



**LINGAYA'S  
UNIVERSITY**

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**SCHEME & SYLLABUS  
ACADEMIC SESSION 2017-18**



# SCHOOL OF ARCHITECTURE

## SCHEME FOR B. ARCH.

B. ARCH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-101	Principles of Architecture - I	2	0	0	2
2	ARC-102	History of Architecture - I	2	0	0	2
3	ARC-103	Building Materials and Processes - I	2	0	0	2
4	ARC-104	Architectural Psychology	2	0	0	2
5	CEA-101	Environmental Science and Ecology	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-155	Basic Design and Visual Arts - I	0	0	6	3
2	ARC-156	Architectural Drawing and Graphics - I	0	0	6	3
3	ARC-157	Building Construction Technology - I	0	0	6	3
4	ARC-158	Model Making Workshop - I	0	0	2	1
5	ARC-159	Computer Applications in Architecture - I	0	0	2	1
6	PD-191A	Hobby Club	0	1	0	1
<b>TOTAL</b>			<b>10</b>	<b>1</b>	<b>22</b>	<b>22</b>

B. ARCH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-110	Principles of Architecture - II	2	0	0	2
2	ARC-111	History of Architecture - II	2	0	0	2
3	ARC-112	Building Materials and Processes - II	2	0	0	2
4	ARC-113	Sociology in Architecture	2	0	0	2
5	CEA-102	Structures in Architecture - I	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-164	Basic Design and Visual Arts - II	0	0	6	3
2	ARC-165	Architectural Drawing and Graphics - II	0	0	6	3
3	ARC-166	Building Construction Technology - II	0	0	6	3
4	ARC-167	Model Making Workshop - II	0	0	4	2
5	ARC-168	Computer Application in Architecture - II	0	0	4	2
<b>TOTAL</b>			<b>10</b>	<b>0</b>	<b>26</b>	<b>23</b>

### SCHEME FOR B. ARCH.

B. ARCH.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-201	History of Architecture-III	2	0	0	2
2	ARC-202	Building Services-I	2	0	0	2
3	ARC-203	Building Sciences	2	0	0	2
4	CEA-103	Structures in Architecture-II	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-255	Architectural Design-I	2	0	6	5
2	ARC-256	Building Material & Construction III	1	0	4	3
3	ARC-257	Computer Applications in Architecture-III	1	0	2	2
4	CEA -260	Surveying	0	0	4	2
5	PD-292	Effective Communication	0	0	2	1
<b>TOTAL</b>			<b>12</b>	<b>0</b>	<b>18</b>	<b>21</b>

B. ARCH.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-210	History of Architecture-IV	2	0	0	2
2	ARC-211	Building Services-II	2	0	0	2
3	ARC-212/ ARC-213 (Elective)	Vernacular Architecture/Energy Efficient Architecture	2	0	0	2
4	CEA -211	Structures in Architecture-III	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-265	Architectural Design-II	1	0	8	5
2	ARC-266	Building Material & Construction -IV	1	0	4	3
3	ARC-267	Measured Drawing	1	0	4	3
4	ARC-268	Computer Applications in Architecture-IV	1	0	2	2
5	PD-293	Intra & Inter-Personal Skills	0	0	2	1
<b>TOTAL</b>			<b>12</b>	<b>0</b>	<b>20</b>	<b>22</b>

## SCHEME FOR B. ARCH.

B. ARCH.			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-301	Principles of Human Settlements I	2	0	0	2
2	ARC-302	Building Services III	2	0	0	2
3	CEA-212	Structures in Architecture - IV	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-354	Site Planning and Landscape Design	2	0	4	4
2	ARC-355	Architectural Design III	2	0	8	6
3	ARC-356	Building Construction and Technology-V	1	0	4	3
		<b>TOTAL</b>	<b>11</b>	<b>0</b>	<b>16</b>	<b>19</b>

B. ARCH.			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-311	Principles of Human Settlements II	2	0	0	2
2	ARC-312	Building Services IV	2	0	0	2
3	ARC-313	Estimation, Costing and Specification	2	0	0	2
4	CEA -311	Structures in Architecture - V	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-365	Architectural Design IV	2	0	8	6
2	ARC-366	Building Construction and Technology-VI	1	0	4	3
3	ARC-367	Working Drawing	1	0	4	3
		<b>TOTAL</b>	<b>12</b>	<b>0</b>	<b>16</b>	<b>20</b>

## SCHEME FOR B. ARCH.

B. ARCH.			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-401	Advanced Services	2	0	0	2
2	ARC-402	Design Research Method	2	0	0	2
3	ARC-403	Interior Design	2	0	0	2
4	ARC-404/ ARC-405 (Elective)	Sustainable Architecture/Urban and Regional Planning	2	0	0	2
5	CEA -312	Structures in Architecture - VI	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-455	Architectural Design V	2	0	10	7
2	ARC-456	Advanced Building Construction & Services	1	0	4	3
3	ARC- 457	Advanced Structural Design and Systems	1	0	4	3
<b>TOTAL</b>			<b>14</b>	<b>0</b>	<b>18</b>	<b>23</b>

B. ARCH.			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-411	Urban design	2	0	0	2
2	ARC-412	Town Planning	2	0	0	2
3	ARC-413 /ARC-414 (Elective)	Architectural Conservation /Intelligent Systems	2	0	0	2
<b>PRACTICAL</b>						
1	ARC-465	Architectural Design VI	2	0	16	10
2	ARC-466	Dissertation-I	2	0	4	4
<b>TOTAL</b>			<b>10</b>	<b>0</b>	<b>20</b>	<b>20</b>

## SCHEME FOR B. ARCH.

B. ARCH.			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-501	Professional Office Training	0	0	24	12
2	ARC-555	Thesis	0	8	0	8
TOTAL			0	8	24	20

B. ARCH.			Semester			X
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ARC-511	Professional Practice	2	0	0	2
2	ARC-512 / ARC-513 /ARC-514 (Elective)	Real Estate Management / Disaster Management / Construction Management	2	0	0	2
PRACTICAL						
1	ARC-565	Thesis	4	0	20	14
2	ARC-566	Dissertation-II	1	0	2	2
TOTAL			9	0	22	20

## SYLLABUS FOR B. ARCH.

Course code	Course title	L	T	P	Credits
ARC -101	PRINCIPLES OF ARCHITECTURE - I	2	0	0	2

### Course Objectives:

- To introduce the student to the world of architecture and establish the key elements involved in the creation of aesthetically appealing and practically appropriate architecture.
- The subject is designed to provide an insight into the principles and processes that underpin the discipline of architecture.
- It is aimed to teach students the key practical and theoretical influences that inform architectural practice enabling students to understand and analyse architecture.

### UNIT-1:

[6]

**INTRODUCTION TO ARCHITECTURE:** Description of architecture; architecture compared to visual and temporal arts; architecture and science and technology; Architecture and social science; the work of an architect compared to that of an artist, technologist and a designer/craftsman, scope of architecture; definition and concepts of architecture.

### UNIT-2:

[4]

**ARCHITECTURE AS AN OCCUPATION:** Types of architectural projects, career opportunities in the field of architecture, role, responsibilities and duties of an architect in a building project.

### UNIT-3:

[10]

#### ELEMENTS OF DESIGN –

**FUNCTIONAL** Study of functional, aesthetic and structural components of architecture: parameters of design; anthropometrics; human activity and the use of spaces; spaces – their relation, interaction and information in a structure.

**AESTHETIC:** Elements and principles of visual composition, forms; functions of spaces and their flexibility; natural forms and shapes and their relation in designing; problems related to the understanding of the elements of architectural design; concepts of space and form and their perception; ordering principles.

**STRUCTURAL:** Elements of structure; elements of construction and their thoughtful use to enhance designs;

### UNIT-4:

[4]

**ANALYSIS OF BUILDINGS:** Analysis of architectural buildings through literature reviews and case studies, based on the functional, aesthetic and structural parameters.

**UNIT-5:****[4]**

**DESIGN PROCESS:** Integration of aesthetics and function; understanding of formative ideas, organization concepts, spatial characteristics; massing and circulation in design analysis

**TEXT BOOKS/REFERENCE BOOKS:**

1. Snyder, J and Catanese, A, "Introduction to Architecture", McGraw-Hill, 1979
2. Farrelly, Lorraine, "The Fundamentals of Architecture", Ava Publishing, 2007
3. Voordt and Wegen, "Architecture in Use", Architectural Press, 2005
4. Smithies, K.W., "Principles of Design in Architecture", Van Nostrand Reinhold Co, 1981
5. Roger H. Clark and Michael Pause, "Precedents in Architecture", Van Nostrand Reinhold Co, 1996

<b>Course outcomes:</b>	
1.	Awareness of basic aspects and expectations of the career as an architect , exact notes and data on role and responsibility
2.	Students know about the initial process of designing , understanding and application of ideas and calculation basics for a design
3.	Selection of various famous buildings with their specific data and complete study for better understanding of pre existing architectural marvels.

Course code	Course title	L	T	P	Credits
ARC-102	HISTORY OF ARCHITECTURE - I	2	0	0	2

**Course Objectives:**

- History of Architecture provides the connection, context, and roots central for the identity of who we were, who we are, and who we might be. Since architecture is a coherent chain of events, styles, tendencies, beliefs and techniques,
- Studying history of architecture enables the student to gain a direct understanding of how and why architecture is made today, and clues to how architecture can be tomorrow.

**UNIT-1:****[4]**

**INTRODUCTION TO ANCIENT WORLD ARCHITECTURE:** Art and culture of pre-historic man; stone henge; a brief outline of the Neolithic revolution and its impact on built



forms– brief study of a few ancient settlements – Jericho, CatalHuyuk, Hassuna, Koln-Lindenthal&Skara Brae.

## **UNIT-2:**

**[4]**

**ART AND ARCHITECTURE OF EGYPT:** Evolution of Egyptian architecture- factors affecting development; spatial planning and characteristic features; tombs- mastabas, pyramids; temples; sphinx, obelisks etc.

## **UNIT-3:**

**[4]**

**ART AND ARCHITECTURE OF MESOPOTAMIA:** Factors affecting the development of art and architecture of Mesopotamia; spatial planning and characteristic features of the architecture of Sumerian, Babylonian, Assyrian and Persian periods; Ziggurats etc

## **UNIT-4:**

**[6]**

**ART AND ARCHITECTURE OF GREECE & ROME:** Evolution of Greek architecture- factors affecting development; characteristic features of Aegean and Helladic architecture; Hellenic and Hellenistic periods; Greek classic orders; agora and other important public buildings/ spaces. Evolution of Roman architecture- factors affecting development; characteristic features Roman classic orders; forums; basilicas; coliseum and other important public buildings/ spaces.

## **UNIT-5:**

**[10]**

**EARLY CHRISTIAN ARCHITECTURE , ROMANESQUE AND GOTHIC ARCHITECTURE:** Factors affecting evolution and development of early Christian and Byzantine, characteristic features basilican church and centralized church typology Factors affecting evolution and development of Romanesque and Gothic architecture, characteristic features and typical examples, spatial planning, construction and other features- rib and panel vaulting etc; church and the precinct, cathedrals, monastic establishments, parish churches; elements of special attributes .English and French church planning; secular architecture- manor houses, castles; town planning principles.

## **TEXT BOOKS/REFERENCE BOOKS:**

1. Cruickshank, D., Fletcher, B., Saint A., “Banister Fletcher's - A History of Architecture”, Architectural Press, 1996.
2. Risebero, Bill, “ The Story of Western Architecture”, MIT Press, 2001
3. Ching Francis D.K., Jarzombek, Mark M., Prakash, Vikramaditya, “A Global History of Architecture”, Wiley, 2006.
4. Hiraskar, G.K., “The Great Ages of World Architecture (with Introduction to Landscape Architecture)”, DhanpatRai Publications (P) Ltd, 2009

## **Course outcomes:**

- |    |   |
|----|---|
| 1. | This central thought of the civilization has permeated the students in various related fields such as religion, arts, science, literature, social and economic setup, which in turn were instrumental to the evolution of architecture specific to the area |
|----|---|

2.	Prehistoric age and Early Civilizations, attempts at sensitizing the students to view architecture as one of the many products of the civilization.
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Course code	Course title	L	T	P	Credits
ARC-103	BUILDING MATERIALS AND PROCESSES-I	2	0	0	2

Course Objectives:

- The course is designed to expose the students to both vernacular and contemporary construction methods and materials, their properties, testing and uses.

**UNIT-1:**

[6]

**SOILS , CLAY AND CLAY MATERIALS :** Formation–index property, specific gravity, grain size distribution, plasticity, characteristics and phase relationship, identification and local names; ISI classification; sources and uses of sand; fineness modulus; Bricks, terracotta, tiles etc; Bricks: types of bricks; study of properties of constituent components, manufacturing process, quality test of bricks.

**UNIT-2:**

[6]

**RURAL AND TRADITIONAL MATERIALS (Mud & Stone):** Mud: mud as a building material; soil stabilization: need for soil stabilization, stabilized soil blocks; rural materials: bamboo, casuarina, coconut, palm, hay, coir – properties and uses; fire retardant treatment and insect proofing; Types of stones; study of properties of constituent components; methods of quarrying of stones; properties and uses of principal building stones.

**UNIT-3:**

[6]

**TIMBER:** Study of properties of timber, uses, seasoning process, quality tests; types of timber and defects in timber; protection from termites; techniques of preserving and finishing of timber; plywood, particle boards, block boards, PVC, laminates etc.

**UNIT-4:**

[6]

**LIME, CEMENT AND CEMENT PRODUCTS:** Lime: fat and hydraulic lime, their uses and properties; manufacture of lime; preparation of lime mortar; functions and requirements of a good mortar; mix properties for various works; Concrete: study of properties of constituent components, manufacturing process, quality tests of cement, lime, sand, aggregates, concrete and mortar.

**UNIT-5:****[4]**

**METALS:** Study of properties of constituent components, manufacturing process, quality test of ferrous and non-ferrous metals (lead, copper, zinc, tin, Al & Steel); weathering effects on such metals, preventive measures. Usage in building Industry.

**REFERENCE BOOKS**

1. Farrelly, Lorraine, "Basic Architecture 02: Construction + Materiality", Ava Publishing, 2008.
2. Watson, Donald, "Time-saver Standards for Building Materials and Systems", Tata McGraw Hill, 2010.

Course code	Course title	L	T	P	Credits
ARC-104	ARCHITECTURAL PSYCHOLOGY	2	0	0	2

**Course Objectives:**

- This course is aimed at helping the student understand the built environment by providing a look at architecture within the framework of human sciences:
- Human psychology and society influence and inform architecture and how in turn architecture affects our lives.
- Students develop critical observation skills and investigate buildings as manifestations of religious, social, and personal values.

**UNIT-1:****[8]**

**ENVIRONMENTAL PSYCHOLOGY & PERCEPTION:** Relation to architecture and planning; meaning of environment; measurement of environmental stimuli from psychological aspect; behavioral effects of environmental conditions: physical - noise, temperature and air pollution; social- overcrowding and isolation; extra ordinary- catastrophe. spatial perception: perception of distance, size and movement; meaning of colour and form; depth perception; visual illusions in architecture; spatial thinking- social and cultural influences on environmental perception.

**UNIT-2:****[6]**

**TERRITORIAL BEHAVIOUR AND PERSONAL SPACE:** Concept of personal space and territoriality, individual and situational as determinants of personal space; consequences of too much or too little of personal space; personal space and environmental space as implications for design aspects; adaptation to environment - behavioral aspects of adaptation to familiar and unfamiliar environment; spatial experience; living requirements and satisfaction, etc.

**UNIT-3:****[6]**

**ARCHITECTURAL PSYCHOLOGY & PSYCHOLOGICAL AESTHETICS:** Psychological effects of various architectural means: line, form, space,

textures, colour, light, scale etc; case studies. Measurement of communication through art and architecture; signs and symbols in architecture; determination of pleasantness and unpleasantness as psychological factors in environmental design.

#### UNIT-4:

[6]

**ENVIRONMENTAL SETTINGS:** Nature and effects of home, work, educational or institutional (e.g. nursing home, hospital, prison, etc.) environments as they affect human health and cognitive functioning; restorative effects of natural environments

#### UNIT-5:

[2]

**LOCAL IDENTITY:** Concept of local identity, globalization and identity, maintaining a distinct identity in a globalised world etc.

Course outcomes:	
1.	Detail study of spaces, behavior, environmental aspects etc
2.	Understanding of environmental settings and its impacts on human health, functioning and restorative effects.
3.	Theory and understanding on local identity , globalization in architectural terms.

**TEXT BOOK:** Parmar, V. S., “Design Fundamentals in Architecture”, Somaiya Publications Pvt. Ltd., 1973.

#### REFERENCE BOOKS

1. Bell, P.A., Greene, T.C., Fisher, J.D., & Baum, A. “Environmental Psychology”, 5th edition, Harcourt, Inc.: Fort Worth, TX, 2001.
2. Gallagher, W., “The Power of Place”, Harper Perennial, New York, 1994.
3. Rapoport, Amos, “House Form and Culture”, Prentice Hall, 1969.
4. Broadbent, Geoffrey. “Design in Architecture: Architecture and the Human Sciences”, John Wiley and Sons, 1973.

Course code	Course title	L	T	P	Credits
CEA 101	ENVIRONMENTAL SCIENCE AND ECOLOGY	2	0	0	2

#### Course Objectives:

- Environmental Studies is a multidisciplinary area, the issues of which everyone should know.
- The aim of the course is to make everyone aware of environmental issues like continuing problems of pollution, loss of forest, solid waste disposal, and degradation of environment. Issues like economic productivity and national security, global warming, the depletion of ozone layer and loss of biodiversity are other serious concerns before mankind.

## **UNIT-1:**

[6]

**ENVIRONMENTAL STUDIES & ECOSYSTEMS:**Basic definitions related to environment; scope, vis-à-vis environmental science and environmental engineering; causes of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principles involved in environmental education, environmental awareness, environmental ethics, environmental organization and their involvement. Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem - forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

## **UNIT-2:**

[6]

**NATURAL RESOURCES:**Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification

## **UNIT-3:**

**[4]BIODIVERSITY AND ITS CONSERVATION:**Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

## **UNIT-4:**

[6]

**ENVIRONMENTAL POLLUTION& SOCIAL ISSUES:**Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, solid waste management, e-waste management; disaster management – floods, earthquake, cyclone and landslides. Water conservation, rain water harvesting, watershed management; climate change, global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

## **UNIT-5:**

[6]

**HUMAN POPULATION AND THE ENVIRONMENT:**Population growth, population explosion – family welfare programmes ; role of information technology in environment and human health; case studies, Chipko movement, SaradarSarovar dam, mining and quarrying in Udaipur, salinity and water logging in Punjab, Haryana and Rajasthan, Bhopal gas tragedy, Chernobyl nuclear disaster, arsenic pollution in ground water

## **TEXT BOOKS/REFERENCE BOOKS:**

1. Agarwal, K. C., “Environmental Biology”, Nidi Publ. Ltd., 2001
2. Brunner R. C., “Hazardous Waste Incineration”, McGraw Hill, 1989.

3. Cunningham, W.P., Cooper, T.H. Gorhani, E. and Hepworth, M.T., “Environmental Encyclopedia”, Jaico Publ. House, 2001.
4. Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, New Age International Publishers, 2004

<b>Course outcomes:</b>	
1.	Modern Science of Climatology in the context of climate and weather as determinants of Design and Form of Habitat and Landscape throughout the ages at the Macro and Micro levels.
2.	Students have knowledge and application to building design as per the environment.
3.	Detail knowledge on environmental pollution types, causes and various measures to prevent them.

Course code	Course title	L	T	P	Credits
ARC-155	BASIC DESIGN & VISUAL ARTS - I	0	0	6	3

Course Objectives:
➤ The course Basic design is aimed at imparting a good base in design through thoughtful designing of simple two dimensional and three dimensional compositions. Also, the Visual Arts component intends to acquaint the students with various drawing principles and artistic techniques; how to sketch and draw at all stages of the design process.

## **COURSE CONTENT:-**

**[70]**

### **PART-I: BASIC DESIGN**

1. To study the elements of visual composition.
2. To study the principles of visual composition.
3. To study the Ordering principles.
4. To study the colour wheel, colour schemes and its application on architectural forms and spaces; principles of harmony and contrast and degree of chromatism.
5. To study textures and textures schemes.
6. To study and demonstrate the application of basic design in architecture: Adopt compositions, murals and sculptures for semi recreational and semi functional architectural spaces.

### **PART-II: VISUAL ARTS**

1. To study the basic elements of free hand sketching.
2. To learn the various sketching techniques and mediums in pencil and ink.
3. To learn how to build a sketch - composing a view, establishing structure, scale, layering tonal values, adding details; achieving spatial depth in drawings; sighting techniques.
4. Free hand Sketching of furniture pieces, parts of building in relation with human scale and proportions.
5. Free hand Sketching of architectural elements and landscapes.

**TEXT BOOKS/REFERENCE BOOKS:**

- 1.Ching, Francis D. K., "Architecture: Form, Space, and Order", Wiley and Sons, 2007.
- 2.Wallschlaeger, C and Snyder, S.B., "Basic Visual Concepts and Principles for Artists, Architects and Designers", McGraw Hill, 1992.
- 3.Laseau, P, "Graphic Thinking For Architects and Designers", John Wiley and Sons, 2001
- 4.Ching, Francis D. K., "Drawing: A Creative Process", Wiley and Sons,1989
- 5.Farrelly Lorraine, "Basic Architecture 01: Representational Techniques", Ava Publishing, 2008.
- 6.Evans, Ray, "Drawing and Painting Architecture", Van Nostrand Reinhold Company, 1983.

<b>Course outcomes:</b>	
1.	The most initial stage of designing this exercise teach compositions, colors contrast and various design elements and other fundamentals of designing.
2.	Application of design principles in two dimensional and three dimensional compositions.

Course code	Course title	L	T	P	Credits
ARC-156	ARCHITECTURAL DRAWING & GRAPHICS - I	0	0	6	3

**Course Objectives:**

- Architectural drawing and graphics is the primary medium for development and communicating design concepts.
- The students are trained to develop imaginative and three dimensional spatial capabilities and acquire the skill of reading plans, sections and elevations and understanding the the drawing conventions and symbols used in them

**COURSE CONTENT:-****[70]**

1. To understand and learn about the various drafting tools required in architectural drafting - pencils, grades of graphite leads, technical pens etc.
2. To study the various drafting techniques, line quality etc.
3. To learn about the drafting procedure and exercises on architectural letterings.
4. To construct architectural scales and apply them to real object and drawings (Plain scale, diagonal scale, comparative scales).
5. To introduce the principles of orthographic projections and prepare drawings on orthographic projection of simple regular two dimension shapes.
6. To prepare drawings on orthographic projection of complex solids, hollow object and sections.
7. To study the principles and techniques of axonometric, oblique and isometric views and construct three dimensional views of basic and complex geometrical shapes.
8. To study the interpenetration of solids.
9. To study the development of surfaces.

10. To study the sections of solids.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Bhatt, N.D., "Engineering Drawing: Plane and Solid Geometry", Charotar Publishing House,
2. Leslie, Martin C., "Architectural Graphics", Macmillan Pub Co, 1970.
3. Parkinson, A.C., "A First Year Engg. Drawing", Sir Issac Pitman and Sons.
4. Black, Earl D., "Engineering and Technical Drawing", Van Nostrand Reinhold Co., 1972.
5. Ching, Francis D. K., "Architectural Graphics", Van Nostrand Reinhold, 2003.

**Course outcomes:**

- |    |   |
|----|---|
| 1. | Students shall be familiarized with a range of techniques of expression beginning with manual drawing |
|----|---|

Course code	Course title	L	T	P	Credits
ARC-157	BUILDING CONSTRUCTION TECHNOLOGY -I	0	0	6	3

**Course Objectives:**

- To give an introduction to building elements and expose the student to the process of building construction

**COURSE CONTENT:-**

**[70]**

1. To introduce the various terminologies used in brick masonry works.
2. To study and prepare drawings of bonds in brick masonry; bonds in columns, corners and junctions, jointing and pointing; buttresses; sills; jambs; corbels; copings;
3. To study and prepare drawings of cavity walls and reinforced brickwork.
4. To study the various tools used in brick masonry works
5. To study the defects in brick masonry: cracking in brick walls etc; supervising brick masonry works.
6. To study and prepare drawings on various stone masonry works: Rubble masonry, Ashlar masonry etc.
7. To study the type of walling and joints, dressing of stone surfaces; coping; supervising stone masonry works.
8. To study various types of composite masonry.
9. To demonstrate various quality test of bricks, stones and timber.
10. To study and prepare drawings on simple foundation for masonry load bearing walls and piers.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Rangwala, S. C., "Engineering Materials (Material Science)", Charotar Publishing House, 2007.
2. Rangwala, S. C., "Building Construction", Charotar Publishing House, 2007
3. McKay, W.B., "Building Construction Volume I, II, III and IV", Longmans, 1955



4.Ching, Francis D. K. and Adams, Cassandra, “Building Construction Illustrated”, Wiley and Sons,

5.Barry, R, “The Construction of Buildings”, the English Language Book Society and Crosby Lockwood, 1976

6.Chudley, Roy, “Construction Technology”, Longman, 2005

Course outcomes:	
1.	Students explore the process of building construction, the components of buildings and the materials, skill and equipment used in shaping them.
2.	Introduction to building construction. Walls, brick works and joints and composite masonry are covered

Course code	Course title	L	T	P	Credits
ARC-158	MODEL MAKING WORKSHOP - I	0	0	2	1

Course Objectives:
➤ Modeling allows an architect to explore an idea in a three dimensional form, allowing communication of the idea in an accessible way.

#### COURSE CONTENT:-

[42]

1. To introduce the carpentry tools, processes, joints and wood working machines.
2. To prepare simple three dimensional objects like cubes pyramids etc.
3. To create complex three dimensional forms for models using carpentry methods.
4. To demonstrate the use of carpentry tools in making joints such as dovetail joint, mortise and tenon joint, lap joint, butt joint etc to be used for making furniture.
5. To demonstrate fixing of plywood, blockboards, commercial boards etc.
6. To study the application of plywood, blockboards, commercial boards etc. in furniture.
7. To introduce the various welding equipments, processes and its applications.
8. To introduce to metallic sections, joinery tools, joinery processes and working with them.
9. To prepare joints (Lap and butt) by metal arc welding.
10. To learn and use various painting methods-brush, spray, hot spray etc.

#### TEXT BOOKS/REFERENCE BOOKS:

1. Raghuwanshi, B.S., “A Course in Workshop Technology - Vol. I and II”, DhanpatRai and Co, 2001.

2. Hazra and Chaudhary, “Workshop Technology - Vol. I and II”, Asian Book Comp, 1998.

Course outcomes:	
1.	Along with introduction to carpentry tools, fixing, and preparation of joints in detail and understanding.

Course code	Course title	L	T	P	Credits
ARC-159	COMPUTER APPLICATIONS IN ARCHITECTURE - I	0	0	2	1

Course Objectives:

- This course will enable the students to understand the basics of computer and to know the basics of MSOffice, enabling the student prepare simple and interactive presentations using computers.

**COURSE CONTENT:-**

**[42]**

1. To introduce and study about the basics of computer hardware and software components; computer terminology.
2. To introduce and study about windows and its applications.
3. To learn the concepts of Internet, server types, connectivity; applications of internet-using e-mail, browsing etc.
4. To understand the concepts of e-commerce.
5. To study in detail Microsoft Word; To Create a document with all formatting effects.
6. Exercises on document preparation using MS Word
7. Create a document with tables, labels in MS word and to create a document to send mails using mail merge option.
8. To learn about the concept of spreadsheet/ worksheets, charts, formulas, functions etc using MS Excel.
9. To Create an Excel File to analyze the student’s performance. Create a chart for the above data to depict it diagrammatically.
10. Create Excel sheet to use built-in-function.
11. To prepare slide shows and presentations using MS PowerPoint;
12. To create architectural presentations using computers: communicating information, presentation sequence, symbols, lettering and presentation formats etc.
13. To Create a Power Point presentation with varying animation effects with timer.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Wallace, Wang, “Office 2010 for Dummies”, Wiley, 2010
2. Rajaraman, V., “Fundamentals of Computer”, Prentice Hall, 2004
3. Icon, Alexis and Leon, Mathew, “Internet for Everyone” Leon Techworld, 1997

4. Press, Barry and Press, Marcia, "Teach Yourself all about Computers", IDG Books India, 20
5. Mansfield, R., "The Compact Guide to Microsoft Office", BPB Publishers, 1994

**Course outcomes:**

1.	Introduction to basic software and hardware, and detail understanding of Microsoft power point presentations
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**Bachelor in Architecture**

**B.Arch (IIInd SEMESTER)**

Course code	Course title	L	T	P	Credits
ARC-110	PRINCIPLES OF ARCHITECTURE-II	2	0	0	2

**Course Objectives:**

- To introduce the student to the world of architecture and establish the key elements involved in the creation of aesthetically appealing and practically appropriate architecture.
- The subject is designed to provide an insight into the principles and processes that underpin the discipline of architecture.
- It is aimed to teach students the key practical and theoretical influences that inform architectural practice enabling students to understand and analyze architecture.

**UNIT-1:**

[6]

**FACTORS INFLUENCING ARCHITECTURE:** Climate, topography, materials, economics, socio-cultural and technological influences etc

**UNIT-2:**

[4]

**ARCHITECTS & THEIR THEORIES ON ARCHITECTURE THROUGH THE AGES:**

Brief introduction to the styles propagated by architects from antiquity to modernism. Philosophy of architecture as propagated by some leading architects; study of selected writings and buildings.

**UNIT-3:**

[6]

**ARCHITECTURE CRITICISM:** Introduction and need for architecture criticism in the academy of architects; criticism in day - to - day transaction, architecture criticism a societal perspective; types and characteristics, crux of normative criticism, interpretive criticism, description criticism, peer criticism.

**UNIT-4:**

[4]

**VERNACULAR AND RURAL ARCHITECTURE:** Introduction to vernacular and rural architecture and its characteristics; rural environment and its architectural considerations; study of exemplary cases.

## UNIT-5:

[8]

**CASE STUDIES & ANALYSIS OF BUILDINGS:** Case studies of some old and new classical architectural projects from India and abroad with special focus on the above mentioned points. Analysis of architectural projects of various scales and types based on the above mentioned points.

### TEXT BOOKS/REFERENCE BOOKS:

1. Snyder, J and Catanese, A, "Introduction to Architecture", McGraw-Hill, 1979
2. Farrelly, Lorraine, "The Fundamentals of Architecture", Ava Publishing, 2007
3. Voordt and Wegen, "Architecture in Use", Architectural Press, 2005
4. Smithies, K.W., "Principles of Design in Architecture", Van Nostrand Reinhold Co, 1981
5. Roger H. Clark and Michael Pause, "Precedents in Architecture", Van Nostrand Reinhold Co, 1996
6. Pevsner Nikolaus, "Canons of Criticism", Penguin, Harmondsworth, 1971

#### Course outcomes:

1.	This principal of architecture curriculum along with introduction to factors influencing will provide detail on vernacular, rural, and lastly a case study which covers the related issues.
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Course code	Course title	L	T	P	Credits
ARC-111	HISTORY OF ARCHITECTURE-II	2	0	0	2

#### Course Objectives:

- History of Architecture provides the connection, context, and roots central for the identity of who we were, who we are, and who we might be. Since architecture is a coherent chain of events, styles, tendencies, beliefs and techniques,
- Studying history of architecture enables the student to gain a direct understanding of how and why architecture is made today, and clues to how architecture can be tomorrow.

## UNIT-1:

[4]

**ANCIENT ARCHITECTURE:** Early Indian architecture up to 3rd century A.D; Indus valley civilization; study of Mohenjodaro and Harappan architecture and planning; Vedic architecture of India; Vastupurush mandala and other canons of Hindu architecture.

## UNIT-2:

[8]

**INDIAN TEMPLE ARCHITECTURE & INDO-ARYAN TEMPLE ARCHITECTURE:** Temples: spatial arrangements, construction, ornamentation; elements of special attributes: columns, shikharas; temple complex etc Characteristic features and typical examples of Indo-Aryan temple architecture- temples of Orissa, Kashmir, M.P, Gujarat.

**UNIT-3:** [6]  
**CENTRAL HINDU TEMPLE ARCHITECTURE & DRAVIDIAN ARCHITECTURE:** Early chalukyan architecture, the Rashtrakuta style and the Hoysala architecture – salient features and typical examples. Characteristic features and typical examples of Pallava, Pandava, Chola, Vijayanagar and Madura styles.

**UNIT-4:** [6]  
**BUDDHIST ARCHITECTURE IN INDIA:** Development and characteristic features; stupas; Buddhist order- Ashoka pillars; Chaityas; rock cut architecture; Viharas etc.

**UNIT-5:** [4]  
**JAIN ARCHITECTURE IN INDIA:** Development and characteristic features; Jain temple architecture etc.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Grover, S. K., “Buddhist and Hindu Architecture in India”, CBS, 2008.
2. Thapar, B., “Introduction to Indian Architecture”, Periplus Editions, 2005.
3. Surendra S., Indian Architecture: Hindu, Buddhist and Jain” Ajanta Offset and Packaging Ltd.,
4. Maheshwari and Garg, “Ancient Indian Architecture”, CBS, 2003.

Course outcomes:	
1.	Ancient architecture, focusing on Indian architecture it covers in depth of Hindu, Buddhist and Jain architecture
2.	The emphasis of the discussions is on the nature and essence of the architectural product, related as far as possible to history of the process of their conceptualization, and process of construction. Use of the concepts of Style/ Typology/Morphology in histories of architecture

Course code	Course title	L	T	P	Credits
ARC-112	BUILDING MATERIALS AND PROCESSES-II	2	0	0	2

**Course Objectives:**

- The course is designed to expose the students to both vernacular and contemporary construction methods and materials, their properties, testing and uses

**UNIT-1:** [4]  
**GLASS:** Types of glass (plate, tinted, heat absorbing etc); structural glass bricks and glasscrete; fiber glass and glass wool etc; properties, varieties and uses.

**UNIT-2:** [6]  
**PLASTICS:** Properties, varieties and uses of plastics in the building industry; Thermoplastics and thermosetting plastics: properties and architectural uses of plastics; structural plastics;

Reinforced plastics and decorative laminates-plastic coatings, adhesives and sealants; modifiers and plasticizers; fabrications of plastics; primary plastic building products for walls, roof and partitions. Secondary building products for rooms, windows, roof lights, domes, gutters and handrails.

**UNIT-3: [4]**

**PAINTS, VARNISHES AND DISTEMPERS:** Constituents of oil paint, characteristics of a good paint; types of paint; process of painting different surfaces; types of varnish; methods of applying varnish; French polish; dry distemper; oil bound distemper; wax polishing, putty.

**UNIT-4: [6]**

**MATERIALS FOR FLOORING AND ROOFING :** Different flooring & paving materials and types that are cast-in-situ viz. Mud flooring, Brick flooring, Indian Patent Stone finish, Terrazzo flooring, red oxide flooring etc. and readymade tiles available in market viz. natural stone tiles / slabs, plain & mosaic cement tiles / blocks, ceramic tiles, vitrified tiles and other modern materials, including the process of providing or laying the flooring or pavement; floor finishes of various materials viz. carpet, linoleum, rubber, PVC etc. : Roofing of Mangalore tile, pan tiles, slate, corrugated asbestos sheet etc.

**UNIT-5: [8]**

**DAMP PROOFING, WATER PROOFING AND MISCELLANEOUS:** Hot applied and cold applied; emulsified asphalt, bentonite clay, butyl rubber, silicones, vinyls, epoxy resins and metallic water proofing materials, their properties and uses; water proofing membranes such as rag, asbestos, glass felt, plastic and synthetic rubber- vinyl, butyl rubber, neoprene, polyvinyl chloride; prefabricated membranes sheet lead, asphalt their properties and uses. Anti termite treatment to foundations, masonry and wood work; sound insulating materials- gypsum; recent advances in building materials.

**Note:** Assignments could be in the form of market surveys for building materials and study of latest building materials in the building construction industry. Students are also required to do case studies of architectural and interior projects where the above-mentioned materials have been innovatively used.

**TEXT BOOK**

Rangwala, S. C., “Engineering Materials (Material Science)”, Charotar Publishing House, 2007.

**REFERENCE BOOKS**

1. Farrelly, Lorraine, “Basic Architecture 02: Construction + Materiality”, Ava Publishing, 2008
2. Watson, Donald, “Time-saver Standards for Building Materials and Systems”, Tata McGraw Hill, 2010.

Course code	Course title	L	T	P	Credits
ARC-113	SOCIOLOGY IN ARCHITECTURE	2	0	0	2

Course Objectives:

- To examines how architectural forms both influence and react to socio-cultural phenomena.
- To inform architecture students in all phases of the design process, including the pre-design and programming, design, construction, and post-construction phases.

**UNIT-1:** [4]  
**INTRODUCTION TO SOCIOLOGY:** Man and his social and physical environment; social groups and social structure; utility and relation with architecture;

**UNIT-2:** [6]  
**CULTURE ,SOCIETY& INDIAN COMMUNITIES:** Meaning of culture and society, influence of socio-cultural patterns on architecture, case studies. Rural and urban communities; their social structures and problems; cultural heritage; rituals and community gathering etc.

**UNIT-3:** [8]  
**URBANIZATION & COMPARISON OF URBANIZATION:** Trend and characteristics; dynamics of urban growth and social change; urban attitude, value and behavior; patterns of urbanization in India; migration studies; problems arising out of urbanization etc. Comparison of urbanization in underdeveloped countries with that in the west – salient features and characteristics

**UNIT-4:** [4]  
**SOCIAL ASPECT OF PHYSICAL ENVIRONMENT:** Its implications and limitations in buildings; neighborhood planning; slum improvements and city fabric.

**UNIT-5:** [4]  
**COMMUNITY PARTICIPATION:** Significance of public opinion and participation

**Note:** Assignments would be in the form of case studies comprising the sociological study of communities with their habitat and built environment

#### TEXT BOOK

Madan, G. R., “Indian Social Problems: Vol - 1 and 2”, Allied Publishers Pvt Ltd, 2003.

#### REFERENCE BOOKS

1. Rapoport, Amos, “House Form and Culture”, Prentice Hall, 1969
2. Broadbent, Geoffrey. “Design in Architecture: Architecture and the Human Sciences”, John Wiley and Sons, 1973
3. PrakasaRao, VLS, “Urbanisation in India”, Concept Publishing Company, New Delhi, 1983.
4. Desai A.R., “Rural Sociology”, Popular Prakashan, Bombay, 1984.
5. Smelsa, “Sociology”, Prentice Hall, New Jersey, 1981.

Course outcomes:	
1.	Students familiarize with basic concepts/ theories of sociology/ psychology as relevant to architecture.
2.	Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture

Course code	Course title	L	T	P	Credits
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CEA-102	STRUCTURES IN ARCHITECTURE - I	2	0	0	2
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#### Course Objectives:

- To introduce the basic concept of structures and enable the students to analyse, understand the fundamentals and working of various parts of different structural systems

#### UNIT-1:

[8]

**ELEMENTS OF STATICS:** Law of Parallelogram of Forces, Resolution of Forces, Law of Triangular of forces, Polygon of forces, Theorem of Resolved parts, Resultant of a Number of Concurrent Coplanar forces, Moment of a Force.

#### UNIT-2:

[8]

**SIMPLE STRESSES AND STRAINS:** Elasticity, Stress, Strain, Types of Stresses, Elastic Limit, Hooke's Law, Modulus of Elasticity, Stresses in Composite Bars, Primary or Linear Strain, Poisson's ratio, Shear Stress, Principal stresses and strains

#### UNIT-3:

[4]

**SHEAR FORCE AND BENDING MOMENT:** Beams, Shear Force and Bending Moment, Moment of Resistance, SF and BM diagrams for simple cases

#### UNIT-4:

[4]

**CENTER OF GRAVITY AND MOMENT OF INERTIA:** Definitions, Methods of Finding CoG of Simple Figures, Center of Parallel Forces, Important Theorems, Section Modulus, Calculation of MI by first Principal and its application, MI of composite sections

#### UNIT-5:

[4]

**TYPES OF LOADS:** Concepts and definitions of dead load, imposed load, seismic load, wind load and snow load as per IS 875-1987 (Part I-V) and IS 1893-2002

#### TEXT BOOKS/REFERENCE BOOKS:

1. Engineering Mechanics and Strength of Materials; R.K. Bansal
2. Strength of Materials; R.S. Khurmi
3. Applied Mechanics and Strength of Materials; R.S. Khurmi
4. Civil Engineering Handbook; P.N. Khanna

#### Course outcomes:

- |    |  |
|----|--|
| 1. | This course is to provide the students with basic concept of mathematical principles, leading to primarily an easy understanding of various topics under "STRUCTURE" |
| 2. | The course also provides basic clues to mathematical models and research techniques in   |



	the field of architecture.
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Course code	Course title	L	T	P	Credits
ARC-164	BASIC DESIGN AND VISUAL ARTS - II	0	0	6	3

#### Course Objectives:

- The course Basic design is aimed at imparting a good base in design through thoughtful designing of simple two dimensional and three dimensional compositions.
- Visual Arts component intends to acquaint the students with various drawing principles and artistic techniques; how to sketch and draw at all stages of the design process

#### COURSE CONTENT:-

[70]

#### PART-I: BASIC DESIGN

1. To study various linear forms for outdoor and indoor architectural spaces.
2. To study planer forms and explore the adoptability of these sculptures to architectural functions.
3. To Study solids and voids: creation of abstract and semi abstract symbolic sculptural forms and spaces.
4. To study the Transformation of forms - dimensional transformation, subtractive, additive forms, organization of additive forms.
5. To study the Articulation of forms- analytical study of the sculptural building forms and its critical appraisal of visual character.
6. To study architectural spaces: Elements defining spaces; factors affecting qualities of architectural spaces; spatial relationships and spatial organizations; movement through space.
7. To study and demonstrate the application of basic design in architecture: Adopt compositions, murals and sculptures for semi recreational and semi functional architectural spaces.

#### SUGGESTED STUDIO EXERCISES:

Integration of construction and building material

Gate design, Bus stop, Kiosk, Mother dairy, Guard room, ATM room, Exhibition stalls, Milk booths.

#### PART-II: VISUAL ARTS

1. To study the effects and techniques of creating tonal values – hatching, cross hatching, scribbling, stippling; visual texture and grain.
2. To study the interaction of light with objects and surfaces; shade and shadows; modeling form.
3. To demonstrate the use of tonal values in architectural drawings.

4. To understand the application of free hand sketching in the design process: conceptual sketches, analytical sketches, observational sketches, contour drawings; parti diagrams; serial views; travel sketching; diagramming.
5. To study the importance of context in architectural drawings: importance of context in views and drawings; elements of context – drawing human figures; furniture and furnishings; vehicles; landscape elements.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Ching, Francis D. K., “Architecture: Form, Space, and Order”, Wiley and Sons, 2007.
2. Wallschlaeger, C and Snyder, S.B., “Basic Visual Concepts and Principles for Artists, Architects and Designers”, McGraw Hill, 1992.
3. Laseau, P, “Graphic Thinking For Architects and Designers”, John Wiley and Sons, 2001
4. Ching, Francis D. K., “Drawing: A Creative Process”, Wiley and Sons, 1989
5. FarrellyLorraine, “Basic Architecture 01: Representational Techniques”, Ava Publishing,
6. Ching, Francis D. K., “Architectural Graphics”, Van Nostrand Reinhold, 2003

<b>Course outcomes:</b>	
1.	Students develop analytical and critical skills for looking at art and architecture.
2.	Students know the fundamental principles of architecture and architectural design,
3.	Understanding of Ideas, Concept, Form, Function and Meaning with respect to architecture

Course code	Course title	L	T	P	Credits
ARC-165	ARCHITECTURAL DRAWING & GRAPHICS -II	0	0	6	3

**Course Objectives:**

- Architectural drawing and graphics is the primary medium for development and communicating design concepts.
- Through this course the students are trained to develop imaginative and three dimensional spatial capabilities and acquire the skill of reading plans, sections and elevations .
- Understanding the drawing conventions and symbols used in them.

**COURSE CONTENT:-**

**[70]**

1. To study the basic terms, principles, types and techniques of geometrical perspective drawing; linear perspectives: one, two and three point perspective.
2. To prepare perspective by measuring point method, angular and parallel perspective.
3. To prepare drawings on the presentation of interior and exterior views in one point perspective and section perspectives.

4. To prepare drawings using two point perspectives for simple objects, inclined planes, cylindrical objects, arches and other circular forms etc.
5. To introduce the basic principles of sciography and its application to the field of architecture.
6. To prepare drawings demonstrating sciography of two dimensional objects in plan and elevation.
7. To prepare drawings demonstrating sciography of three dimensional objects in plan, elevation and views (Isometric and perspective).
8. To study the various graphics codes and symbols used in architectural drawings: graphic conventions for scale, orientation, materials, line thicknesses and line types, symbols representing doors and windows, staircases, centerlines, property lines etc.
9. To study the different types of plans used in architectural drawings: site plan, location plan, floor plans, roof/ terrace plan, reflected ceiling plan; sections - design and construction; elevations.
10. To introduce the various types of architectural drawings – feasibility study drawings; conceptual drawings; presentation drawings; working drawings; specialized drawings.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Gill, Robert W., “Basic Perspective”, Thames and Hudson, 1974
2. Malik, Shankar, “Perspective and Sciography”, Allied Publishers, 1994
3. Leslie, Martin C., “Architectural Graphics”, Macmillan Pub Co, 1970
4. Ching, Francis D. K., “Architectural Graphics”, Van Nostrand Reinhold, 2003

<b>Course outcomes:</b>	
1.	Students can learn the Graphic representation of concepts and design principles of two dimensional and three dimensional composition.
2.	Learning principles of development of lateral surfaces of solids, applying them to work out and drawing developed surfaces of simple geometric solids

Course code	Course title	L	T	P	Credits
ARC-166	BUILDING CONSTRUCTION TECHNOLOGY - II	0	0	6	3

**Course Objectives:**

- To give an introduction to building elements and expose the student to the process of building construction.

**COURSE CONTENT:-**

**[70]**

1. To study and prepare drawings on various types of joinery used in carpentry.
2. To study various types of wooden doors: ledged, braced and battened, paneled, glazed, flush, sliding doors, revolving; doors with and without fanlight etc;
3. To study various types of wooden windows: fixed, side and top hung, casement, pivoted, louvered, bay, dormer, ventilators and fanlights etc.
4. To study and prepare drawings of the various types of metal (pressed steel and z-section) doors and windows.

5. To study methods of mosquito proofing of doors and windows.
6. To study and prepare drawings of the various fixtures and fastenings commonly used in doors and windows.
7. To introduce the various terminology of arches.
8. To prepare drawings on the various type of arches.
9. To study the procedure of centering of arches.
10. To study and prepare drawings on the types of lintels and sunshades.

**Note:** Sessional will be in the form of reports, drawings and models. There shall be regular visits to construction sites.

**TEXT BOOKS/REFERENCE BOOKS:**

1. McKay, W.B., "Building Construction Volume I, II, III and IV", Longmans, 1955
2. Ching, Francis D. K. and Adams, Cassandra, "Building Construction Illustrated", Wiley and Sons, 2000
3. Barry, R, "The Construction of Buildings", The English Language Book Society and Crosby Lockwood, 1976
4. Chudley, Roy, "Construction Technology", Longman, 2005
5. Arora, S.P. and Bindra, S.P., "The Text book of Building Construction", Dhanpat Rai Publications, 2009.

<b>Course outcomes:</b>	
1.	Awareness about the role of Wood in Building Industry.
2.	Know about different typology of Doors , Windows and their fixing Details

Course code	Course title	L	T	P	Credits
ARC-167	MODEL MAKING WORKSHOP - II	0	0	3	2

Course Objectives:
➤ Modeling allows an architect to explore an idea in a three dimensional form, allowing communication of the idea in an accessible way.

**COURSE CONTENT:-**

**[42]**

1. To introduce the various materials used in architectural model making.
2. To introduce the various techniques of model making.
3. To model with paper, card board, mount board, thermocol, styrofoam, softwood, acrylic sheets and wire.
4. To study the development of simple and composite form, experiments on three dimensional forms such as cubes, pyramids, tetrahedron and forms to understand the spaces conceived by them.
5. To create organic forms by using clay, plaster of paris, metal scrap, jute fiber etc. for study of forms.
6. To study about murals.

7. To introduce and make various types of architectural models – concept models; development models etc.
8. To introduce the concept of illuminated models.
9. To work on sectional models.
10. To study and make presentation models using various materials etc.

**Note:** Students are required to prepare block models of groups of buildings including roads and landscaped open spaces and detailed models of buildings from given set of drawings.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Morris, M., “Architecture and the Miniature: Models”, John Wiley and Sons, 2000
2. Sutherland, Martha, “ Model Making: A Basic Guide”, W.W. Norton and Co, 1999
3. Mills, Criss B., “Designing with Models : A Studio Guide to Making and Using Architectural Models”, Thomson and Wadsworth, 2000

<b>Course outcomes:</b>	
1.	Basic skills for preparing architectural models and art project while in calculating value for good craftsmanship.

Course code	Course title	L	T	P	Credits
ARC-168	COMPUTER APPLICATION IN ARCHITECTURE- II	0	0	3	2

**Course Objectives:**

- The objective of introducing this course is to promote computer knowledge and applications in architecture.
- This course will familiarize the students to the concepts CAD and will enable them to present Computer Aided Architectural Drawings in both 2D & 3D.

**COURSE CONTENT:-**

**[42]**

1. To introduce to the basics of CAD and the fundamentals of 2D drafting.
2. To introduce different 2D object drawing methods, editing objects and modifying their associated properties.
3. Exercises on text annotation and dimensioning, defining text and dimension styles.
4. To learn about the concept of blocks and object grouping; styles and organizing objects in layers.
5. To create and customize hatch patterns; introduction to symbol libraries.
6. To study drawing unit association, scaling, associating limits
7. To introduce the different View management techniques, Concept of UCS and Icon management
8. To introduce the concept of model space and organize drawings in custom layouts.
9. Exercises on the use of templates.
10. To learn about the database concepts, attributes and scripts, concepts of OLE

11. To learn about importing/ exporting files to and from CAD.
12. To learn printing and plotting using CAD.
13. To introduce Auto LISP.
14. To introduce the different types of 3D modeling techniques- Solid creation; Editing; Creating complex solids; Boolean operations on solids.
15. Exercises on shading – Rendering, Material mapping, Environment attributes

**TEXT BOOKS/REFERENCE BOOKS:**

1. Kyles, Shannon R., “AutoCAD Workbook for Architects and Engineers”, Wiley-Blackwell, 2008.
2. Saka, Tuna, “AutoCAD for architecture”, Prentice Hall, 2002

<b>Course outcomes:</b>	
1.	Basic drawing and editing commands for 2D drawings, application of Auto CAD commands.
2.	Advanced 3D drawings using Auto CAD, Use of layers and blocks exercise on simple working drawings

**Bachelor in Architecture**

**B.Arch (IIIrd SEMESTER)**

Course code	Course title	L	T	P	Credits
ARC-201	HISTORY OF ARCHITECTURE III	2	0	0	2

**Course Objectives:**

- History of Architecture provides the connection, context, and roots central for the identity of who we were, who we are, and who we might be.
- Since architecture is a coherent chain of events, styles, tendencies, beliefs and techniques, studying history of architecture enables the student to gain a direct understanding of how and why architecture is made today, and clues to how architecture can be tomorrow.
- To introduce architectural vocabulary and provide an understanding of various architectural styles and their salient features.

**UNIT-1:**

**[6]**

**INDO-ISLAMIC ARCHITECTURE:**

Introduction to Islamic culture in India, salient features of Islam, Islamic culture compared to other religions - Muslim invasion of India; socio-political influence; Building types: mosques, tombs; architectural character: spatial arrangements, structural system, constructional features, surface ornamentations, fenestration details; elements of special attributes: arch, dome etc.

**UNIT-2:**

**[6]**

## **ISLAMIC ARCHITECTURE – IMPERIAL STYLE, PROVINCIAL STYLES & MUGHAL ARCHITECTURE:**

Influences on Islamic Architecture - evolution of the Islamic Arch, salient features of an Indian mosque; development of the Imperial style by the kings of the Slave dynasty and the provincial styles in different regions – typical examples and characteristic features.

Development of the Mughal style under the different rulers - Babur, Humayun, Akbar, Jahangir, Shahjahan, Aurangzeb; typical examples and salient features.

### **UNIT-3: [6] ARCHITECTURE IN COLONIAL INDIA:**

Styles and trends of architecture brought by Britishers to India and their evolution; characteristics of British colonial architecture; monumental buildings of the colonial period; architectural character of Indo-Saracenic and classical revival; Later colonial period: Contribution of Edwin Lutyens & Herbert Baker to the layout and architecture of New Delhi.

### **UNIT-4: [4] THE TREND IN INDIAN ARCHITECTURE AFTER 1970:**

Principles and works of Balakrishna Doshi, Charles Correa, Anant Raje, Raj Rewal and Laurie Baker with suitable examples.

### **UNIT-5: [6] RENAISSANCE & POST RENAISSANCE ARCHITECTURE:**

Birth of Renaissance and its impact on architectural style revivalism and synthesis of classical features; Churches, Palazzo, villa: spatial planning, construction and other architectural features; town planning principles; French and British Renaissance; High Renaissance and Mannerism.

Baroque architecture; works of Brunelleschi, Alberti, Bramante, Michelangelo, Palladio & Bernini, Inigo Jones; Arts and crafts and Art Nouveau movements and their impact on architecture; principles and works of Horta, Guimard, Macintosh and Antonio Gaudi.

**Note:** An educational tour/ study tour to the places of architectural interest / building appraisal shall be organized as per the programme. The documentation shall be done in the form of photographs / slides and sketches presented in form of a seminar and written report immediately after the tour / building appraisal.

### **TEXT BOOKS/REFERENCE BOOKS:**

1. Brown, Percy, "Indian Architecture (Islamic period)", DB Taraporevala Sons & Co, Mumbai, 1983.
2. Hambly, Gavin, "Cities Of Mughal India", Ubs Publisher's Distributors, 1968
3. Grover, S, "The Architecture of India (Islamic)", Vikas Publishing House Pvt. Ltd., New Delhi, 1981.
4. Michell, G. "Architecture of the Islamic World (its history and social meaning)", Thames and Hudson, London, 1978.
5. Hillenbrand, Robert, "Islamic Architecture, Form, Function and Meaning", Edinburgh University Press,
6. Nath, R., "History of Mughal Architecture", Abhinav Publications, New Delhi, 1985

Course outcomes:	
1.	Students will also know about the design variables, construction techniques materials and craftsmanship used in the historical buildings of this great country.
2.	The students will develop the ability to sketch plans, sections, elevations and other architectural details of heritage buildings in India.

Course code	Course title	L	T	P	Credits
ARC-202	BUILDING SERVICE- I	2	0	0	2

Course Objectives:
<ul style="list-style-type: none"> <li>➤ Building Services are the dynamics in a static structure, providing movement, communications, facilities and comfort. As they are unavoidable and absolutely necessary,</li> <li>➤ It is imperative that architects and all those who are concerned with the construction of buildings have a knowledge and appreciation of the subject.</li> </ul>

## UNIT-1:

[6]

**WATER SUPPLY AT A CITY AND BUILDING LEVEL:** Demand of water for various purposes as per BIS standards, per capita demand , DETECTION OF leakage and wastage of water and its preventive measures; sources and method of water supply - BRIEF OF catchment areas, reservoirs, and their location; system of water supply-Continuous, intermittent, their advantages and disadvantages; water purification systems, control systems, supply for a neighborhood and town. Tapping of water; storage and distribution of water in premises; boosting water, gravity and pressure distribution by storage tanks of individual buildings; service connections, types and sizes of pipes, piping network, materials, joinery, water supply fixture and installations, installation of network both open and concealed; water supply for multi storied buildings.

## UNIT-2:

[4]

**HOT WATER SUPPLY:** Direct and indirect systems of hot water supply, their components and equipment's used for the same; insulation of piping work and safety devices; solar heating.

## UNIT-3:

[6]

**SITE DRAINAGE AND SANITATION SYSTEMS:** Site planning from drainage point of view; storm water drains, details of construction OF DRAINS, water entrances, gullies, open drains, gradients, rainfall maintenance; storm water and roof drainage systems and their installations; underground drainage systems with application of ventilation, self cleansing velocity, laying of drains to required gradients and testing of drains. Study of sanitary fittings with reference to use, materials and functions; traps and their uses, classification of traps as per use and shape; pipes and piping systems, vent and anti-siphonage systems, jointing and installations; disposal of sewage within the premises using septic tanks, inspection chambers,



effluent treatment plants, their function and layouts; sewage and sewage treatment plants; connection of house sewers to municipal sewers, ventilation of sewers;

#### UNIT-4:

[6]

**SOLID WASTE DISPOSAL:** Collection, treatment and disposal of organic and inorganic waste, urban solid waste treatment systems, traditional methods, garbage chutes, sanitary landfills, vermicomposting, incineration, pyrolysis-advantages and limitations etc; garbage disposal in multi –storied buildings, dry and wet treatment; treatment of industrial refuse; refuse and pollution problems.

#### UNIT-5:

[6]

**DESIGNING PLUMBING AND SANITARY LAYOUTS:** Designing of toilet blocks in residential buildings, showing both Indian and European W.Cs and in public buildings; preparation of working drawings showing complete details of fittings and plumbing required for water supply and drainage; with all required calculations.

Note: Assignments can be in form of compiling required information from site visits, market surveys and other sources.

#### TEXT BOOKS/REFERENCE BOOKS:

- Rangwala, S.C., “Water Supply and Sanitary Engineering”, Charotar publishing house.
- Shah, Charanjit, “Water Supply and Sanitary Engineering”, Galgotia publishers.
- Wise, A.F.E., &Swaffield, J.A., “Water Sanitary Services for Buildings”, Longman Scientific and Technical, Harlow, 1995.
- Greeno, Roger, “Building Services Technology and Design”, Longman Scientific and Technical, Harlow, 1997.
- Chatterjee, A.K., “Water Supply and Sanitary Engineering”, Khanna publishers, New Delhi, 1986.
- “Hand Book on Water Supply and Drainage (with special emphasis on plumbing)”, Bureau of Indian standards, New Delhi .

Course outcomes:	
1.	Knowledge of environmental support systems as they apply to human habitat, with special reference
2.	Students have thorough understanding on water supply and waste water management, in residential unit, small campus, commercial buildings.
3.	Students are aware of best practices for Solid waste management

Course code	Course title	L	T	P	Credits
ARC-203	BUILDING SCIENCES - I	2	0	0	2

#### Course Objectives:

- Architecture and climate have always been linked in a pattern of mutual influence. In its role as a provider of shelter, architecture intentionally modifies the climate of an immediate area – and traditionally, its design has been shaped by the stresses and opportunities inherent in the

regional climate.

**UNIT-1:** [4]

**CLIMATE & THERMAL COMFORT:** Introduction to climate as a factor of human shelter, comfort and environment; its classification as global, macro and micro climate; elements of climate; thermal balance of the human body, thermal comfort indices: effective temperature, CET, comfort zone & calculation of overheated & under heated periods

**UNIT-2:** [6]

**PRINCIPLES OF THERMAL DESIGN IN BUILDINGS:** Thermal quantities: heat flow rate, conductivity (k-value) & resistivity, conductance through a multi-layered body, surface conductance, transmittance: calculation of U-value, convection, radiation, concept of sol-air temperature & solar gain factor; exercises in heat loss & heat gain in building assuming steady state assumption (thermal balance equation); periodic heat flow in building: time lag & decrement factor & its application in selection of appropriate materials for walls & roof; effect of insulation & cavity on time lag & its practical use

**UNIT-3:** [6]

**VENTILATION & DAYLIGHTING:** Functions of ventilation stack effect due to the thermal forces, wind velocity: wind rose diagram, wind pressure; air movement through building and around buildings; factors affecting indoor air flow, wind shadow etc.; The nature of light, its transmission, reflection, coloured light, the munsell system; photometric quantities, illumination, day lighting prediction, the daylight design graph

**UNIT-4:** [6]

**SOLAR GEOMETRY & USE OF SOLAR ENERGY:** Study of solar control with references to solar charts, sun path diagrams; methods of calculating and designing of shading devices; introduction to concepts of solar energy utilization in heating water such as Flat Plate collectors; introduction to use of solar energy in lighting in buildings such as Photovoltaic cells; solar passive strategies-Principals of natural light and natural ventilation.

**UNIT-5:** [6]

**DESIGN FOR CLIMATIC TYPES & GREEN BUILDING CONCEPTS:** Study of analysis of climatic zones in India along with data analysis; design strategies for Indian climate zones - building design & lay out planning consideration; study of climatic zones along with traditional dwelling units; study measurement and analysis of micro climatic elements and its use for a Designer; Introduction to the concepts of green buildings and energy conscious architecture; introduction to ECBC rules, Energy audit and Green buildings rating eg. TERI Griha, LEED etc.

**NOTE:** Assignments can be in the form of:

1. Exercises on achieving the required indoor temperature by varying the components of composite materials according to the U values.
2. Exercises on design of small buildings for various climates

**TEXT BOOKS/REFERENCE BOOKS:**

1. Koenigsberger & Ingersol, "Manual of Tropical Housing and Building: Climatic Design", Universities Press,
2. Evans, M., "Housing, Climate and Comfort", Architectural Press, 1980

3.ArvindKrishan et al, “Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings”, Tata McGraw Hill, 1999.

4.Givoni, B., “Man, Climate and Architecture”, Elsevier Publishing Company Limited, 1969.

5.Watson& Labs, “Climatic Design”, Mcgraw Hill, NewYork, 1983.

Course code	Course title	L	T	P	Credits
CEA-103	STRUCTURES IN ARCHITECTURE II	2	0	0	2

**Course Objectives:**

- To introduce the basic concept of structures and enable the students to analyze, understand the fundamentals and working of various parts of different structural systems

**UNIT-1: [4]**

**BENDING STRESSES IN BEAM:**Introduction, Theory of Simple bending, assumptions in the theory, illustrative examples.

**UNIT-2: [4]**

**DEFLECTION OF BEAMS:**Deflection in simply supported beams and cantilever beams; double integration method and area moment method, illustrative examples.

**UNIT-3: [6]**

**ANALYSIS OF STRESS:**Introduction, principal stresses and principal planes, maximum shear stress, circular diagram for stresses, Mohr’s circle, illustrative examples.

**UNIT-4: [8]**

**SHEAR FORCE AND BENDING MOMENT:**Types of supports, relationship between bending moment, shear force and load; shear force and bending moment diagrams in case of simply supported beams and cantilevers with distributed and point loads; simply supported beams with overhangs, moments applied to cantilevers and beams, illustrative examples.

**UNIT-5: [6]**

**COLUMNS:**Introduction, modes of failure, elastic instability, Euler’s theory, End conditions and effective length, radius of gyration, slenderness ratio, strut and column, long column under eccentric loading, , illustrative examples.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Khurmi, R.S., “Theory of Structures”, S. Chand and Company, New Delhi, 2005
2. Khurmi, R.S. “Strength of Materials”, S. Chand and Company, New Delhi, 2010
3. Punmia, B.C., “Strength of Materials and Mechanics of Structure”, Standard Publishers and Distributors, 1971

**Course outcomes:**

- |    |  |
|----|--|
| 1. | Students have a feel for structural principles as they relate to a building design |
| 2. | Enable to make an informed choice regarding the most appropriate                   |

	structural system for the building
3.	Develop a reasonable understanding of its operational and economic implications.

Course code	Course title	L	T	P	Credits
ARC-255	ARCHITECTURAL DESIGN- I	2	0	6	5

#### Course Objectives:

- To introduce the students to the various approaches to design process and to impart understanding of a range of design parameters related to site conditions, social aspects, user groups along with functional and aesthetic aspects

### COURSE CONTENT:-

[112]

#### IMPORTANCE OF LITERATURE AND CASE STUDIES IN THE DESIGN PROCESS:

Study of a given space through elementary measured drawings, sketching and photography. At least one project to study, analyze and compare private residential typologies and/or a small building of public use with respect to the spaces, their inter-relation, scale, ambience, technology and material for construction etc. e.g. Havelis, apartments, bungalows, row houses etc Synthesis of observations of case studies in design of an architectural form with a specific function

#### CLIMATE RESPONSIVE ARCHITECTURE

Design of a simple building for public activity incorporating elements of thermal comfort, ventilation, day lighting and design for various climatic types e.g. moderate, hot & humid, cold & hot climate considering the social and physical environment and methods of construction like timber construction emerging out of the traditional way of life of the people of the given place. This introduction to other role players in the architectural processes i.e. the client and the user. E.g. Architect House, Resort, Post Office, Bank etc.

#### Course outcomes:

1.	The students will endeavour to acquire an understanding of the determinants of the built form such as social imperatives, environmental concern and craft of building.
2.	The student develops the ability to successfully design independent residential buildings in urban areas with concepts that respond to personal preference & taste, family lifestyle, culture & site conditions.
3.	Derivation of concepts and strategies will then lead to deliberate responses in the shape of a specific design proposal with the help of organizational and communicative skills.

Course code	Course title	L	T	P	Credits
ARC-256	BUILDING MATERIAL & CONSTRUCTION -III	1	0	4	3

Course Objectives:
➤ To give an introduction to building elements and expose the student to the process of building construction

**COURSE CONTENT:-****[70]**

1. To introduce the various terminology of staircases.
2. To study and prepare drawings of various types of timber staircases- single, double (Dog legged and open well) and Triple flight stairways in stone and timber.
3. To design handrail and balusters using different materials and study the various methods of fixing them.
4. To prepare drawings on details of joints in timber staircases.
5. To prepare drawings on the different types of timber floors- Single, double and framed floors with joints between joist with wall plate.
6. To prepare drawings on the different types of timber floors- Single, double and framed floors with joist with beam and sub beam with main beam.
7. To study strutting of joists.
8. To study various terminologies and prepare drawings on the classifications of timber roofs.
9. Study of timber trusses: King post and queen post trusses with details of joints.
10. To prepare drawings on Built-up and Composite roof truss.
11. Study of different sheet roof covering material viz. asbestos cement, galvanised iron, aluminium, asphaltic, fibreglass reinforced plastic, polycarbonate and other, along with fixing details.
12. To prepare drawings on the detail of eaves projection with soft boarding and alternative detail of gutter at eaves etc.
13. To study the different types of partitions and their properties.
14. To prepare drawings on Joinery details and constructional techniques involved in timber partitions, single and double skinned partitions, partially glazed partitions.
15. **MATERIALS FOR FLOORING AND ROOFING :** Different flooring & paving materials and types that are cast-in-situ viz. Mud flooring, Brick flooring, Indian Patent Stone finish, Terrazzo flooring, red oxide flooring etc. and readymade tiles available in market viz. natural stone tiles / slabs, plain & mosaic cement tiles / blocks, ceramic tiles, vitrified tiles and other modern materials, including the process of providing or laying the flooring or pavement; floor finishes of various materials viz. carpet, linoleum, rubber, PVC etc. : Roofing of Mangalore tile, pan tiles, slate, corrugated asbestos sheet etc.
16. **DAMP PROOFING, WATER PROOFING AND MISCELLANEOUS:** Hot applied and cold applied; emulsified asphalt, bentonite clay, butyl rubber, silicones, vinyls, epoxy resins and metallic water proofing materials, their properties and uses; water proofing membranes such as rag, asbestos, glass felt, plastic and synthetic rubber- vinyl, butyl rubber, neoprene, polyvinyl chlnide; prefabricated membranes sheet lead, asphalt their properties and uses. Anti termite treatment to foundations,

masonry and wood work; sound insulating materials- gypsum; recent advances in building materials.

**Note:** Sessionals will be in the form of reports, drawings and models. There shall be regular visits to construction sites.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Rangwala, S. C., "Building Construction", Charotar Publishing House, 2007
2. McKay, W.B., "Building Construction Volume I, II, III and IV", Longmans, 1955
3. Ching, Francis D. K. and Adams, Cassandra, "Building Construction Illustrated", Wiley and Sons, 2000
4. Barry, R, "The Construction of Buildings", The English Language Book Society and Crosby Lockwood, 1976
5. Chudley, Roy, "Construction Technology", Longman, 2005

Course outcomes:	
1.	Students will examine the critical role of materials and methods for the design and construction of buildings
2.	Students will get exposed to rural and traditional materials and their construction techniques.
3.	They learn to represent the different building components, Staircases, damp proofing & water proofing in various applications through relevant drawings.

Course code	Course title	L	T	P	Credits
ARC-257	COMPUTER APPLICATIONS IN ARCHITECTURE -III	1	0	2	2

Course Objectives:
<ul style="list-style-type: none"> <li>➤ Communicating design concepts and project status to clients, regulators, and colleagues can be challenging.</li> <li>➤ This course will enable the students to understand the basics of Photoshop, the professional image-editing standard</li> <li>➤ Permitting the student groundbreaking new creative options to realize their vision and an unprecedented level of customization to streamline their workflow.</li> </ul>

**COURSE CONTENT:-**

**[42]**

- 1.To study the basics of Adobe Photoshop; Selection, Slice, Painting tools
2. To scan an image into Photoshop CS3; check the scan quality and resolution; crop the image to final size and orientation.
3. To adjust the brightness, contrast and tonal range of the image; sharpen the overall focus of the image etc
4. To learn working with Layers and use layers to create a logo or collage for a PowerPoint presentation.
5. Exercises on Basic and Advanced Retouching: - Color manipulations, - levels, curves, patch tool, cropping, special color effects: black and white, sepia, grainy
6. Exercises on designing simple Web Pages by using Slice Tool.
7. Exercises involving the designing of Logos by using Texts and Paints professionally.

8. To transfer CAD drawings into Photoshop while preserving graphic scale.
9. To enhance drawings using patterns, strokes, color overlays, fill layers, inner and drop shadows, clipping groups, adjustment layers etc
10. Exercises on rendering plans, elevation and sections using Photoshop
11. To render elements from 3ds Max as layers in Photoshop and learn how to create realistic auto-blending color-matched skies, greenery, trees etc
12. Exercises on rendering 3D views using Photoshop.
13. Presentation techniques for portfolio, design sheets etc using Photoshop

#### TEXT BOOKS/REFERENCE BOOKS:

1. Galer, M. & Andrews, P., “Photoshop CS3 Essential Skills”, Elsevier, 2007
2. Sondermann, H., “Photoshop in Architectural Graphics”, Springer, 2009
3. Alten, “Adobe Photoshop CS3: Classroom in a Book”, Peachpit Press, 2007

Course outcomes:	
1.	Exposure to CAD and Photoshop will help students to produce their operation and critical parameters.
2.	Presentations for large gatherings, corporate clients-using CAD drawings, pictures, 3D images, text etc

Course code	Course title	L	T	P	Credits
CEA-260	SURVEYING	0	0	4	2

Course Objectives:
➤ This course intends to make the student familiar with locating the object positions in horizontal and vertical plane with desired accuracy as needed for architectural profession and to prepare and interpret survey drawings.

#### COURSE CONTENT:-

[56]

1. Standardization of pace length; to estimate horizontal distance by pacing; study of metric chain and long distance measurement by a chain.
2. Exercises on direct and indirect ranging.
3. Chain survey of given area
4. Study of prismatic and surveyor's compass
5. Chain and compass surveying
6. To carry out fly leveling for establishment of a benchmark.
7. To carry out profile leveling for a proposed road and its cross section.
8. To carry out contour survey by square method.

9. To study plane table and its accessories and carry out plane table survey by radiation, intersection and by transversing methods.
10. To solve two and three point problems.
11. To find out Tacheometric constants of Dumpy level/ Theodolite.
12. To find out horizontal and vertical angle by Theodolite.
13. To carry out transversing by Theodolite
14. To practice Transiting, elongation of line, taking bearing and marking north direction on ground.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Basak, “Surveying and Levelling”, Tata McGraw-Hill, 2004
2. Rangwala, “Surveying and Levelling”, Charotar Publishing House Pvt. Ltd., 2005
3. Punmia et al, “Surveying - Volume 1 & 2”, Firewall Media, 2005

<b>Course outcomes:</b>	
1.	Knowledge of interpretation and preparation of contour maps
2.	Site modeling with total station. Exercises in setting out of building works

**Bachelor in Architecture**

**B.Arch (IVth SEMESTER)**

Course code	Course title	L	T	P	Credits
ARC-210	HISTORY OF ARCHITECTURE - IV	2	0	0	2

**Course Objectives:**

- This course introduces the students to various design philosophies of Modern & Post Modern architecture
- To provide a comprehensive knowledge of contemporary design philosophies in the development of novel architectural forms and designs

**UNIT-1:**

**[4]**

**EVOLUTION OF MODERN ARCHITECTURE:-**Reasons for the evolution of Modern architecture, origins: Neo Classicism, enlightenment, social revolutions, revivalism; Industrial revolution and its impact, Emergence of new building typologies, new materials and technologies: history of steel, glass and concrete.

**UNIT-2:**

**[8]**

**EVOLUTION OF MODERNISM:** Developments in Germany: Deutscher Werkbund, principles and works of Peter Behrens, German expressionism and the works of Walter Gropius and Erich Mendelsohn; Bauhaus school and its impact; Russian Architecture after revolution (1917 – 1934); The futurism of Antonio Sant’Elia; Cubism and its impact on architecture, De stijl movement of Netherlands. Post Modernism: Criticisms of Modern Architecture; Post



Modernism, collage, technology and new science, Pop art, Deconstruction, Critical Regionalism with examples; Critics of modern movement: Robert Venturi, Christopher Alexander, Aldo Rossi and Jane Jacob; emergence of later trends in modern architecture: Brutalism, Archigram, and Metabolism in architecture.

### UNIT-3:

[4]

**THE INTERNATIONAL STYLE:** Emergence of International style of architecture; principles and works of Le Corbusier, Rohe, Johnson; Organic Architecture: Early works of F.L.Wright; Chicago school; Art deco.

### UNIT-4:

[6]

**CONTEMPORARY ARCHITECTURE IN INDIA:-**The impact of International style of architecture in independent India, works of Le Corbusier and Louis Kahn in India with examples, their impact on architecture of fifties and sixties.

### UNIT-5:

[6]

**POST-NEHRUVIAN MODERNIST ARCHITECTURE:-**Modernism, utilitarian modernism and neo-modernism, brutalism; criticisms on the modern movement in India; countering the stigma of colonialism; critical regionalism and the neo-vernacular; the community architectural movement;

Integrating the new and the old; revivalism in religious and secular buildings; revivalism and post-modernism.

**Note:** An educational tour/ study tour to the places of architectural interest / building appraisal shall be organized as per the programme. The documentation shall be done in the form of photographs / slides and sketches presented in form of a seminar and written report immediately after the tour / building appraisal.

### TEXT BOOKS/REFERENCE BOOKS:

1. Frampton K, "Modern Architecture: A Critical History", Thames and Hudson, London.
2. Lang, Desai, Desai, "Architecture & Independence", Oxford University Press, New Delhi.
3. Bhatt, V. and Scriver, P. , "Contemporary Indian Architecture: After the Masters", Mapin, Ahmedabad
4. Lang, "A concise history of modern architecture in India", Orient Blackswan, 2002
5. SarbjitBahga et al, "Modern Architecture in India", Galgotia Publishing Company, New Delhi.

Course outcomes:	
1.	The student acquires general understanding of the basic terminology of the subject and know the chronology and typology of architecture in the 20th/21st century
2.	Identify the architectural theories and socio-economic and cultural conditions of their emergence.
3.	The student know the life and masterpieces of the most renowned Architects of that Era.

Course code	Course title	L	T	P	Credits
ARC-211	BUILDING SERVICE II	2	0	0	2

Course Objectives:
➤ To create awareness about the importance of electrical services in buildings and to develop technical and practical knowledge in these services

**UNIT-1:****[6]**

**PRINCIPLES OF ILLUMINATION:** Light - electromagnetic radiation, Visual tasks - factors affecting visual tasks, visual task requirements; modern theory of light and colour; synthesis of light, additive and subtractive synthesis of colour; luminous flux, candle, solid angle illumination, utilization factor, depreciation factor, MSCP, MHCP; laws of illumination: Illumination from point, line and surface sources; environment and glare.

**UNIT-2:****[6]**

**ILLUMINATION SYSTEMS AND LIGHTING DESIGN:** Standards of Lighting and Visual comfort; different illumination systems such as direct, indirect, diffused; classification of lighting: daylight, artificial light sources; incandescent, fluorescent; arc lamps and lasers; spectral energy distribution, luminous efficiency, colour temperature, colour rendering. Design of modern lighting; Interior lighting- industrial, office, residential, commercial etc; exterior lighting- flood, street, transport; lighting for displays, neon signs, LED-LCD display beacons special features and minimum level of illumination required for physically handicapped and elderly in building types.

**UNIT-3:****[4]**

**LIGHT FITTINGS/ LUMINARIES:** Applications of lighting systems with reference to levels of illumination for various uses and lumen method calculations; all types of energy efficient lamps, optic fiber, led etc.

**UNIT-4:****[6]**

**ELECTRICAL SYSTEMS:** Basic of electricity, single/Three phase supply, generation and distribution of electric power in urban areas, substations for small schemes in industrial units; protective devices in electrical Installation; earthing for safety, types of earthing, ISI Specifications. building wiring systems, types of wires, wiring systems and their choice; planning electrical wiring for building, electrical load estimation; safety methods and measures to be adopted, study of relevant I.S. Codes

**UNIT-5:****[6]**

**ELECTRICAL INSTALLATIONS:** Principles of electrical installation in buildings, branch circuit; main and distribution boards, transformers and switch gears; layout of Substations; .Designing and preparing a complete electrical layout and illumination detailing for an interior design project, with all required calculations; electrical system installations from the supply mains to individual outlet points, including meter board, distribution board and layout of points with load calculations; electrical wiring systems including different material specification; electrical control and safety devices etc.

**NOTE:** Assignments can be in the form of compiling of required information collected from site visits, market surveys and finding out latest trends and materials for the same.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Hopkinson, R.G., "Architectural Physics: Lighting", London, 1963.
2. "Philips Lighting in Architectural Design", McGraw Hill, New York, 1964.

3. Hopkinson and Kay, "The Lighting of Buildings", Faber and Faber, London, 1969.
4. Pritchard, D.C., "Lighting", Longman Scientific & Technical, Harlow, 1995.

Course outcomes:	
1.	Students have thorough understanding on Electrical supply
2.	Students are aware of best practices for Electrical management

Course code	Course title	L	T	P	Credits
ARC-212	VERNACULAR ARCHITECTURE (ELECTIVE)	2	0	0	2

Course Objectives:
<ul style="list-style-type: none"> <li>➤ To expose the students to traditional architecture of the various parts of the country</li> <li>➤ Impart knowledge of the planning aspects, materials used in construction, constructional details and settlement planning of the settlements in various parts of the country.</li> </ul>

#### UNIT-1: [6]

**INTRODUCTION:** Approaches and concepts to the study of Vernacular architecture; advantages and possible application; Introduction to Kutcha architecture and Pucca architecture; tribal settlements. **VERNACULAR ARCHITECTURE IN THE WORLD:** Factors that contributed to their evolution; Middle East, Africa, Far East etc

#### UNIT-2: [4]

**VERNACULAR ARCHITECTURE IN INDIA - DRAVIDIAN SOUTH :**Planning aspects, materials of construction, constructional details & settlement planning of Kerala/ TamilNadu/ Karnataka / Andhra Pradesh; religious practices, beliefs, culture & climatic factors influencing the planning of the above.

#### UNIT-3: [6]

**WESTERN REGION:** Planning aspects, materials used constructional details, climatic factors influencing the planning buildings in Rajasthan; primitive forms, symbolism, colour, folk art etc in the architecture of the deserts of Kutch & Gujarat state; vernacular architecture of Goa.

#### UNIT-4: [6]

**NORTHERN INDIA:** Factors influencing the planning aspects, materials of construction & constructional details of buildings in Kashmir - Dhoongas (Boathouses), bridges; Himachal Pradesh / Uttar Pradesh. **EASTERN INDIA:** Planning aspects, materials used constructional details, climatic factors influencing the planning buildings in Bengal / Nagaland

#### UNIT-5: [6]

**INFLUENCE ON MODERN ARCHITECTURE:** Examples from the works of Frank Lloyd Wright, Green Broken & HasanFathy, GeofferyBawa; possible applications of vernacular architectural techniques today.

#### TEXT BOOKS/REFERENCE BOOKS:

1. Jain, K. & Jain, M., "Architecture of the Indian desert", Aadi Centre, Ahmedabad

2. Michell, G., "The Royal Palaces of India", Thames and Hudson Ltd., London
3. Pramari, V.S., "Haveli – Wooden houses & mansions of Gujarat", Mapin Publishing Pvt. Ltd., Ahmedabad
4. Tillotson, G.H.R. "The Tradition of Indian architecture – Continuity & Controversy – Change since 1850", Oxford University Press, Delhi
5. Oliver, "Encyclopedia of Vernacular Architecture of the world (3 Vol. Set)", Cambridge University Press, U.K., 1997.

Course outcomes:	
1.	The students will be able to identify and conserve the untapped values and principles in the evolution of new theories for architectural creations.
2.	Highlight needs and various ways of vernacular building research, analysis, presentation of finding and its application to contemporary building

Course code	Course title	L	T	P	Credits
ARC-213	ENERGY EFFICIENT ARCHITECTURE (Elective)	2	0	0	2

Course Objectives:
<ul style="list-style-type: none"> <li>➤ A growing global concern for the conservation of energy &amp; environment has led to the importance on sustainable habitats as a key solution to growing urban concerns.</li> <li>➤ This course aims at creating awareness of designing energy efficient building envelopes that respond to the climate of a place, create environment – friendly and energy efficient building by actively harnessing renewable nature sources of energy (solar energy etc) and utilizing materials that least pollute the environment</li> </ul>

#### UNIT-1:

[6]

**CLIMATE & SHELTER:** Over view of the different Passive Solar Techniques & Climate responsive design features adopted in the traditional / vernacular architecture of various places in different climate zones; control of Micro-climate around the building by settlement pattern, built form; open space relationship & facade articulation; appropriate use of building materials in historic buildings.

#### UNIT-2:

[6]

**SOLAR ENERGY & BUILDING:** Solar geometry and built form; various techniques of shading to reduce heat gain in tropical climate; methods of maximizing exposure to solar radiation in cold & temperate climate; heating & cooling loads; energy estimates; energy conservation; efficient day lighting; Solar Water heating system; exercises on heating and cooling load calculations in buildings.

#### UNIT-3:

[6]

**PASSIVE SOLAR HEATING:** General principles, direct gain systems - glazed walls, bay windows, attached sun spaces etc; indirect gain systems - water wall, solar chimney, roof pond, roof radiation trap, solarium etc; isolated gain systems - natural convective loop etc.

**UNIT-4:** [6]

**PASSIVE COOLING CONCEPTS:** General principles: Evaporative cooling, nocturnal radiation cooling, Passive desiccant cooling, induced ventilation, earth sheltering, berming, wind towers, earth, air tunnels, curved roofs & air vents; Insulation, vary Thermal wall etc.

**UNIT-5:** [4]

**ENERGY MANAGEMENT OF BUILDINGS:** Introduction to energy management of buildings and energy audit of buildings; aims and main aspects. Case study and overall design concepts

**TEXT BOOKS/REFERENCE BOOKS:**

- Arvind Krishnan et al, “Climate Responsive Architecture”, Tata Mcgraw Hill, New Delhi, 2001.
- Ritchie, James D., “Successful Alternate Energy Methods”, Structures Publishing Co., Michigan, 1980
- Majunder, Mili “Energy Efficient Building in India”, Thomson Press, New Delhi, 2001

Course outcomes:	
1.	The student understand the importance, installation and working of essential services in buildings.
2.	Knowledge of building services help in generating a cleaner and healthier built environment

Course code	Course title	L	T	P	Credits
CEA-211	STRUCTURES IN ARCHITECTURE III	2	0	0	2

**Course Objectives:**

- To introduce the basic concept of steel structures and enable the students to analyze, understand the fundamentals and working of various parts of these structural systems.

**UNIT-1:** [6]

**MODULE 1: STEEL STRUCTURES:** Types of steel structures, Framed and Shell structures, Properties of Indian standard rolled steel section; use of IS 800 and steel tables; permissible stresses in tension, compression and shear.

**UNIT-2:** [4]

**MODULE 2: CONNECTIONS:** Welded and riveted connections—types of failure; design of welded and riveted connections for members subjected to axial forces

**UNIT-3:** [6]

**MODULE 3: TENSION AND COMPRESSION MEMBERS:** Steel structures –Tension and compression members; design of single angle and double angle sections in tension; design of compression members; slenderness ratio; design of simple and compound sections; design of lacing and battens.

**UNIT-4:** [6]

**MODULE 4: BEAMS:** Principal Stresses, allowable stresses, General specifications, Design of

laterally supported beams.

#### UNIT-5:

[6]

**MODULE 5: STEEL ROOF TRUSSES:** Types of roof trusses–Selection of trusses according to the span; estimation of gravity loads and wind loads; use of BIS and book SP-38 in analyzing and design of trusses, gusseted plate connections.

#### TEXT BOOKS/REFERENCE BOOKS:

1. Ramachandra .S, “Design of Steel Structures Vol. I”, Standard publication, New Delhi, 1992
2. Arya .A.S and Ajamani .J.L, “Design of Steel Structures”, Nem Chand and Bros, Roorkee, 1999
3. Design of Steel Structures by S. Ramamruthan
4. Vazirani .V.N, and Ratwani .M.M, “Steel structures”, Khanna Publications, New Delhi, 1995
5. Duggal, “Design of Steel structures”, Tata McGraw Hill Company, New Delhi, 2000
6. Dayaratnam .P, “Design of Steel Structures”, Wheelers Publishing Company Co. Ltd, 1990
7. “Handbook of Typified Designs for Structures with steel roof trusses, SP 38 1987”, BIS, New Delhi, 1987

Course outcomes:	
1.	Development of the basic understanding of the forces & its effects in simple building structural systems in Steel
2.	Knowledge about the structural behaviour of various roof configurations & built form is also gathered.

Course code	Course title	L	T	P	Credits
ARC-265	ARCHITECTURAL DESIGN - II	1	0	8	5

#### Course Objectives:

- The course Architectural Design – II intends to encourage students to develop an understanding of cultural expressions & its varied manifestations in the built environment.
- Design exercises that explore Architecture as responding to Social issues such as Culture, History, Religion, Politics etc have been introduced.
- Students would also be exposed to design exercises involving small Architectural design problems involving simple spatial organizations starting from single space and progressing to small functional grouping of spaces

#### COURSE CONTENT:-

[126]

**VERNACULAR ARCHITECTURE & ENERGY EFFICIENT ARCHITECTURE:** Design of a building for public activity considering the social and physical environment and methods of construction like RCC Construction installing various building services like electrical etc. Incorporating various energy efficient measures and vernacular architecture features and techniques.

**CONTEXT OF A SETTLEMENT** Contextual architectural proposal by studying a settlement and working on an architectural program in that settlement. To understand the linkages between Occupation, Social structure and Religious beliefs and its physical manifestation in the form of the settlement. Design of a small building of public use in the settlement. The public use to be determined through settlement studies, surveys etc. Principles of sociology and community participation to be explored. E.g. Primary School, Community Centre, Commercial Complex Etc.

## REFERENCE BOOKS

1. Lin, "Drawing & Designing with Confidence – A Step by Step Guide", John Wiley and sons, USA, 1998.
2. Chiara and Callender, "Time Saver Standards for Building Types", McGraw Hill Co., N.Y., 1973.
3. Edward. D., Mills, "Planning the Architects Hand Book", Butterworth, London, 1985.
4. Isaac, "Approach to Architectural Design", Butter worth & Co. Ltd., London, 1977

Course outcomes:	
1.	Develops the capacity to design public buildings that respond to a particular educational philosophy
2.	Generate concepts for various activities and explore the integration of classroom spaces with outdoor play areas

Course code	Course title	L	T	P	Credits
ARC-266	BUILDING MATERIAL & CONSTRUCTION - IV	1	0	4	3

Course Objectives:
➤ To give an introduction to building elements and expose the student to the process of building construction.

## COURSE CONTENT:-

[70]

1. To prepare drawings on Flat roof construction in R.C.C. and composite materials.
2. To prepare drawings on R.C.C. slab beams.
3. To study and prepare drawings on R.C.C lintels and chajjas including cantilevers.
4. To prepare drawings on R.C.C. columns.
5. To prepare drawings on R.C.C. footings.
6. To study about various types of R.C.C staircases.
7. To design a Staircase and provide details of balustrade fixing, materials used etc.
8. To prepare drawings on Precast components i.e. masonry blocks, hollow blocks, jallis, shelving units, slabs and pre-stressed units

9. To draw a section through a five storied building showing all components.
10. To study mild steel roof trusses and details of roof coverings and gutters.
11. To study the principles of temporary works such as shuttering, centering, scaffolding and form work.
12. **PAINTS, VARNISHES AND DISTEMPERS:** Constituents of oil paint, characteristics of a good paint; types of paint; process of painting different surfaces; types of varnish; methods of applying varnish; French polish; dry distemper; oil bound distemper; wax polishing, putty.
13. **METALS:** Study of properties of constituent components, manufacturing process, quality test of ferrous and non-ferrous metals (lead, copper, zinc, tin, Al & Steel); weathering effects on such metals, preventive measures. Usage in building Industry.

### REFERENCE BOOKS

1. Rangwala, S. C., "Building Construction", Charotar Publishing House, 2007
2. McKay, W.B., "Building Construction Volume I, II, III and IV", Longmans, 1955
3. Ching, Francis D. K. and Adams, Cassandra, "Building Construction Illustrated", Wiley and Sons, 2000
4. Barry, R, "The Construction of Buildings", The English Language Book Society and Crosby Lockwood, 1976
5. Chudley, Roy, "Construction Technology", Longman, 2005
6. Arora, S.P. and Bindra, S.P., "The Text book of Building Construction", Dhanpat Rai Publications, 2009.

Course outcomes:	
1.	The students will gain knowledge of material properties and construction techniques of Glass, concrete, RCC and special concreting methods and appropriate material and technology.
2.	Get exposed to the advanced construction systems developed by research organizations in India

Course code	Course title	L	T	P	Credits
ARC-267	MEASURED DRAWING	1	0	4	3

### Course Objectives:

To enable the students to learn how to measure and then draw an Existing building / Structure / Interior space / Landscape etc. as much near to the actual.



This measurement work is done in a group / team . This measure drawing is indeed use full for the students of architecture to learn various aspects of Historical or old buildings.

Study their architectural features and then draw the same to scale and prepare a drawing / document for record. Mostly in practice this technology is effectively used to reconstruct dilapidated or old /historic structures including their repairs , reconstruction or addition / alterations etc.

It would help them work in a team and produce work in a coordinated manner as is often required in the field.

## EXERCISES

1. Selection of a Existing Space / Building or a Historic monument, surveying and taking all possible measurements of the same .
2. Preparation in the form of sketches -- Key plans, plans, elevations and other details at site.
3. Preparation of hand drafted to the scale drawings referring all the above.
4. Documentation of literature obtained from site or elsewhere and the Measure drawing prepared.

## TEXT BOOKS / REFERENCE BOOKS:

- Measured drawing for architects, Robert Chitham.
- Architectural Details and Measured Drawings of Houses of the Twenties (Dover Architecture), by William A. Radford

Course outcomes:	
1.	The students will able to measure the existing structure and prepare a drawing / document for record.

Course code	Course title	L	T	P	Credits
ARC-268	COMPUTER APPLICATIONS IN ARCHITECTURE - IV	1	0	2	2

Course Objectives:
<ul style="list-style-type: none"> <li>➤ The objective of introducing this course is to promote computer knowledge and applications in architecture.</li> <li>➤ This course will familiarize the students to the concepts of parametric modeling, or BIM, through Autodesk REVIT or similar software,</li> <li>➤ Enable them to create Computer Aided rendered Architectural Drawings in 3D.</li> </ul>

## COURSE CONTENT:-

[42]

1. To introduce the new features of REVIT, editing and working with families in a Project.
2. To introduce the concepts of REVIT, creating a shared Family, Project and System settings.

3. To create the basic model, creating the basic structural system – walls, columns, beams, roofs etc.
4. To add doors, windows, openings, stairs, railings, curtain systems etc
5. To create drawings, creating detail from building model, scheduling, annotating and dimensioning.
6. To study about Viewing the Model
7. Exercises on Applying Materials and textures and creating a perspective views
8. Exercises on rendering an exterior view and an interior view.
9. Exercises on applying lights in an Interior and creating shadows
10. Exercises on creating and recording Walkthroughs, creating 3D cutaways with Section Boxes
11. To create an Interior of a given architectural drawing by using the above mentioned tools and commands.
12. To apply the above mentioned tools and commands to create rendered exterior views of a given architectural drawing.
- 13.

### REFERENCE BOOKS

1. Fox & Balding, “Introducing and Implementing Revit Architecture”, Cengage Learning, 2008
2. Autodesk REVIT 9.1 Manual, Autodesk publications
3. REVIT 9.1 Tutorials, Autodesk publications

Course outcomes:	
1.	Students will understand the concepts of architectural drawing as well as representation skills; through REVIT.
2.	Creating and recording Walkthroughs, creating 3D and commands to create rendered exterior views of a given architectural drawing.

### Lingaya'sVidyapeeth

### B.Arch (FIFTH SEMESTER)

Course code	Course title	L	T	P	Credits
ARC-301	PRINCIPLES OF HUMAN SETTLEMENTS-I	2	0	0	2

### Course Objectives:

The course aims at introducing the history of development of settlement planning and also gives emphasis on tracing broad principles of settlement design.

### UNIT-1:INTRODUCTION

[4]

Human Settlement Science - objective, scope & relations with architecture; man's role in

designing and developing settlements; various factors influencing development of settlements.

## **UNIT-2: SETTLEMENT PLANNING IN ANCIENT INDIA [6]**

General information of various settlement planning principles Indus valley city, typical Hindu Aryan city, typical Dravidian temple city. Settlement planning principles developed and contributed by Egyptians, Greeks and Roman etc. Classical European city, medieval European city, European Renaissance city; study of selected historical examples of villages, towns, forts, palaces, gardens, public places etc.

## **UNIT-3: PLANNING IN THE PRE INDEPENDENT INDIA [6]**

Contribution of Mughal and British; typical Muslim city in India, bazaar based traditional city; British colonial city.

## **UNIT-4: MODERN PLANNING PRINCIPLES [6]**

Ebenezer Howard - Garden city movement, Patrick Geddes, Dr. C.A. Doxiadis, Le Corbusier, Soria Y Mata - Linear city Clarence, A. Perry - The neighbourhood concept.

## **UNIT-5: URBAN & RURAL SETTLEMENTS [6]**

Their differences, origin, evolution and growth of settlements: site and situation, major function

of a city, city forming and city serving functions; the relationship between urban and rural areas.

### **TEXT BOOKS/REFERENCE BOOKS:**

- Burn, Stanley & Williams, Jack, "Cities of the World, - World Regional Urban Development", Harper & Row, New York, 1983.
- Keeble, Lewis, "Principles and Practice of Town and Country Planning", The Estates Gazette Ltd. London, 1972.

<b>Course outcomes:</b>	
1.	The student will understand and familiarize the planning concepts of eminent town planners, will be acquainted with the current issues in urban planning
2.	They will be exposed to classification of settlements, land-use, zoning, types of development plan and familiarize the students with simple Town planning techniques.

Course code	Course title	L	T	P	Credits
ARC-302	BUILDING SERVICES - III	2	0	0	2

### **Course Objectives:**

This course is intended to integrate the knowledge of mechanical services in building
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**UNIT-1: INTRODUCTION [8]**

Introduction of mechanical services, its internal and external components, their functions and

principles of air-conditioning. AIR CONDITIONING: Introduction; comfort conditions within built environment; basic refrigeration systems; refrigeration system components, vapor compression

cycle; concept of cooling load, introduction to calculation of cooling load; concept of zoning; air-

conditioning methods, equipments and ducting: their space requirements and placements. TYPES

OF AC UNITS: Unit type equipment: (i) room A.C. & (ii) split A.C.; Package units: (i) fully self contained (factory made) & (ii) split type units; central DX plants and central chilled water plants;

schematic details of various systems, comparison of various systems; space data of A.C. equipment

rooms.

**UNIT-2: VERTICAL TRANSPORTATION: [6]**

Lifts, moving walkways and escalators, their layouts; Lifts: types of lifts, dimension of lifts; traffic analysis, calculation of round trip time and selection of lifts. Hoist way/shaft/well, machine room & pit, arrangement of lifts; Escalators - characteristics, dimensions and arrangements of escalators

**UNIT-3:L.P.G / BIO-GAS INSTALLATIONS: [4]**

Their location and layouts in residential and non-residential buildings.

**UNIT-4:FIRE SAFETY: [6]**

Causes of fire, mechanism of fire spread in buildings, classification of fire. grades of fire hazard

—

personal hazard, internal hazard & exposure hazard classification of building based on occupancy;

high temperature effects and combustibility of building materials and structure.

**UNIT-5:FIRE RESISTANCE OF BUILDINGS [4]**

Fire escape staircases and fire fighting equipments/ alarms- their spatial requirements and locations;

passive and active fire precautions; site planning, heat sensitive detectors, fire alarm system, means of escape. fire fighting installations: hose reel, internal hydrant system, CO2 system, wet risers, etc

#### **TEXT BOOKS/REFERENCE BOOKS:**

- McKay, W.B., “Building Construction Volume I, II, III and IV”, Longmans, UK, 1955.
- Ching, Francis D. K., Adams, Cassandra, “Building Construction Illustrated”, Wiley & Sons, Incorporated, John.
- Barry. R., “The construction of Buildings”, The English Language Book society and Crosby Lockwood, London, 1976.
- Chudley, Roy, “Construction Technology”, Longman, 2005.
- Arora, S.P. & Bindra, S.P., “The text book of Building Construction”, Dhanpat Rai Publications, 2009.

<b>Course outcomes:</b>	
1.	The student understand the importance, installation and working of essential services in buildings, and a way building services help in generating a cleaner and healthier built environment.

Course code	Course title	L	T	P	Credits
CEA-212	STRUCTURES IN ARCHITECTURE IV	2	0	0	2

#### **Course Objectives:**

- To introduce the basic concept of structures and enable the students to analyze, understand the fundamentals and working of various parts of different structural systems.

### **UNIT-1: [6]** **CONCEPTS & DESIGN OF R.C.C STRUCTURES**

Introduction to concepts of R.C.C. structure and structural components like tie, stirrups, beams, arch, vault, dome etc; type of structures and structural framing, rigid jointed, pin jointed etc.

Permissible stresses - limit states; characteristic strength and load; partial safety factor; deflection; modification factors.

### **UNIT-2: [6]** **R.C.C BEAMS** - Design principles of limit state methods; design of singly reinforced, doubly reinforced, T & L beams by LSD method with IS code specifications; design for shear, illustrative examples.

### **UNIT-3: [6]** **R.C.C SLABS** - One way and two way slabs for different edge conditions; continuous slabs - IS

code specifications, illustrative examples.

**R.C.C COLUMNS** - Reduction factors; compression members and slender columns; design of columns - columns with helical reinforcement, IS code specifications, illustrative examples.

**UNIT-4:** [4]

**R.C.C STAIRCASES** – Types; design as per IS code specifications, illustrative examples.

**UNIT-5:** [6]

**R.C.C FOOTINGS** - Design of isolated footings - square, rectangular and circular footings; strip footings; combined footings, illustrative examples.

#### REFERENCE BOOKS

1. Jain, Ashok. K., "Reinforced concrete structures", New Chand & Bros, Roorkee, 1992.
2. Shah, H.J., "Reinforced concrete - Vol I", Charotar Publishing House, Anand, 1994
3. Sinha, N.C. & Roy, S.K., "Reinforced Concrete Structures", S. Chand & Company Ltd., New Delhi, 1983.

Course outcomes:	
1.	The architecture student should understand the process of limit state method of structural design off RCC structures
2.	Develop the ability to interpret structural drawings to the contractor in the building site

Course code	Course title	L	T	P	Credits
ARC-354	SITE PLANNING AND LANDSCAPE DESIGN	2	0	4	4

#### Course Objectives:

This course intends to develop an understanding of Site Planning and landscape architecture to compliment architectural design.

**COURSE CONTENT:** [84]

1. To introduce site planning, its scope and role; environmental/ regional context in site planning and landscape design.
2. To highlight the importance of site analysis and study the various onsite and offsite factors of a site. (Factors involved accessibility, size and shape of sites; confirming and non-conforming uses; climate and topography, infrastructure available, sources of water supply and means of disposal system, architectural and visual aspects).
3. To prepare site analysis diagrams.
4. To prepare contour drawings and understand the concepts of surface drainage and watershed.
5. To study various factors affecting site planning and landscape design: geological setup, topography, slope, drainage network, flora and fauna.

6. Preparation of maps of matrix analysis, composite analysis, locality plans, topographical analysis.
7. Design exercise incorporating the following: Access network, parking and service planning, service layouts and trenching; Landscape constructions: pavings, curbs, edgings, drains, trees, plants in paved areas, landscape furniture etc; ponds, pools, waterways and fountains.
8. Study oriented work involving study of the use of outdoor spaces by different user groups, landscape elements, street furniture, etc.
9. To study and prepare the ecological profile of an area.
10. To study architectural examples where nature is an integral part of the design:-
  - Introduction of landscape architecture and major garden styles
  - Basic elements of landscape- land , water & vegetation
  - Study and detailing of hard and soft landscape
  - Services related to landscape-plumbing, electrical, sewage, water supply
  - Plant material- trees, shrubs, ground cover and indoor plants
  - Grading and slopes
  - Landscape design concept of various countries-Europe, Japan, India, China,Renaissance

Course code	Course title	L	T	P	Credits
ARC-355	ARCHITECTURAL DESIGN - III	2	0	8	6

#### **Course Objectives:**

To educate students about urban development control for multi-storied structure by using codes and building bye-laws.

#### **COURSE CONTENT:**

**[140]**

#### **DESIGN OF A MULTI-FUNCTIONAL PUBLIC BUILDING IN THE URBAN SETTINGS :**

- To highlight Projects to include buildings or building complexes with multi - use public activities, i.e. campus design with more than one building accommodated in the same premises.
- Introduction to urban development controls, codes and bye-laws; exercise in articulation and manipulation of programmed needs; criticism and evaluation of alternative concepts, understanding of complex relationship between the form, function, structure and aesthetics in a building, Contextual Design,decision-making process; use of computers as an aid to Design.
- e.g: Campus design (single or multistoried type) in urban settlement such as courts, college/ university campus, commercial complex, etc.

#### **Nature based architecture with integration of site planning and landscape, building construction and services.**

- Design of a holiday resort, beach resort, sparesort, weekend cottages etc on sites of natural abundance.

- Demonstration of use of natural elements on and off site as propagator of design concept; site development by exploiting natural forms etc; contextual design.

#### TEXT BOOKS / REFERENCE BOOKS:

1. Kanvinde& Miller, "Campus Design in India: Experience of a Developing Nation", Jostens/American Yearbook Company, 1969
2. Dober R., "Campus Planning", Reinhold Pub. Corp., 1968
3. Spreiregen, Paul D. "Urban Design: The Architecture of towns and cities", R.E. Krieger
4. Zevi, Bruno, "Modern Language of Architecture", Da Capo Press, 1994
5. YoshinobuAshihara "Exterior design in Architecture", Van Nostrand Reinhold,1981.

<b>Course outcomes:</b>	
1.	Understanding the making and meaning of spaces and how spaces relate to one another
2.	To begin to question the idea of "built expression" and "meaning" with respect to materials in architecture

Course code	Course title	L	T	P	Credits
ARC-356	BUILDING CONSTRUCTION AND TECHNOLOGY-V	1	0	4	3

<b>Course Objectives:</b>
To give an introduction to building elements and expose the student to the process of building construction

#### COURSE CONTENT:

[70]

1. To study different types of partitions and their properties.
2. To study and prepare drawings on the joinery details and constructional techniques involved in timber partitions, single and double skinned partitions, partially glazed partitions.
3. To study various types of aluminum partitions, its extrusions & details of components for partitions.
4. To study aluminum panels for partitions, cladding component for various structures, aluminum grill modules.
5. To study and prepare drawings on various types of wall finishes - external facing and veneers - stone facing, wall facing, wall tiling, and cement concrete facing - methods of construction and details pertaining to the same.
6. To introduce fixing devices in walls, ceilings and floors of solid construction.



7. To understand the purpose and functions of joints in building construction and to prepare drawings on the types of joints that occur in buildings.
8. To prepare drawings on expansion joints in Brick walls and R.C.C. framed structures and its construction details and materials involved in the construction.
9. To study different types of roofing of industrial buildings.
10. To understand and prepare drawings on the construction details of Curtain walls in glass, aluminum, precast concrete units etc.

#### **TEXT BOOKS / REFERENCE BOOKS:**

- Rangwala, S. C., “Building Construction”, Charotar Publishing House, 2007.
- McKay, W.B., “Building Construction Volume I, II, III and IV”, Longmans, UK, 1955.
- Ching, Francis D. K., Adams, Cassandra, “Building Construction Illustrated”, Wiley & Sons, Incorporated, John.
- Barry. R., “The construction of Buildings”, The English Language Book society and Crosby Lockwood, London, 1976..
- Arora, S.P. & Bindra, S.P., “The text book of Building Construction”, Dhanpat Rai Publications, 2009.

<b>Course outcomes:</b>	
1.	Knowledge of Different Material used for Construction and their fixing Details.
2.	Understanding the expansion joints used for large scale buildings.

### **Bachelor in Architecture**

#### **B.Arch (SIXTH SEMESTER)**

Course code	Course title	L	T	P	Credits
<b>ARC-311</b>	<b>PRINCIPLES OF HUMAN SETTLEMENTS-II</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **Course Objectives:**

The course aims at introducing the history of development of settlement planning and also gives emphasis on tracing broad principles of settlement design.

#### **UNIT-1: BASIS FOR PLANNING [6]**

Understanding the social, cultural and economic basis for planning; evolution of society from tribal, rural and urban to present time; relationship between social structure and spatial structure; need for social, economical, physical, technical and environmental as part of a comprehensive planning system; basic principles of regional planning.

#### **UNIT-2: EVOLUTION OF PLANNING THEORY [4]**

Aim and objects of planning; understanding planning as a social, economic, political, technical and environmental process of shaping of living environment.

**UNIT-3:PLANNING PROCESS****[6]**

Development plan, structure plans, master plans: scope and objectives, planning as an integrated systematic activity related to different sectors of economy. understanding planning as a multi-level comprehensive process of development through local, urban, rural, regional and national planning.

**UNIT-4: PROBLEMS FACED BY A TYPICAL CITY****[6]**

Activity pattern and landuse, traffic and road network, density of population; central business district of a city; urban nodes, fringe area and suburbs; Migration and urban population explosion; problem caused due to this including slums; human, social and environmental problems and issues in Indian context.

**UNIT-5 (a) INTERNAL SPATIAL STRUCTURE****[6]**

Concentric theory, Sector theory, Multi nuclei theory, Inverse concentric theory; pattern of settlements in region and their major function; Satellite towns.

**B) NEW TOWNS:** Development of new towns and cities. Study of new towns in India such as Chandigarh, Bhubaneswar, Gandhinagar and Navi Mumbai.

**TEXT BOOKS / REFERENCE BOOKS:**

- Burn, Stanly& Williams, Jack, "Cities of the World, - World Regional Urban Development", Harper & Row, New York, 1983.
- Keeble, Lewis, "Principles and Practice of Town and Country Planning", The Estates Gazette Ltd. London, 1972.

<b>Course outcomes:</b>	
1.	To understand the city as a large system composed of physical components such as circulation networks, districts, open spaces and its delimiting legal edge.
2.	The components have emerged, transformed and sustained their character in settlements under varying conditions in the course of history.
3.	With the understanding of city and its components, the modern planning process as applied to a settlement is studied.

Course code	Course title	L	T	P	Credits
ARC-312	BUILDING SERVICES - IV	2	0	0	2

**Course Objectives:**

This course in Architectural Acoustics offers an intense curriculum in acoustics for effectively shaping sonic environments to achieve optimum acoustic performance and sound quality.

## **UNIT-1: INTRODUCTION TO ACOUSTICS**

**[4]**

General principles of sound, its origin, propagation and sensation; behavior of sound with

Respect to various surfaces and in an enclosed space. Reflection of sound and their applications;

reverberation time and sound levels and their calculations.

## **UNIT-2: SOUND ABSORBING MATERIALS**

**[6]**

Absorption of sound, sound absorption coefficient; sound absorbing materials - porous materials, panel / membrane absorbers & cavity / Helmholtz resonators; absorption coefficients of indigenous acoustical materials; space / functional absorbers; mounting conditions and its impact on sound absorption.

## **UNIT-3: CONSTRUCTIONAL AND PLANNING MEASURES**

**[6]**

For good acoustical design; Acoustical defects and remedies, Sound application systems, Case studies for the above aspects.

## **UNIT-4: ACOUSTICAL DESIGN OF AUDITORIUMS**

**[6]**

Adequate loudness, uniform distribution of sound energy, optimum reverberation time & elimination of acoustical defects. Methods of raking the auditorium floor and the balcony. Acoustical Design of seminar rooms, Conference halls, Cinema Theatres etc.

## **UNIT-5 NOISE**

**[6]**

Outdoor & indoor noise (air traffic, rail traffic, road traffic and sea shore & inland water traffic), Planning & Design against Outdoor Noise - for air traffic, road traffic and rail traffic, airborne noise & structure borne noise / impact noise, community noise, & industrial noise; transmission of noise & transmission loss; maximum acceptable noise levels; means of noise control & sound insulation. Sources of industrial noise.

## **TEXT BOOKS / REFERENCE BOOKS:**

1. Egan, M. David, "Architectural Acoustics", J. Ross Publishing 2007.
2. Templeton, Duncan & Saunders, David, "Acoustic Design", The Architectural Press, London, 1987.
3. Templeton (ed.), "Acoustics in the Built Environment", Butterworth, London, 1993.
4. Mehta, Johnson & Rocafort, "Architectural acoustics: principles and design", Prentice Hall, 1999.

<b>Course outcomes:</b>	
1.	Understanding the advanced service requirements of buildings- Acoustics and lighting

2.	To teach the schematic layout for Acoustics
3.	To teach the importance and emphasis on lighting in buildings

Course code	Course title	L	T	P	Credits
ARC-313	ESTIMATION ,COSTING AND SPECIFICATION	2	0	0	2

### Course Objectives:

To educate students in computing quantities of various building items for simple load bearing structures, R.C.C. framed structure, steel structure, building services such as water supply, sanitation and drainage, electrical installations, acquainting them with rates of various building items and acquaints them with various types of estimates including mode of measurements.

### UNIT-1:

[6]

**INTRODUCTION&TERMINOLOGY:** Introduction to quantity surveying, definition, aim and object, scope and importance of subject; method of preparing estimates, data required for framing estimate and type of estimates. Mensuration, standard mode of measurements, schedule of rates, administrative approval, technical sanction, competent authority, issue rate, interest, indent of work, etc.

### UNIT-2:

[6]

**METHODS OF APPROXIMATE ESTIMATING & DETAILED ESTIMATE:** Built up or carpet area method, cubic contents, method and numbers system, current rates in Delhi-NCR for approximate estimating. : method and procedure of working out quantities and abstract of estimate, bill of quantities of tender, contingencies; examples and exercise for working out quantities for items from excavation to the final finishing.

### UNIT-3:

[4]

**RATE ANALYSIS&MEASUREMENT OF WORKS:** Rate analysis, cost of material and labour for various works, detailed rate analysis of important items of construction work. Measurements of completed items for payment to contractors interim and final certificate. .

### UNIT-4:

[6]

**BUILDING SPECIFICATION :**Importance of specification in the building activities, method of writing correct order and sequence of use of materials; art of works; use of Indian Standard specification and P.W.D specifications. specification of basic materials required writing specifications of material along with emphasis on the quality of the materials and proper

sequence of construction in residential buildings , such as bricks, stone, concrete, R.C.C, plastering and various finishes, timber work, flooring materials, glazing, metals such as steel, brass, aluminium, etc .

#### UNIT-5:

[6]

**SPECIFICATION OF WORKS:-** Specification of works for a residential building- load-bearing type and/ or R.C.C framed type , Specification for materials used in roofing and roof such as tiles, A.C sheets, G.I and aluminium sheets, etc. Specifications for fixtures and fastenings, specification of works. construction of steel and R.C.C structure, ceiling and partition ,paneling, insulation and water- proofing, specification for services such as drainage, water-supply, electrical installation .Study of proprietary building materials along with manufactures specification, trade name of such materials;

**NOTE:** Sessional shall be submitted in the form of drawings and estimate report

#### TEXT BOOKS/REFERENCE BOOKS:

1. Dutta, B.N., "Estimating & Costing in Civil Engineering Theory & Practice", UBS Publishers' Distributors Ltd., New Delhi, 1995.
2. Rangawala, K.S., &Rangawala, K.K., "Elements of Estimating & Costing", Charotar Publishing House, Anand, 1984.
3. Patil, B.S., "Civil Engineering Contracts and Estimates", Universities Press, 2006
4. I.S.I. Handbook of measurements of building works.

Course outcomes:	
1.	Students learn the art of building construction through specification writing.
2.	Students learn to work out the approximate estimate, detailed estimate for small scale building projects and low cost housing.

Course code	Course title	L	T	P	Credits
CEA -311	STRUCTURES IN ARCHITECTURE - V	2	0	0	2

#### Course Objectives:

The objective of the course is to develop a feel for structural principles as they relate to a building design, to enable him to make an informed choice regarding the most appropriate structural system for this building and to develop a reasonable understanding of its operational and economic implications.

#### UNIT-1: DETERMINATE AND INDETERMINATE STRUCTURES

[4]

Definitions, Degree of Redundancy and Examples, Externally Indeterminate Structures,

Internally Indeterminate Structures, Difference between determinate and indeterminate structures, Indeterminacy of truss beams, Portal Frames.

## **UNIT-2: WORKING STRESS METHOD**

**[6]**

Introduction to Working Stress Method Singly Reinforced Beams: Introduction, Bending of Beam Assumptions, Moment of Resistance, Modes of Failure, Maximum Depth of Neutral Axis, Limiting Values of Tension Steel and Moment of Resistance, Minimum and Maximum Tension Reinforcement, Effective Span, Type of Problem .Doubly Reinforced Beams: Introduction, Problems, Stress and Compression, Reinforced Design Stress, Minimum and Maximum Reinforcement. Flanged Beams: Introduction, Effective Width of Flange, Minimum and Maximum Reinforcement

## **UNIT-3:LIMIT STATE METHOD**

**[6]**

Limit State Method vs Working Stress Method, Introduction, Limit State, Characteristic Strength and Characteristic Load, Design Values, Partial Safety Factor, Factored Loads, Stress-Strain Relationship for Concrete and Steel, Yield Stress .Theory and Design of Singly Reinforced, Doubly Reinforced and T-Beam(Limit State Method)

## **UNIT-4: ELEMENTS OF SOIL MECHANICS**

**[6]**

Soil as a Three Phase System, Density of Soil, Unit Weight, Moisture Content, Void Ratio, Porosity, Degree of Saturation, Different Types of Soils, Bearing Capacity

RETAINING WALLS:Types, Active Earth Pressure, Passive Earth Pressure

## **UNIT-5: FOUNDATION ENGINEERING**

**[6]**

Spread Footing, Isolated Footing, Combined Footing, Raft Foundation, Pile Foundations including Under Reamed Piles, Grillage Foundation,Construction of Foundation in Water Logged Areas including Dewatering of soil or soils having harmful salts.

## **TEXT BOOKS / REFERENCE BOOKS:**

- Jain,A.K., Elementary Structural Analysis, Nem Chand Bros. Roorkee.
- Jain, O.P. and Jain B.K., Theory of Structures, Vol. 1, Nem Chand Bros. Roorkee.

<b>Course outcomes:</b>	
1.	Introduce students to various materials and their intrinsic properties.
2.	Understand how various materials function when loaded
3.	To understand how different materials interact with each other

Course code	Course title	L	T	P	Credits
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ARC-365	ARCHITECTURAL DESIGN - IV	2	0	8	6
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**Course Objectives:**

To educate students about multi-storied frame structure and various housing schemes by using codes and building bye-laws and also considering the social , economical , environmental aspects.

**COURSE CONTENT:**
**[140]**
**DESIGN OF HIGH DENSITY, LARGE-SCALE HOUSING**

Socio-economic determinants, legislative and economic constraints and technological alternatives shall be studied in detail. Exercises in simulation and conceptual modeling shall be conducted. Application of concepts of community participation, phasing, financing and construction planning. Projects may include multistoried apartments or group housing etc.

**DESIGN FOR PEOPLE WITH SPECIAL NEEDS**

Design of residential accommodation for senior citizens or differently-abled persons with emphasis on barrier free architecture. Students are required to understand the special needs of these people-, physical, mental and social and provide design solutions accordingly. Projects may include the design of Old Age homes, Hostels for the Disabled, Rehabilitation centers etc.

**TEXT BOOKS / REFERENCE BOOKS:**

- URPFDI Guidelines
- Neufert's Architecture Data
- Time Saver Standards
- National Building Code

**Course outcomes:**

1.	Exploring and designing for city level
2.	Understanding the language of city spaces, plazas, etc in architectural design
3.	Develop Design for People with special need as their design requirement

Course code	Course title	L	T	P	Credits
ARC-366	BUILDING CONSTRUCTION AND TECHNOLOGY- VI	1	0	4	3

**Course Objectives:**

To give an introduction to building elements and expose the student to the process of building construction.

**COURSE CONTENT:****[70]**

1. To study and prepare drawings on suspended ceilings and false ceiling using aluminum sections.
2. To understand the various construction details for providing thermal insulation.
3. To study insulation materials like glass wool, insulating boards, gypsum boards, plaster of paris and various kinds of perforated boards.
4. To study the fixing details of sound absorbing materials, its properties and uses.
5. To study various damp - proofing materials like bitumen, felts, etc. Relevant construction chemicals for W.P.C. & O.P.C. Study of construction chemical products.
6. To prepare drawings on various types of foundations: raft foundation, pile foundation etc.
7. To study various techniques of termite proofing. To prepare drawings on various cavity wall construction techniques.
9. To study and prepare drawings on fire resisting constructions.
10. To study the different types of structures (timber and steel, literature survey on temporary structures.

**TEXT BOOKS / REFERENCE BOOKS:**

- Rangwala, S. C., "Building Construction", Charotar Publishing House, 2007
- McKay, W.B., "Building Construction Volume I, II, III and IV", Longmans, 1955
- Ching, Francis D. K. and Adams, Cassandra, "Building Construction Illustrated", Wiley and Sons, 2000
- Barry, R, "The Construction of Buildings", The English Language Book Society and Crosby Lockwood, 1976
- Chudley, Roy, "Construction Technology", Longman, 2005

**Course outcomes:**

1.	The students will gain knowledge of material properties and construction techniques,
2.	Exposed to the advanced construction systems developed by research organizations in India

Course code	Course title	L	T	P	Credits
ARC-367	WORKING DRAWING	1	0	4	3

**Course Objectives:**

This course provides clear explanations of why working drawings are required, what they must contain to be relevant, the importance of understanding drawing intent and content, and how to combine individual drawings into meaningful and construction-ready sets.

**COURSE CONTENT:****[70]**



- To prepare working drawings of a Frame Structure for Design problem done during preceding years, indicating to appropriate scale
- Prepare working drawings related to their design drawings
- To design Staircase & provide details of Balustrade & their fixing , Material Used etc.
- Preparation of working drawings for
- All floors from basement to roof top plans, foundation, columns, beams, doors and windows along with details. - Scheduling of different finishes, doors, windows including hardware fixtures.
- Layout plan showing different buildings/blocks on site, internal roads, water supply, sewerage including area drainage plan.
- Elevations: Elevations of all sides (front, back and both sides).
- Sections: Transverse and longitudinal sections, sections through staircase, lift and sanitary units.
- Details of terracing- roof drainage system layout
- Details of electrical drawing and lighting - Layout of electrical lines and fixtures
- Details of water supply and plumbing
- Details of toilet and kitchen for all floors with plumbing pipes

#### **TEXT BOOKS / REFERENCE BOOKS:**

- [Wakita,Linde&Bakhoun](#). “The Professional Practice of Architectural Working Drawings”, John Wiley & Sons, 2011
- Liebing, Ralph W. “Architectural Working Drawings”, John Wiley & Sons, 1999.
- Styles & Bichard, “Working Drawings Handbook”, Taylor & Francis, 2004.
- Stitt, “Working Drawing Manual”, McGraw-Hill Professional, 1998.

<b>Course outcomes:</b>	
1.	Identify architectural requirements and governing codes
2.	Able to produce a set of commercial construction drawings to include a site plan, floor plans, reflected ceiling plan, sections, elevations, schedules, and details

### **Bachelor in Architecture**

#### **B.Arch (VII SEMESTER)**

Course code	Course title	L	T	P	Credits
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ARC-401	ADVANCED SERVICES	2	0	0	2
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**Course Objectives:**

To impart knowledge about the special service requirements of tall buildings and to create awareness about the systems, equipment and materials that are commonly employed in high rise buildings. Understanding the special systems required in mechanical, electrical and Fire safety services. The ability to design vertical transportation systems, HVAC systems and Fire protection systems in line with the various standards, building codes and safety requirements

**UNIT-1: [4]**

**VERTICAL TRANSPORTATION :**

Introduction to passenger elevator codes ; Express & Local Elevators, Sky lobbies etc., ; Study of elevator equipments, control systems and spatial requirements ; Escalators and Capsule elevators ; Stairways & Ramps

**UNIT-2: [6]**

**FIRE PROTECTION :**

Designing for fire safety ; NBC ; Fire alarm systems ; Smoke detectors ; Fire fighting support systems ; Fire rating of materials ; Fire escape stairs & Safety regulations ; Lightning protection.

**UNIT-3: [6]**

**THERMAL CONTROL SYSTEMS :**

Calculation of Heating and Cooling loads ; Selection of suitable HVAC system ; Special equipments systems for heating and cooling ; Spatial requirements for HVAC plants ; Design of duct layouts etc.

**UNIT-4:**

**[6]**

**WATER SUPPLY :**Basic planning for water supply ; Calculation of capacity for sumps and water tanks ; Skip stage pumping etc., ; Rainwater harvesting methods.

**ELECTRICAL SYSTEMS :**Planning transformer & generator rooms, Preparation of electrical layouts for tall buildings – Spatial requirements of electrical rooms and ducts – Intelligent systems for electrical and illumination.

**UNIT-5: [6]**

**SEWAGE & GARBAGE DISPOSAL** :Sanitation arrangements in high rise structures ; Service floors ; Ducts and vertical shafts ; Waste treatment etc., In context to hotels, hospitals and multistoried residential properties

**TEXT BOOKS/REFERENCE BOOKS:**

1. Stein Reynolds Mc Guinness, “ Mechanical and Electrical equipment for buildings – vol 1 & 2”, John Wiley & sons
2. Francisco AsensioCerver ,” The architecture of Skyscrapers”, Hearst Book International, New York, 1997
3. Bennetts Ian & others,”Tall building structural systems”
4. Proceedings of the council for tall buildings – vol 1

Course outcomes:	
	The student understand the importance, installation and working of essential services in buildings, and a way building services help in generating a cleaner and healthier built environment

Course code	Course title	L	T	P	Credits
ARC-402	DESIGN RESEARCH METHOD	2	0	0	2

**Course Objectives:**

The objective of seminar work is to train the students to prepare state of art report by assimilation of concepts/ideas on the chosen topics which could be in continuation with the earlier works in previous semesters..

**UNIT-1:**

[6]

**RESEARCH & TYPES OF RESEARCH:**Definition; Characteristics ;Objectives; Research and Scientific method . Descriptive vs. Analytical Research; Applied vs. Fundamental Research; Quantitative vs. Qualitative Research; Conceptual vs. Empirical Research.

**UNIT-2:**

[6]

**RESEARCH PROCESS & DATA COLLECTION:**Basic Overview, Formulating the Research Problem, Defining the Research Problem. Observation Method; Interview Method; Questionnaires; Literature study Case Study Method; Computer & Internet: Its Role in Research.

**UNIT-3:**

[6]

**PROCESSING AND ANALYSIS OF DATA** :Processing Operations; Statistics in Research; Descriptive Statistics; Inferential Statistic; Elements / Types of Analysis

**UNIT-4:****[4]****CITATION METHODS :**Foot Note; Text Note; End Note; Bibliography**UNIT-5:****[6]**

**SEMINAR :**The state of art prepared on the chosen topics is studied and analyzed on the identification of areas for the research and development. Alternatively the students can also identify new topics for the seminar work which can be further developed into a thesis work in the final semester. The progress of seminar work is presented and discussed by the students periodically in the classroom environment and progress monitored continuously. The students are also encouraged to seek guidance from the experts in the related fields.

<b>Course outcomes:</b>	
	Students are expected to come out with more specific findings and recommendations, better innovative solutions through an extensive literature study and data collection from the field

**TEXT BOOK / REFERENCE BOOKS**

1. Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)
2. Montgomery, Douglas C. &Runger, George C. (2007), 3/e, Applied Statistics &Probability for Engineers (Wiley India)
3. Kothari C.K. (2004), 2/e, Research Methodology- Methods and Techniques (New Age International, New Delhi)
4. Krishnaswamy, K.N., Sivakumar, Appalyer and Mathiranjana M. (2006), Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi).

**Bachelor in Architecture****B.Arch (VII SEMESTER)**

Course code	Course title	L	T	P	Credits
ARC-401	ADVANCED SERVICES	2	0	0	2

Course Objectives:
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To impart knowledge about the special service requirements of tall buildings and to create awareness about the systems, equipment and materials that are commonly employed in high rise buildings. Understanding the special systems required in mechanical, electrical and Fire safety services. The ability to design vertical transportation systems, HVAC systems and Fire protection systems in line with the various standards, building codes and safety requirements

**UNIT-1:** [4]

**VERTICAL TRANSPORTATION :**

Introduction to passenger elevator codes ; Express & Local Elevators, Sky lobbies etc., ; Study of elevator equipments, control systems and spatial requirements ; Escalators and Capsule elevators ; Stairways & Ramps

**UNIT-2:** [6]

**FIRE PROTECTION :**

Designing for fire safety ; NBC ; Fire alarm systems ; Smoke detectors ; Fire fighting support systems ; Fire rating of materials ; Fire escape stairs & Safety regulations ; Lightning protection.

**UNIT-3:** [6]

**THERMAL CONTROL SYSTEMS :**

Calculation of Heating and Cooling loads ; Selection of suitable HVAC system ; Special equipments systems for heating and cooling ; Spatial requirements for HVAC plants ; Design of duct layouts etc.

**UNIT-4:**

[6]

**WATER SUPPLY :**Basic planning for water supply ; Calculation of capacity for sumps and water tanks ; Skip stage pumping etc., ; Rainwater harvesting methods.

**ELECTRICAL SYSTEMS :**Planning transformer & generator rooms, Preparation of electrical layouts for tall buildings – Spatial requirements of electrical rooms and ducts – Intelligent systems for electrical and illumination.

**UNIT-5:** [6]

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**TEXT BOOKS/REFERENCE BOOKS:**

5. Stein Reynolds Mc Guinness, " Mechanical and Electrical equipment for buildings – vol 1 & 2", John Wiley & sons
6. Francisco AsensioCerver , " The architecture of Skyscrapers", Hearst Book International, New York, 1997
7. Bennetts Ian & others, "Tall building structural systems"
8. Proceedings of the council for tall buildings – vol 1

**Course outcomes:**

The student understand the importance, installation and working of essential services in buildings, and a way building services help in generating a cleaner and healthier built environment

Course code	Course title	L	T	P	Credits
ARC-402	DESIGN RESEARCH METHOD	2	0	0	2

**Course Objectives:**

The objective of seminar work is to train the students to prepare state of art report by assimilation of concepts/ideas on the chosen topics which could be in continuation with the earlier works in previous semesters..

**UNIT-1:**

[6]

**RESEARCH & TYPES OF RESEARCH:** Definition; Characteristics ;Objectives; Research and Scientific method . Descriptive vs. Analytical Research; Applied vs. Fundamental Research; Quantitative vs. Qualitative Research; Conceptual vs. Empirical Research.

**UNIT-2:**

[6]

**RESEARCH PROCESS & DATA COLLECTION:** Basic Overview, Formulating the Research Problem, Defining the Research Problem. Observation Method; Interview Method; Questionnaires; Literature study Case Study Method; Computer & Internet: Its Role in Research.

**UNIT-3:**

[6]

**PROCESSING AND ANALYSIS OF DATA :**Processing Operations; Statistics in Research; Descriptive Statistics; Inferential Statistic; Elements / Types of Analysis

**UNIT-4:**

[4]

**CITATION METHODS :**Foot Note; Text Note; End Note; Bibliography

## UNIT-5:

[6]

**SEMINAR :** The state of art prepared on the chosen topics is studied and analyzed on the identification of areas for the research and development. Alternatively the students can also identify new topics for the seminar work which can be further developed into a thesis work in the final semester. The progress of seminar work is presented and discussed by the students periodically in the classroom environment and progress monitored continuously. The students are also encouraged to seek guidance from the experts in the related fields.

### Course outcomes:

Students are expected to come out with more specific findings and recommendations, better innovative solutions through an extensive literature study and data collection from the field
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## TEXT BOOK / REFERENCE BOOKS

5. Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)
6. Montgomery, Douglas C. & Runger, George C. (2007), 3/e, Applied Statistics & Probability for Engineers (Wiley India)
7. Kothari C.K. (2004), 2/e, Research Methodology- Methods and Techniques (New Age International, New Delhi)
8. Krishnaswamy, K.N., Sivakumar, Appalyer and Mathiranjani M. (2006), Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi).

Course code	Course title	L	T	P	Credits
ARC-403	INTERIOR DESIGN	2	0	0	2

### Course Objectives:

- To inform the various components of interior space and treatment and finishes for the same.
- To familiarize the student with the various components of interior design like lighting, landscaping and furniture.

## UNIT-1:

[6]

**INTRODUCTION TO INTERIOR DESIGN :** Definition of interior design ; Interior design process ; Vocabulary of design in terms of principles and elements ; Introduction to the design of interior spaces as related to typologies and functions; themes and concepts ; Study and design, Brief study of the **history of interior design** through the ages relating to historical context; design movements and ideas etc. ; Brief study of folk arts and crafts (vernacular design in India) with reference to interior design and decoration

## UNIT-2:

[6]

**ELEMENTS OF INTERIOR DESIGN - ENCLOSING ELEMENTS :** Introduction to various elements of interiors like floors, ceilings, walls, staircases, openings, interior service

elements; incidental elements etc. and various methods of their treatment involving use of materials and methods of construction in order to obtain certain specific functional, aesthetic and psychological effects.

**UNIT-3:** [6]

**ELEMENTS OF INTERIOR DESIGN– LIGHTING ACCESSORIES :** Study of interior lighting; Different types of lighting their effects types of lighting fixtures; Other elements of interiors like accessories used for enhancement of interiors ; Paintings, objects de art, etc

**INTERIOR LANDSCAPING :**Elements like rocks, plants, water, flowers, fountains, paving, artifacts, etc.; their physical properties; effects on spaces and design values.

**UNIT-4:** [6]

**ELEMENTS OF INTERIOR DESIGN - FURNITURE DESIGN & SPACE PLANNING**

: Study of the relationship between furniture and spaces; human movements & furniture design as related to human comfort; Function, materials and methods of construction ; changing trends and lifestyles ; innovations and design ideas; Study on furniture for specific types of interiors like office furniture, children's furniture, residential furniture, display systems, etc.

**UNIT-5:** [4]

**DESIGN PROJECTS-** Residential, Commercial and Office Interiors.

Course outcomes:	
1.	An understanding of interior design as an interdisciplinary as well as allied field related to architecture.

**TEXT BOOKS / REFERENCE BOOKS:**

1. Francis D.K.Ching, “ interior design illustated” U.N.R publication.NY1987
2. PremavathySeetharaman, ParveenPannv“ Interior Design and Decoration” CBS publication, 2015
3. Julius PENERO and Martin Zelnik, 'Human Dimensions and Interior Space' Whitney library of design, NY 1979
4. SyanneSlesinAnd Stafford Ceiff 'Indian Style,ClarksonN.Potter', New York 1990.
5. Gary Gordon 'Interior Lighting For Designers' John Willey&Sons-2003.
6. Kathryn.B.HiesingerAnd George H.Marcus,Landmarks Of Twentieth Century Design; Appey Ville Press,1993.
7. Inca/Interior Design Register,Inca Publications, Chennai,1989.
8. Steprt-DevanKness, Logan AndSzebely,'Introduction To Interior Design' Macmillan Publication

Course code	Course title	L	T	P	Credits
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ARC-404	SUSTAINABLE ARCHITECTURE (Elective)	2	0	0	2
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**Course Objectives:**

- To equip the students with multi-disciplinary approach to sustainable design such as design methodology, resource optimization and innovative approaches to eco-design.
- To familiarize the student with some of the acclaimed sustainable buildings designed within the past decade

**UNIT-1:**

[6]

Introduction to the ideas, issues and concepts of sustainable Architecture, global environment and the built environment, principles of environmentally and ecologically supportive architecture

**UNIT-2:**

[6]

Study of sustainable architecture, use of energy, materials, health and global environment as related to the construction and operation of buildings

**UNIT-3:**

[4]

Sustainable and conservation practices – water conservation, sewerage treatment, solid waste treatment, economics and management

**UNIT-4:**

[6]

Low energy design, hybrid systems, modeling and simulation of energy systems, integration of PV and wind systems in the building.

**UNIT-5:**

[6]

Wind solar and other non conventional energy systems, solar thermal applications for heating and cooling, electricity generation in buildings. Case studies on specific contemporary sustainable architecture.

**TEXT BOOK / REFERENCE BOOKS**

**Course outcomes:**

Students will get exposure to theoretical and practical aspects of sustainable design and technologies involved in executing them

Course code	Course title	L	T	P	Credits
ARC-405	URBAN AND REGIONAL PLANNING (Elective)	2	0	0	2

**Course Objectives:**

Students will understand the fundamental concepts and theories of urban design and apply them in their design projects

**UNIT-1:**

[4]

Basic components of urban areas and Regions

**UNIT-2:**

[6]

Role and working of Urban and Regional planning at different levels like national level, state level, district level etc.

**UNIT-3:**

[6]

Different planning theories and models.

**UNIT-4:**

[6]

Socio-cultural, economic planning, land use planning etc. General principles and working.

Planning norms and development norms for urban and Regional approaches

techniques of development for existing areas, renewal schemes and development.

**UNIT-5:**

[6]

Detailed survey and preparation of questionnaire for land use, socioeconomic, Transportation planning etc.

**TEXT BOOK / REFERENCE BOOKS**

**REFERENCE BOOKS**

1. Lynch, Kevin, "The Image of the City", MIT Press, Cambridge, Mass, 1960.
2. Paul. D. Spreiregen, " Urban Design - The Architecture of Towns and Cities", McGraw-Hill, 1980.
3. Krier, Rob, "Urban Space", Academy Editions, London, 1967
4. Gordon Cullen "The Concise Townscape", The Architectural press, 1978.
5. D. Gosling and Maitland, "Urban Design", St. Martins Press 1984.
6. Jonathan Barnett, "An Introduction to Urban Design", Harper & Row, Publishers, N.Y., 1982

<b>Course outcomes:</b>	
1.	Students will understand the terminologies, elements, principles & concepts & components of urban design techniques.
2.	It helps us to understand the evolution of urban development from past to present through various examples

Course code	Course title	L	T	P	Credits
CEA-312	STRUCTURES IN ARCHITECTURE - VI	2	0	0	2

#### Course Objectives:

The objective of the course is to develop a feel for structural principles as they relate to a building design, to enable him to make an informed choice regarding the most appropriate structural system for this building and to develop a reasonable understanding of its operational and economic implications.

#### UNIT-1: [6]

Method of analysis of different type of structures (Complex and composite).

#### UNIT-2: [6]

Design of continuous RCC and steel beams.Design of box and complex girder.

#### UNIT-3: [6]

Effect of wind and seismic forces on different elements of Multi storied structure.

#### UNIT-4: [4]

Concepts for design of shear walls and service core.

#### UNIT-5: [6]

Basic concepts for design of prefabricated structures, different forces acting on the elements.

#### TEXT BOOKS / REFERENCE BOOKS:

- Jain,A.K., Elementary Structural Analysis, Nem Chand Bros. Roorkee.
- Jain, O.P. and Jain B.K., Theory of Structures, Vol. 1, Nem Chand Bros. Roorkee.
- RamamruthamS.and Narayan R., "Theory of structures", DhanpatRai and sons, 2010.
- Punmia R.C., Jain Ashok kumarDr., Jain Arun Kumar, "Soil Mechanics and Foundations".
- Dr.RamchandraDr.&GehlotVirendra "Design of Steel Structures"..
- Jain Ashok K. "Reinforced Concrete Structures".

#### Course outcomes:

1. Understanding the designing of Prefabrication structures

Course code	Course title	L	T	P	Credits
ARC-455	ARCHITECTURAL DESIGN-V	2	0	10	7

#### Course Objectives:

- Understanding design as a function of specific agenda of complex services, acoustics, building byelaws and structure;
- To understand design as a process: of problem identification, space analysis, formulation of requirements, evolution of design criteria and design; Incorporating elements of site planning and landscape in the design process;
- Preparation of computer aided presentation drawings.

## **COURSE CONTENT:-**

**[168]**

### **Services and Byelaws in low-rise buildings:**

Suggested design exercises: Cinema Halls, Auditoriums, Indoor Stadiums etc.

### **Services and Byelaws in high-rise buildings:**

Suggested design exercises: Hospitals, Hotels, Super Markets etc.

## **APPROACH**

- Students will develop the programs after prototype studies.
- Computer drawings will be produced for at least one of the design programs.
- Time problems between major studio programs shall be given to prepare students for the examinations.

## **TEXT BOOKS/REFERENCE BOOKS:**

### **REFERENCE BOOKS:**

- URPFDI Guidelines
- Neufert's Architecture Data
- Time Saver Standards
- National Building Code

#### **Course outcomes:**

1.	The scholar gets exposure to urban design issues at the city level & the strategies that are commonly employed
2.	The housing project makes the student conversant with the problems in community living and how to address the same

Course code	Course title	L	T	P	Credits
ARC-456	ADVANCED BUILDING CONSTRUCTION & SERVICES	1	0	4	3

#### **Course Objectives:**

- To create an insight of the latest and advanced modern building construction typologies this will be more relevant at the professional level
- To introduce and familiarize the students with advanced and speedy building techniques;
- The understanding for the system to be adopted for the construction of large span

structures.

#### COURSE CONTENT:-

[70]

1. **Prefabrication:** Systems – open prefab system, large panel prefab system, joints, pre-casting methods, materials, on-site and off-site prefabrication, components, etc.
2. **Pre-stressed Concrete:** Introduction, methods of pre-stressing and their application to large-space structures.
3. **Speedy Construction:** Methods, Types of floor construction: Beam & Slab, Waffle Grid Slab, Drop Beam & Slab, Flush Slab, Lift Slab Construction; Cast-in-situ service & stair cores; Cross wall & Box frame construction.
4. **Industrial Construction**
5. **Structural Steel Works:** Portal Frame Construction, North-Light truss and Lattice Girder roof with various roof coverings

#### TEXT BOOKS:

1. W.B. Mickay – Building construction Vol 1, 2 and 3 – Longmans, UK 1981.
2. R.Chudley – Building Construction Handbook – BLPD, London 1990.
3. S.C.Rangwals – Engineering materials – Charotar Publishing, Anand.

#### REFERENCE BOOKS:

1. Dr.B.C.Punmia – *Building construction*
2. R.Chudley, *construction Technology*.
3. FranciesD.K.Ching – *Building Construction illustrated*. VNR, 1975.

#### Course outcomes:

1.	The students will gain knowledge of material properties and construction techniques of Glass, concrete,
2.	They get exposed to the advanced construction systems developed

Course code	Course title	L	T	P	Credits
ARC-457	ADVANCED STRUCTURAL DESIGN SYSTEMS	1	0	4	3

#### Course Objectives:

To introduce the basic concepts of Space Frames, Shells and folded plates and tensile structures. By the end of the course the student shall be capable of designing Shells and Space Frames. No detailed design but overall understanding of systems and factors is required. Further he shall have sufficient knowledge to suggest appropriate shells and folded plates and tensile structure for the space coverage.

**COURSE CONTENT:-****[70]**

1. **MODULE 1: SHELLS:** General Understanding of shell behavior, Historical Perspective and Modern day use, Thick and Thin shells, Membrane Stresses in Thin shells, Geometry of shell, Meridian stress.  
**SPACE FRAMES:** General Understanding, Space structures against Plain Structures, Examples
2. **MODULE 2: FOLDED PLATES:** General Understanding, Folded Plate as a form active system, Design of Cross sectional dimensions of folded plates, FerroCement as a material for folded plate construction, Examples of Modern use
3. **MODULE 3: VIRENDREL GIRDER :** General Understanding as an architectural/structural element,
4. **MODULE 4: DESIGN OF VIRENDREL GIRDER:** design of Cross Sectional dimensions of Vierendrel Girder, Examples and Modern Day Use
5. **MODULE 5: TENSILE STRUCTURES:** Tensile Structures, Principles /Understanding of General Structural Behavior, Calculating Sag and Cross Sectional area of cables, Cable suspended and Cable Stayed Structures.

**TEXT BOOKS:**

1. Heller Robert and Salvadori Mario, Structures In Architecture: The Building Of Buildings, Prentice Hall Inc., 1963.

**REFERENCE BOOKS:**

1. Bandyopadhyay .J.N, Thin Shell Structures Classical and Modern Analysis, New Age International
2. Publishers, New Delhi, 1998
3. Ramaswamy .G.S, Design of Construction of Concrete Shell Roofs, McGraw Hill Publishing Company, New York, 1986

**Course outcomes:**

The student will understand the concepts and application them of tensile structures, grids, domes, shells and folded plates application in design

**Bachelor in Architecture****B.Arch (VIII SEMESTER)**

Course code	Course title	L	T	P	Credits
ARC-411	URBAN DESIGN	2	0	0	2

**Course Objectives:**

To enable a student to understand how architecture is related to urban design in the planning process and appreciate the nature and role of various facets of urban design in the making of the built environment.

#### **UNIT-1:**

[4]

**INTRODUCTION TO URBAN DESIGN:** Need, Role and objectives of Urban design; relationship between Architecture, Urban Design and City Planning; scope of urban design under Indian context; types of urban design projects.

#### **UNIT-2:**

[4]

**URBAN DESIGN THROUGH HISTORY:** Historical development and approach to urban design and comparative analysis of public spaces, their organization and articulation: West (Greek, Roman, Medieval and Renaissance towns); East (Vedic, temple towns, medieval and Islamic towns); colonial towns; modern Indian cities like Chandigarh and New Delhi.

#### **UNIT-3:**

[4]

**PRINCIPLES AND TECHNIQUES IN URBAN DESIGN:** Introduction to Urban design vocabulary: Grain, texture, pattern, density, urban character etc; Design Principles: Scale and Enclosure; Urban Form: Elements, visual order and determinants: landform, climate, symbolism, activity patterns, socio-cultural factors etc.; understanding the Elements of townscape; techniques of urban design. Concepts of Imageability, Kevin Lynch's elements of city image; Introduction to concepts that enhance the liveability of communities; Public Realm; Pedestrian friendly cities; crime and the city etc

#### **UNIT-4**

[4]

**URBAN STRUCTURE & SPACES:** Inter - relationship between economic activities, public organization, population densities, communication systems, urban conservation and land-use; impact on urban environment; Causes and consequences of chaotic and disorderly urban environment with special emphasis to CBD; Types of Urban Spaces: Streets, Plazas, Precinct, Squares, spaces for residential, commercial, recreational and industrial use etc; their hierarchy; organisation and articulation of urban spaces; Urban spaces and urban activities

#### **UNIT-5:**

[4]

**LEGISLATIONS AND CONTROLS:** Role of legislations and controls in the built environment, types of urban controls: FAR, Incentive Zoning, TDR etc, special provisions of Town Planning Acts; Aesthetic legislations: historical development, applications, problems in implementation and enforcement.

#### **REFERENCE BOOKS**

1. Lynch, Kevin, "The Image of the City", MIT Press, Cambridge, Mass, 1960.
2. Paul. D. Spreiregen, "Urban Design - The Architecture of Towns and Cities", McGraw-Hill, 1980.
3. Krier, Rob, "Urban Space", Academy Editions, London, 1967
4. Gordon Cullen "The Concise Townscape", The Architectural press, 1978.

5. D. Gosling and Maitland , “Urban Design”, St. Martins Press 1984.
6. Jonathan Barnett, “An Introduction to Urban Design”, Harper & Row, Publishers, N.Y., 1982.

<b>Course outcomes:</b>	
1	Students will understand the terminologies, elements, principles & concepts & components of urban design techniques.
2	It helps us to understand the evolution of urban development from past to present through various examples

Course code	Course title	L	T	P	Credits
ARC-412	TOWN PLANNING	2	0	0	2

Course Objectives:
Introduction to elementary art and science of town planning including traffic and transportation planning.
Introduction to evolution and development of planning thought through history.

## **UNIT-1:** [4]

### **Introduction to Principles and Techniques:**

Town planning and architecture, role of a town Planner

## **UNIT-2:** [6]

### **Town planning Terminology&The Planning Process**

Land use, Concept of F.A.R. and Density, Zoning and Subdivision Regulations, Master Plan, Town planning surveys, Preparation of MASTER PLAN for old and new towns, Planning Standards

## **UNIT-3:** [6]

### **Analytical account of cities**

Renaissance and Baroque. Development of modern cities: Tony Garnier’s Industrial town, Radburn planning, new cities such as Chandigarh, Brasilia etc

## **UNIT-4:** [6]

### **Case study**



Case study of New Extension of Cities such as Navi Mumbai, Naya Raipur, Noida, Greater Noida,  
etc

#### UNIT-5:

[6]

**Traffic and transportation planning:** Traffic and urban environment, Traffic design Elements, Traffic control devices, road intersection

Course outcomes:	
	The student will understand and familiarize the planning concepts of eminent town planners, will be acquainted with the current issues in urban planning.
	They will be exposed to classification of settlements, land-use, zoning, types of development plan and familiarize the students with simple Town planning techniques

Course code	Course title	L	T	P	Credits
ARC-413	ARCHITECTURAL CONSERVATION (ELECTIVE)	2	0	0	2

#### Course Objectives:

- To develop the expertise in the field of Architectural conservation specifically catering to the regional context.
- To develop an awareness of the holistic nature of the conservation practice.
- To equip students with technical know-how required for Architectural Conservation.

#### UNIT-1:

[4]

##### HISTORY, THEORY& PHILOSOPHY OF CONSERVATION :

Archeology and conservation., Definitions and terminologies in conservation., Principles and approaches of conservation.

#### UNIT-2:

[6]

##### VALUES, ETHICS & SIGNIFICANCE IN CONSERVATION:

Values in conservation, Ethics of Conservation , Degrees of intervention such as prevention of deterioration, preservation, consolidation, restoration, rehabilitation, reproduction and reconstruction.

#### UNIT-3:

[6]

**CONSERVATION METHODS & THREATS:**

Conservation Plan Maintenance and Maintenance Plans ,Types of threats, causes of Decay in Cultural Property, External Causes of Decay, Biological and Botanical Causes, Natural disasters and manmade causes of decay

**UNIT-4:**

[6]

**MANAGEMENT OF HISTORIC SITES & CULTURAL HERITAGE:**

Heritage definition ,Classification of heritage (UNESCO) ,World heritage sites World Heritage Nomination Procedure

**UNIT-5:**

[6]

**ORGANISATIONS & CHARTERS:**

Studies of various charters like Venice Charter and Burra Charter. Role of INTACH, UNESCO, ICOMOS and other such organizations.

**REFERENCE BOOKS :**

1. Managing Our Cultural Property: XavierGraffe, Aryan book International, New Delhi
2. Lending for Urban Heritage Conservation: issues and opportunities, Eduardo Rojas and Claudio de Moura Castro, Inter-American Development Bank, Sustainable Development Department, 1999.
3. Urban Conservation: Nahoum Cohen, The MIT Press (1999) Cambridge, Mass.
4. Conservation of Immovable Property 2: Cultural Identity and Urban Development, (1989): A.G.K. Menon, INTACH, New Delhi.
5. Documentation and identification of built heritages in India: Divya Gupta, 2007. Conservation briefs, INTACH, New Delhi.
6. Heritage and Environment: An Indian Diary. ShyamChainani, 2007. Urban Design Research Institute.

**Course outcomes:**

The student understands importance of heritage, issues and practices of conservation through case studies and will gain understanding on historic materials and their properties

Course code	Course title	L	T	P	Credits
ARC-414	INTELLIGENT SYSTEM (ELECTIVE)	2	0	0	2

**Course Objectives:**

To understand the basic concepts and their application for various services.

To impart knowledge about the Intelligent systems and their application in various building typology

**UNIT-1:****[4]**

Control systems for various buildings services, and Types of controllers.

**UNIT-2:****[6]**

Preparation of necessary drawings for installing control systems

**UNIT-3:****[6]**

Integrated building management system, Remote monitoring and management

**UNIT-4:****[6]**

Home automation

**UNIT-5:****[6]**

Developments in service control systems

**REFERENCE BOOKS :**

Advances in Computational Intelligence: Theory and Practice (Natural Computing Series)

Introduction to Artificial Intelligenc by Mirsolavkubat

**Course outcomes:**

	The student understand the importance, installation and working of essential services in buildings, and a intelligent way to help in generating a cleaner and healthier built environment.
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Course code	Course title	L	T	P	Credits
ARC-465	ARCHITECTURAL DESIGN-VI	2	0	16	10

**Course Objectives:**

Design problems at urban or metropolitan scales and environment, multi-use complexes including functions such as residential, public services, industrial, commercial, transportation, cultural and civic. The focus should essentially be on an urban design exercise with emphasis on design to suit the surrounding environment in relation to both traffic and planning control. The design output should clearly indicate the application of theory of architecture, materials & structural systems, environmental sciences and behavioral sciences.

From this year and hence fourth students will be expected to enlarge the design brief incorporating through research of ancillary requirement s related to various functions forming part of the design problem. And the areas of various functions shall be based on data collected by the students themselves. This independent research, analysis and data collection for the design problem will form the basis to prepare them to deal with the

Thesis topic.

**COURSE CONTENT:-**

**[252]**

**DESIGN FOR TRAVEL AND SPORTS:** Contemporary transportation terminals and stadiums are large building with multiple entries & exits dealing with large crowds and having multiple levels with large spans, complex services & demanding environmental conditions. Function, convenience and security will become the basic design parameters. Ex. Bus terminal / Railway station / Indoor sports complex / Aquatic complex etc.

**REFERENCE BOOKS:**

1. Time saver standards for building types, DeChiara and Callender, McGraw hill company
2. Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science Ltd
3. National Building Code - ISI
4. New Metric Handbook –Patricia Tutt and David Adler–The Architectural Press

**Course outcomes:**

The student develops the ability & confidence to handle large sports complex projects in the urban scenario & gets to understand the materials and technology required to build the same.

Course code	Course title	L	T	P	Credits
ARC-466	DISSERTATION-I	2	0	4	4

**Course Objectives:**

Dissertation is intended to enlighten students on the fundamentals of research methods. The students are expected to choose topics, which are of special interest to them and prepare a report after research. It is possible that in keeping with the School's commitments from time to time certain themes may be permitted and students encouraged choosing their subject matter for study or research accordingly.

**COURSE CONTENT:-**

**[84]**

**Module-1 Introduction** Learning the formulation of research question or hypothesis

**Module-2 Writing a Technical Paper**

- Writing a paper of 5000 words in following stages:
- Formulation of an original research issue by ascertaining the gaps in research. Synopsis with clear heads of Intent, Background, Aims and Objectives, Scope, Methodology.

- Structuring the body of the paper in detail.
- Ascertaining Primary and Secondary Sources.
- Utilizing the sources to reach to the desired objectives. Editing the paper.

**NOTE- Follow Chicago manual style for writing.**

**REFERENCE BOOKS:**

<b>Course outcomes:</b>	
	Enable the student to research on topics related to architecture.

**Bachelor in Architecture**

**B.Arch (IXth SEMESTER)**

Course code	Course title	L	T	P	Credits
ARC- 501	PROFESSIONAL OFFICE TRAINING	0	0	0	12

Course code	Course title	L	T	P	Credits
ARC-555	THESIS	0	0	0	8

**Bachelor in Architecture**

**B.Arch (Xth SEMESTER)**

Course code	Course title	L	T	P	Credits
ARC-511	PROFESSIONAL PRACTICE	2	0	0	2

**Course Objectives:**

The students would be exposed to the various kinds of surveys involved in planning and relevance of the same. To understand through case studies the techniques used in planning.

**UNIT-1:**

**[4]**

**ARCHITECT'S ROLE & OFFICE MANAGEMENT :**

Social Role / Social Responsibilities of Architects. Filling and recording of letters and drawings; Nature of partnership; registration of firm and dissolution; Practice Procedure and conduct; membership of professional organisation. Code of Professional Conduct; Code relation to Architectural Competition; Architect's Services and scale of normal and partial fees; Architect's Act 1972 for registration; Copy-rights of drawings.

#### **UNIT-2:**

**[4]**

**DUTIES AND LIABILITIES IN PROFESSION :** Legal responsibility of architect to Employer, Government bodies and local bodies; Express and implied authority of the Architect; Architect's relationship with the client and the contractor; Duration of liability; Consumer Protection Act 1986.

#### **UNIT-3:**

**[4]**

**EASEMENTS ARBITRATION , & LEGISLATIONS BUILDING BYE-LAWS :** Definition, types of Easements, acquisition, protection and extinction of easements – Need for Arbitration, arbitration agreement, role of arbitrators, umpire etc, excepted matters, arbitral award. Comprehensive study of Building Bye-laws relating to the strength and stability of structures; bye-laws relating to light and ventilation, sanitation and Buildings; Study of special provisions in bye-laws in respect of factory and amusement buildings Company, New York, 1986

#### **UNIT-4:**

**[4]**

**ACQUISITION & VALUATION REPORT :** General principals of land acquisition with reference to norms of compensation; Purpose of acquisition Purpose of valuation; types of valuation- book value, salvage value, scrap value; depreciation obsolescence, sinking fund, land valuation; mortgage and lease; problems on valuation-; Annuity- definition, Fixation of rent- out going- gross and net income ; year's purchase; capital cost-standard rent; market rent economical. Valuation reports of few properties to be done by the students.

#### **UNIT-5:**

**[4]**

**IMMOVABLE PROPERTY & RENT :** Meaning of immovable property ; ownership and possession, Joint tenancy and tenancy in common ; Different types of tenures of land – as commonly found; leasehold and freehold and lease and other rents. Different types of rent – standard rent; example on working out of standard rent; Rateable value and its relation to rent ; nature and purpose of rateable value

#### **REFERENCE BOOKS**

1. Hand book on Professional Practice by I. I. A, Image systems, Mumbai, 1998.
2. 1. Dutta B.N., Estimating and Costing in Civil Engineering, UBS Publishers Distributors Ltd,

**Course outcomes:**

- |    |  |
|----|--|
| 1. | To Understand aspects of professional conduct, duties and responsibilities and legal rights and procedures of the architectural profession |
|----|--|

Course code	Course title	L	T	P	Credits
ARC-512	REAL ESTATE MANAGEMENT(Elective)	2	0	0	2

**Course Objectives:**

The primary responsibility of a real estate property manager is to understand and implement the owner's goals and objectives. In order to accomplish this and to develop a short term and long term "plan" for the property, the manager needs to formulate a Management Plan.

**UNIT-1:****[4]**

**INTRODUCTION TO REAL ESTATE:** Definition, Real Estate Scope, principles of real estate value concepts, Real estate sectors and its stakeholders, Role of Government in real estate market, FDI, role of NRIs.

**UNIT-2:****[6]**

**LEGAL FRAMEWORK FOR REAL ESTATE:** Statutory Approvals and NOCs, Law & Regulations in real estate Industry and its compliance.

**UNIT-3:****[6]**

**LAND PRICING AND REAL ESTATE MARKETS:** Land valuation techniques, subsidies, type of development, Real estate market and property analysis.

**UNIT-4:****[6]**

**CASE STUDY:** Real estate project formulation, Transfer or Sale of the property and deeds

Contracts and agreements , REIT (real estate investment trust)

**UNIT-5:****[6]**

**ANALYSIS :**Physical and economic analysis of real estate projects

Course code	Course title	L	T	P	Credits
ARC-513	DISASTER MANAGEMENT (Elective)	2	0	0	2

#### Course Objectives:

To create awareness about natural disasters, factors that cause them, and to foster knowledge about strategies for disaster prevention and management.

#### UNIT-1:

[4]

**INSTRUCTIONAL OBJECTIVES** :Basic understanding of fragile Eco-systems and factors that cause global climatic changes. Overview of major natural disasters, design & planning solutions for disaster mitigation, organizational and management aspects.

#### UNIT-2:

[6]

**INTRODUCTION TO NATURAL DISASTERS:**Understanding the effects of natural calamities such as floods, tropical cyclones, earthquakes, landslides, heat waves, droughts & Tsunami.

#### UNIT-3:

[6]

**FACTORS CAUSING DISASTERS:**Climate changes, global sea rise, coastal erosion, environmental degradation, large dams & earth tremors, roads buildings & land- slides, urbanization & desertification, cyclone effects on coastal towns.

#### UNIT-4:

[6]

**(a) STRATEGIES FOR DISASTER PREVENTION &MITIGATION** :Pre disaster, emergency, transition, and recovery. Disaster management plan, Natural crisis management committee [NCMC], State crisis management group [SCMG].

**(b) REPAIRS AFTER DISASTER:** Seismic repairs & retrofitting of damaged and undamaged buildings.

#### UNIT-5:

[6]

**(a) DESIGN & PLANNING SOLUTIONS:** Design guidelines for disaster proof construction at appropriate situations & planning solutions for different types of calamities.- Norms, standards and practice procedures for shelter & settlement.

**(b) CASE STUDIES OF NATURAL DISASTERS:** Earthquakes at Bhuj, Latur, etc., Cyclones in coastal Andhra pradesh& Orissa, Land slides in Nilgiris, Himachal etc, Floods in Bangladesh, and Droughts in Rajasthan & Tsunami in Tamil Nadu.

#### REFERENCE BOOKS

1. S.Rajagopal – *Problems of housing in cyclone prone areas* – SERC, Vol.2 , Chennai, 1980.
2. Office of the UN Disaster Relief Co-ordinator – *Disaster prevention and mitigation, Vol 12*, Social and Sociological aspects – UNO, NY, 1986.



3. F.C.Conry et.al – *Issue and problems in the prevention of disaster and housing* – A review of experiences from recent disasters – Appropriate reconstruction and training information centre, 1978.
4. S.Ramani, *Disaster management – Advanced course on modern trends in housing* – SERC,

Course code	Course title	L	T	P	Credits
ARC-514	CONSTRUCTION MANAGEMENT (Elective)	2	0	0	2

**Course Objectives:**

The primary responsibility of a real estate property manager is to understand and implement the owner's goals and objectives. In order to accomplish this and to develop a short term and long term "plan" for the property, the manager needs to formulate a Management Plan.

**UNIT-1:**

**[4]**

**INTRODUCTION TO REAL ESTATE:** Definition, Real Estate Scope, principles of real estate value concepts, Real estate sectors and its stakeholders, Role of Government in real estate market, FDI, role of NRIs.

**UNIT-2:**

**[6]**

**LEGAL FRAMEWORK FOR REAL ESTATE:** Statutory Approvals and NOCs, Law & Regulations in real estate Industry and its compliance.

**UNIT-3:**

**[6]**

**LAND PRICING AND REAL ESTATE MARKETS:** Land valuation techniques, subsidies, type of development, Real estate market and property analysis.

**UNIT-4:**

**[6]**

**CASE STUDY:** Real estate project formulation, Transfer or Sale of the property and deeds Contracts and agreements, REIT (real estate investment trust)

**UNIT-5:**

**[6]**

**ANALYSIS:** Physical and economic analysis of real estate projects.

Course code	Course title	L	T	P	Credits
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ARC-565	THESIS	4	0	20	14
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**Course Objectives:**

The Architectural Thesis is the culmination of the development of the student's knowledge, attitudes and skills over the course of studies in architecture. It is an occasion for exercising conscious choices in the field based on the students personal abilities and inclinations, and for testing out his commitment. The student, in consultation with the faculty, is expected to demonstrate through an imaginative approach, his expertise in effecting positive changes in our built environment.

**COURSE CONTENT:**

[336]

Design Thesis on a topic (project) approved by the college separately for each student and each student shall carry out research considering the following aspect:

Method of construction, advance technology (concrete and steel), advances building services, climatology, theory of structures studied till now.

- Research analysis and data collection
  - Site selection and justification
  - Climatic conditions
  - Socio-economic problems
  - Communication
  - Transportation
  - Landscape and town / urban planning
1. Each students work shall include intensive study on the above points and shall include briefs on selection of site, methodology of research, designing of the selected project and proper presentation of the drawings and detail of the site, its analysis and justification, case studies and analysis, data, brief on structural system and services selected for the project, program for the selected project, etc. S.Ramani, *Disaster management – Advanced course on modern trends in housing* – SERC,

**Course outcomes:**

- |    |   |
|----|---|
| 1. | Thesis projects must reflect the culmination of the development of the students architectural skills and design aptitude. |
|----|---|

Course code	Course title	L	T	P	Credits
ARC-566	DISSERTATION-II	1	0	2	2

**Course Objectives:**

The Seminar shall be a research paper on a subject of theoretical nature on related to their thesis topic. The overall supervision shall be by a Seminar coordinator to be appointed from within the faculty and individual guidance shall be provided by experts in the subject. The thrust of the seminar shall be on achieving a thorough understanding of the topic of study and on the ability to present it to an intelligent and critical audience.

## **COURSE CONTENET**

[42]

### **Module-1 Introduction**

### **Module-2 Writing a Technical Paper**

### **Module-3 Preparing Seminar Report / Presentation**

- Writing a paper of 5000 words in following stages:
- Formulation of an original research issue by ascertaining the gaps in research. Synopsis with clear heads of Intent, Background, Aims and Objectives, Scope, Methodology.
- Structuring the body of the paper in detail.
- Ascertaining Primary and Secondary Sources.
- Utilizing the sources to reach to the desired objectives. Editing the paper.
- Preparing detailed seminar report of their related topic.

NOTE- Follow Chicago manual style for writing.

#### **Course outcomes:**

- |    |   |
|----|---|
| 1. | To enable the student to research and document on any topic of their choice relevant to the built environment |
|----|---|

## SCHEME FOR M. ARCH.

M. ARCH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MAR-612	Architecture philosophy.	2	1	0	3
2	MAR-613	Virtual architecture and computational analysis.	2	1	0	3
3	MAR-614	Research methodology and Techniques	2	1	0	3
4	MAR-615	Advance Building Services	2	1	0	3
5		<b>ELECTIVE I*</b>	2	1	0	3
<b>PRACTICAL</b>						
1	MAR-611	Design studio (climate responsive design).	2	0	8	6
	LECTIVE-1	<b>TOTAL</b>	<b>12</b>	<b>5</b>	<b>8</b>	<b>21</b>
1	MAR-616	Sustainable Architecture.				
2	MAR-617	Energy Efficient Architecture				

M. ARCH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MAR-622	Architecture and critical theory.	2	1	0	3
2	MAR-623	Advance material and technology in architecture.	2	1	0	3
3	MAR-624	Advanced Architectural Illumination System and Design.	2	1	0	3
4	MAR-625	Architectural Law, Arbitration & Legislation	2	0	0	2
<b>PRACTICAL</b>						
1	MAR-621	Advance design studio (advance building design).	2	0	8	10
		<b>TOTAL</b>	<b>10</b>	<b>3</b>	<b>8</b>	<b>21</b>

### SCHEME FOR M. ARCH.

M. ARCH.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MAR-712	Issues in architecture and urbanism.	2	1	0	3
2	MAR-713	Planning typology.	2	0	0	2
3	MAR-714	Real estate and Financial Management	2	1	0	3
4	MAR-715	Housing.	2	1	0	3
5	MAR-716	Environmental Laws and Legislations.	2	0	0	2
PRACTICAL						
1	MAR-711	Advance design studio (urban redevelopment).	2	0	16	10
		<b>TOTAL</b>	<b>12</b>	<b>3</b>	<b>16</b>	<b>23</b>

M. ARCH.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MAR-721	Architecture thesis.	2	0	28	16
		<b>TOTAL</b>	<b>2</b>	<b>0</b>	<b>28</b>	<b>16</b>

## SYLLABUS FOR M. ARCH.

Course code	Course title	L	T	P	Credits
MAR-611	DESIGN STUDIO (CLIMATE RESPONSIVE DESIGN)	2	0	8	6

### Course Objectives:

To design a climate responsive and disaster resilient built form. To design an educational campus in the five climatic zones in India. The class can be divided in groups of 3-4 and each group can be assigned a climatic zone

#### ASSIGNMENT

[140]

#### Climatic Zones:

Hot & Dry – Jodhpur  
Warm & Humid – Kolkata  
Composite – Bhopal  
Moderate – Bangalore  
Cold – Shrinagar

The students are required to:

Form their own design brief with areas and requirements.

Develop a block site plan showing placement of each blocks and functions.

Develop site strategies (at a conceptual level) explaining the green strategies of their campus such as vehicle movement, pedestrian or cycle tracks, waste management, rain water harvesting strategies etc  
Detailing of any one block as per the group's choice.

#### Design approach

##### STAGE I:

Climatic study of each zones under the following parameters:

- solar radiation
- temperature range
- relative humidity
- wind direction and speed
- sky conditions

Use of climate consultant tools and other govt based sites such as IMD etc to establish the study  
Analysis and inference from the climatic study

##### STAGE II:

Case study of the existing vernacular and traditional settlement of that particular place

Analysis in terms of design strategies and materials used.

Understanding the evolution of the vernacular built form to modern day's scenario. The changes in terms of design and material evolution

##### STAGE III:

Combining the analysis and inferences of Stage I & II and develop a set of design guidelines for the studio design case

##### STAGE IV:

Selection of site on google map of that particular city  
 Site analysis in terms of –  
 Surrounding context, connectivity etc  
 Surrounding shadow analysis  
 Sun path and wind direction analysis  
 Development of site zoning such as placement of building blocks, semi covered and open functions as per the analysis and inferences derived from the above studies  
**STAGE V:**  
Block detailing  
 Using the Site analysis to develop the built form:  
 Orientation  
 Massing  
 Site landscaping/shading strategies  
 Building Fenestration designs, natural ventilation, shading OR as applicable to a particular climatic zone  
 Incorporating at least two Passive heating/Cooling strategies based on the climatic zones  
 Implementation of alternate construction materials in the building envelope by studying the existing construction materials and technology of that particular region.  
 If the existing technology is outcome of a response to any particular disaster, then understanding the principal to be applied in the proposed design  
 Supporting the choice of construction materials through their technical properties such as U value, thermal lag, Co2 emissions and a detailed wall section  
 A detailed analysis of any one critical surface/Zone of the building in terms of fenestration design, shading strategy, day lighting and envelope

#### **TEXT BOOKS/REFERENCE BOOKS:**

1. Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings by Arvind Krishan, Nick Baker, Simos Yannas, Steve Szokolay
2. Energy Efficient Buildings in India by Mili Majumdar
3. Sustainable Building Design: Applications Using Climatic Data in India (Design Science and Innovation) by Chitrarekha Kabre

<b>Course outcomes:</b>	
1.	After successful completion of this course, student should be able to: Acquire a comprehensive base of knowledge required for the practice of architecture and develop awareness in physical context about implications of limited resources in design decision making.
2.	A detailed analysis of any one critical surface/Zone of the building in terms of fenestration design, shading strategy, day lighting and envelope
3.	Implementation of alternate construction materials in the building envelope by studying the existing construction materials and technology of different climatic regions.

Course code	Course title	L	T	P	Credits
<b>MAR-612</b>	<b>ARCHITECTURE PHILOSOPHY</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

#### **Course Objectives:**

This course is an introduction to philosophy of architecture in the analytic philosophical tradition. The philosophy of architecture incorporates not only aesthetics but also ethical aspects of architecture. In the main, though, the aim of philosophy of architecture is to see how the pressing questions of aesthetics are translated into architectural terms: What is an architectural work? Are there architectural classes or types? What is the role of intentionality and expression for architects? What are rationally-justifiable foundations for architectural criticism? The relevant ethical issues include the delineation of rights, responsibilities, the good, virtues, and justice in architectural milieu. There are, in addition, philosophical issues arising out of the non-artistic facets of architecture; these include architecture's social and technological characteristics.

## **UNIT-1: Introduction to Architecture and Philosophy**

**[6]**

- Architecture as Relatively Neglected by Philosophy
- A Word on Terminology
- What is Architecture?
- Metaphysics
- Architectural Language and Notation
- Formalism and Anti-formalism

## **UNIT-2: Architectural Theory**

**[9]**

- Building Experience
- Building Philosophy
- Lines of Work: On Diagrams and Drawings

## **UNIT-3: Architectural Experience, Knowledge, and Appreciation**

**[9]**

- Experience of Architecture
- Architectural Knowledge
- Architectural Appreciation

## **UNIT-4: Architecture and Social and Political Philosophy**

**[9]**

- Socially Constitutive Features of Architecture
- Socially Efficacious Features on, and of, Architecture
- Architecture and the Political

## **UNIT-5: Further Issues in Philosophy of Architecture**

**[9]**

- Architectural Failure
- Built Versus Natural Environment
- Human and Non-Human Architecture
- Environmental Psychology



**TEXT BOOKS/REFERENCE BOOKS:**

1. The Poetics Of Space By Bachelard
2. The Timeless way of building by Christopher W. Alexander
3. On Architecture by Vitruvius

<b>Course outcomes:</b>	
1.	Visually recognize architectural Illustrations (plans, elevations, sections) and Identify main characteristics of modern architecture, recognizing Influences and major concepts - identify buildings, ideas, and architects that portray Modern and Contemporary Architecture. (Knowledge).
2.	Describe, using formal and technical vocabulary, the defining characteristics of Modern and Contemporary buildings.
3.	Apply critical thinking to theories in the history of architecture

Course code	Course title	L	T	P	Credits
<b>MAR-613</b>	<b>VIRTUAL ARCHITECTURE AND COMPUTATIONAL ANALYSIS</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

Introduction to various aspects of computer applications into Architectural Design and Construction. Opening up horizons of technical advances and advantages of computational technologies through the use of computer modelling, rendering and digital fabrication. Focus on the exploration of space and place making through the use of computer modelling and design construction.

This subject investigates and applies emerging computational theories and technologies through the design and fabrication of a full-scale building component and/or assembly. This investigation includes various static, parametric, and scripted modelling paradigms, computational-based structural and sustainability analysis, and digital fabrication technologies.

**UNIT-1: Introduction to Revit Architecture****[6]**

- Editing Tools, Templates, Families, Projects

**UNIT-2: Introduction of Revit Family****[9]**

- To introduce the new features of REVIT, editing and working with families
- To introduce the concepts of REVIT, creating a shared Family, Project and System settings.

**UNIT-3: Revit Modeling****[9]**

- To create the basic model, creating the basic structural system – walls, columns, beams, roofs etc.
- To add doors, windows, openings, stairs, railings, curtain systems etc.

**UNIT-4: Presentation Techniques****[9]**

- To create drawings, creating detail from building model, scheduling, annotating and dimensioning.
- To study about Viewing the Model, Architectural Rendering

**UNIT-5: Revit BIM (Building Information Modeling)****[9]**

- Introduction to BIM
- Energy Analysis
- Concepts of parametric modeling

**TEXT BOOKS/REFERENCE BOOKS:**

1. Fox & Balding, "Introducing and Implementing Revit Architecture", Cengage Learning, 2008
2. Autodesk REVIT 9.1 Manual, Autodesk publications
3. REVIT 9.1 Tutorials, Autodesk publications

Course outcomes:	
1.	On successful completion of this course students will be able to:  Describe the relevance and application of REVIT in professional practice.
2.	Describe and apply international drawing standards.
3.	Apply dimensions and annotate drawings to a professional standard.
4.	Working on Revit Modeling and Parametric Design

Course code	Course title	L	T	P	Credits
MAR-614	RESEARCH METHODOLOGY & TECHNIQUES	2	1	0	3

**Course Objectives:**

To study the need and necessity of Research in providing a practical solution and to evaluate the efficacy of the solutions existing in the relevant problem by taking into account new technological features inbuilt in the existing solution.

The Need, Scope, Research Methodology, Research Aims & Philosophy, Research Paradigms., Available sources.

## **UNIT-1: Domain of Architectural Research**

**[6]**

- Design and Research
- Systems of Inquiry and Standards of Research Quality

## **UNIT-2: Literature Review and Research Design**

**[9]**

- Aim and structuring of Literature Review, Classification based on available means i.e. use of data base or libraries, Case studies including field surveys etc.

## **UNIT-3: Data Analysis**

**[9]**

- Analysis of a new problem, Field surveys, Theoretical models,
- Recording of Inferences and laboratory experiments.
- Behavioural research: Obtain data; questionnaires, interviews, un-obtrusive & obtrusive measures.

## **UNIT-4: Research Writing and Publishing**

**[9]**

- Presentation, Available Media Options,
- Introduction to scholarly writing; writing and publishing a paper;
- Writing and presenting a conference / Seminar Paper;
- Presentation of Scientific Research.

## **UNIT-5: Research Strategies**

**[9]**

- Historical Research
- Qualitative Research
- Correlational Research
- Experimental and Quasi-Experimental Research
- Simulation Research
- Logical Augmentation
- Case Studies and Combined Strategies

**TEXT BOOKS/REFERENCE BOOKS:**

1. Architectural Research Methods by Linda Groat and David Wang
2. Research Methods for Architecture by Raymond Lucas
3. Creating Architectural Theory: Role of Behavioural Sciences in Environmental Design by Jon Lang

Course outcomes:	
1.	Understand the nature of Research in Architecture
2.	Recognize different research methods in architecture and urban design
3.	Ability to employ architectural research methods including data collection and analysis to assess and propose improvements in existing built environments.

Course code	Course title	L	T	P	Credits
MAR-615	ADVANCED BUILDING SERVICES	2	1	0	3

#### Course Objectives:

To develop awareness and understanding of Advanced Building Services employed in various complex buildings and address environmental issues related to these services.

The course aim to equip the student with basic principle of the building services systems, the technique of integration amongst the building services systems, the building and the structure. The course will also highlight the systems of special interest, the key issues, benefits and limitations and the local practice in the building services field.

An understanding of the working relationship between the architects and the building services engineers in professional practice.

#### UNIT-1: Water supply and Plumbing systems in high rise buildings and complex structures [9]

- Procurement, demand and distribution of water in large complexes.
- Quality of water consideration for different uses.
- Systems and equipment used in Treatment of water for distribution, recycling and reuse and specialized equipment used for this purpose.
- Identify special needs for a building typology development.

#### UNIT-2: Sanitation and Waste disposal systems in high rise buildings and complex structures [6]

- Collection and disposal systems used in high-rise buildings and complex structures.
- Effluent treatment plants and their efficiency, chemical properties of the treated effluent considering the source and end use.
- Concept of recycling and reuse of treated effluent. Rainwater harvesting and similar methods of conserving water resources.
- Disposal of treated effluent into natural sources of water. Storm/rain/surface water estimation, collection systems and disposal

### **UNIT-3: Mechanical & Communication systems**

[9]

- Elevators, escalators, conveyors,
- Security systems in high rise building, public buildings,
- Parking lots in complex structures like Hospitals, public transport terminals etc.
- Design parameters for determining the loads & requirement, Operation and maintenance of these Services.

### **UNIT-4: Electrical & HVAC**

[9]

- Electrical and telecommunication systems in high rise building complexes public buildings, and complex structures like Hospitals, public transport terminals, IT complexes etc.
- Design parameters for determining the loads & requirement, Operation and maintenance of these Services.

### **UNIT-5: Acoustics Design and Fire Protection and Prevention**

[9]

- A brief overview of Acoustics studied in the B Arch programme.
- Design parameters for determining the acoustical behaviour of spaces.
- Passive & active ways of control of acoustical behaviour of spaces for good hearing conditions.
- Introduction to simulation software to determine acoustical behaviour of spaces.
- Study of advance acoustical materials, types of finishes & treatments, specially manufactured items from manufacturer's catalogues, etc
- Code provisions from NBC for Fire protection and prevention in high rise building, public buildings, Parking lots and complex structures like Hospitals, public transport terminals educational buildings, building types categorised under etc.
- Design parameters for determining the loads & requirement.
- Study of advance materials, types of finishes & treatments, specially manufactured items from manufacturer's catalogues, etc for prevention of fire and fire-fighting

**TEXT BOOKS/REFERENCE BOOKS:**

1. Handbook of designing & installing of services in high rise building complexes by Er.V K Jain ,Khanna publisher
2. Mechanical and Electrical Equipment for Buildings, 9th Edition. Benjamin Stein & John Reynold – Wiley

<b>Course outcomes:</b>	
1.	Determine how building performance and regulatory requirements affect the design and commissioning of building services
2.	Explain how energy is supplied to and used in buildings and the impact of energy efficiency on the design of sustainable buildings
3.	Explain how building services modify the indoor environment

Course code	Course title	L	T	P	Credits
<b>MAR-616</b>	<b>ELECTIVE I (SUSTAINABLE ARCHITECTURE)</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

<b>Course Objectives:</b>
This subject will serve as an introduction to concepts of sustainable architecture and design. This class will not demand much outside work from student but, it will demand creative and focused thinking on given topic.

## **UNIT-1      Introduction to Sustainable Development and Architecture** **[6]**

- Ecology and Environmental Management
- Climatology and Building Physics

## **UNIT-2:      Integrated Energy Performance** **[9]**

- Sustainable Building Materials and Technology
- Fundamentals of Building Physics and Thermal Comfort

## **UNIT-3:      Passive Design Strategies** **[9]**

- Passive Design Strategies
- Theories and Technologies related to Energy Efficient Building Design
- Waste and water management

## **UNIT-4:      Sustainability Performance** **[9]**

- Ecological and Environmental Performance
  - Life cycle analysis and Embodied energy theory and evaluation
- Economical Performance

- Introduction to Green Building Rating System

## **UNIT-5: Implementation** **[9]**

- Sustainable Neighborhood Planning and Urban Design
- Short Research paper on any of the topics discussed in class OR of your own interest from the concerned field

### **TEXT BOOKS/REFERENCE BOOKS:**

1. Arian Mostaedi , "Sustainable Architecture : Low tech houses", CarlesBroto, 2002.
2. Sandra F.Mendler&Willian Odell, "HOK Guidebook to Sustainable Design", John willey and sons, 2000.
3. Richard Hyder, "Environmental brief:Pathways for green design", Taylor and Francis, 2007.
4. Brenda Vale and Robert Vale, "Green Architecture: Design for a sustainable future", Thames and Hudson 1996.

<b>Course outcomes:</b>	
1.	The students are oriented about the concepts sustainability and sustainable development,passive design strategies, energy efficient buildings.
2.	The students understand the various incentives and evaluation systems for green buildings
3.	The students are familiar with the various approaches to achieving sustainable neighborhood planning and urban design.

Course code	Course title	L	T	P	Credits
<b>MAR-617</b>	<b>ELECTIVE I (ENERGY EFFICIENT ARCHITECTURE)</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

### **Course Objectives:**

Course Objectives:This course aims to provide an understanding of the concept of reduction in energy consumption through low energy buildingdesign. It will highlight strategies to integrate daylighting and low energy heating/cooling in buildings.

To study the different energy-efficient principles of a building and their variousapplication techniques in different climatic zones prevailing in India includingsolar active and passive features. The students have to take individual orgroup projects dealing with at least one or more than one technique.

## **UNIT-1: CLIMATE & SHELTER** **[6]**

Over view of the different Passive Solar Techniques & Climate responsive design features adopted in the traditional / vernacular architecture of various places in different climate zones

– Control of Micro-climate around the building by settlement pattern, built form – open space relationship & façade articulation & appropriate use of building materials in historic buildings.

## **UNIT-2: SOLAR ENERGY & BUILDING**

**[9]**

Solar geometry and built form – Various techniques of shading to reduce heat gain in tropical climate – Various methods of Maximising exposure to solar radiation in cold & temperature climate. Heating & cooling loads – Energy estimates - Energy conservation – Efficient day lighting – Solar Water heating system. Exercises on heating and cooling load calculations in buildings.

## **UNIT-3: PASSIVE SOLAR HEATING**

**[9]**

General principles – Direct gain systems - Glazed walls, Bay windows, Attached sun spaces etc. Indirect gain systems – Trombe wall, Water wall, Solar Chimney, Transwall, Roof pond, Roof radiation trap, Solarium etc - Isolated gain systems – Natural convective loop etc. Case studies on buildings designed with passive heating techniques.

## **UNIT-4: PASSIVE COOLING CONCEPTS**

**[9]**

General principles – Evaporative cooling, Nocturnal radiation cooling, Passive Dessicant cooling, induced ventilation, earth sheltering, Berming, Wind Towers, earth – Air tunnels, Curved Roofs & Air Vents, Insulation, Vary Thermal wall etc. Case studies on buildings designed with passive cooling techniques.

## **UNIT-5: OVERALL DESIGN CONCEPTS**

**[9]**

Land form & orientation – Vegetation & Pattern – Water Bodies – Open Space & Built form - Plan form & Elements – Roof form – Fenestration pattern & Configuration – Building envelope & finishes.

### **TEXT BOOKS/REFERENCE BOOKS:**

1. Crosbie, M.J., 1998. The Passive Solar Design And Construction Hand Book, John Wiley & Sons Inc., New York.
2. Givoni, B., 1998. Climatic Consideration in Building and Urban Design, John Wiley & Sons, Inc., Canada.
3. Guzowski, M., 2000. Daylighting for Sustainable Design, McGraw-Hill, New York.
4. Nayak, J.K. and Prajapati, J.A., 2006. Handbook on Energy Conscious Buildings
5. Santamouris, M., 1996. Passive Cooling of Buildings, James & James (Science Publishers) Ltd., London.

<b>Course outcomes:</b>	
1.	Have acquired an understanding of the concept and theoretical background of low energy building design.



2.	Be able to demonstrate their learning about use of simulation tools to achieve energy efficiency.
3.	At the end of the course students will be able to develop an understanding of low energy building design to provide natural lighting, cooling and heating in buildings.

## **SECOND SEMESTER**

Course code	Course title	L	T	P	Credits
<b>MAR-621</b>	<b>ADVANCE DESIGN STUDIO (ADVANCE BUILDING DESIGN)</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>10</b>

### Course Objectives:

To develop awareness and understanding construction of large span structures, High Rise Buildings, Pre-fabrication in building construction, Modular Construction and Advance Building Material.

## **ASSIGNMENT:**

**[140]**

Students are required to design International Airport OR Highrise Building >300m.

Report will be submitted in following format:

1. Layout plan
2. Form of structure
3. Understanding of construction details
4. Locational Attributes (Conditions & Topography of the site, water logging & marine structures)
5. Service System
6. Structural System
7. Identifying Sequence of Erection
8. How the maintenance is being facilitated

Lecture, demonstration, presentation & site visit will be done

### **TEXT BOOKS/REFERENCE BOOKS:**

1. Stantec: Airports by Trevor Boddy, Stanis Smith
2. Airport Design (Design Books) by Daab
3. Building Structures Illustrated (Patterns, Systems and Design) by Francis D.K. Ching, Barry S. Onouye, Douglas Zuberbuhler
4. Structural Design of Highrise Buildings (Detailed Background, Evolution, Analysis and Design of High Rise Multi Storey Reinforced Concrete and Structural Steel Buildings) by Raja Rizwan Hussain
5. Designing Tall Buildings (Structure as Architecture) by Mark Sarkisian

<b>Course outcomes:</b>	
1.	Understanding construction of large span structures, High Rise Buildings, Pre-fabrication in building construction, Modular Construction and Advance Building Material.
2.	Incorporate services Integration
3.	Understand context based programme & design

Course code	Course title	L	T	P	Credits
<b>MAR-622</b>	<b>ARCHITECTURE AND CRITICAL THEORY</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

### **Course Objectives:**

As architecture is both a discipline and a profession, this course will examine architectural theories in relation to practice. Most architects say they have a foot in both worlds, with principles guiding action and experience confirming the appropriateness of such action and the principles behind it. A basic assumption by architects is that theory is a “thing that guides” action. Theory and practice form the counterpoint of architecture or designing and building. it is always out of this bi-polarity that architecture can be comprehended, that the story of architecture as idea and reality can be told. To explain and show how architecture is enmeshed in the society and to explore how it becomes a product of larger socio-cultural issues and practices.

### **UNIT-1: INTRODUCTION TO ARCHITECTURAL THEORY** **[6]**

- Architectural theory and practice.
- Relation between theory and practice.
- Traditions in architectural theory.

### **UNIT-2: INTRODUCTION TO CRITICAL THEORY** **[9]**

- Critical Theory.
- Qualities and challenges of critical theory.

### **UNIT-3: POWER AND BUILT ENVIRONMENT** **[9]**

- Forms of power.
- Power and knowledge

## **UNIT-4: CONTEMPORARY CITIES**

**[9]**

- Colonialism as a form of dominance.
- Colonialism in India.
- Production of Indo-Saracen architecture.
- Ideas of segregation, control and surveillance in colonial towns.
- Discussing New Delhi as a part of imperial vision.
- Idea of Ghetto,
- Surveillance and control in contemporary cities.

## **UNIT-5: CASE STUDIES**

**[9]**

- A review of the history and heritage of human settlements in India from ancient times to date.
- A critical examination of current trends in contemporary architecture and planning in India.

### **TEXT BOOKS/REFERENCE BOOKS:**

1. City: Rediscovering the Center by William H. Whyte
2. The City of Tomorrow and Its Planning By: Le Corbusier, Frederick Etchells
3. Theories and Manifestoes of Contemporary Architecture 2nd Edition by Charles Jencks, Karl Kropf
4. An Imperial Vision: Indian Architecture and Britain's Raj by Thomas R. Metcalf
5. Henry Irwin and the Indo Saracenic Movement Reconsidered by Pradip Kumar Das

<b>Course outcomes:</b>	
1.	Be able to cultivate an understanding of major critical and interpretive methods and apply them to primary literary sources to construct interpretive arguments
2.	Develop analytical and critical thinking and research skills through close readings of primary literature and secondary scholarship and criticism.
3.	Develop understanding of contemporary cities, colonialism in India, Indo Saracen Architecture, etc.

Course code	Course title	L	T	P	Credits
<b>MAR-623</b>	<b>ADVANCE MATERIAL AND TECHNOLOGY IN ARCHITECTURE</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

### **Course Objectives:**

To develop awareness and understanding construction of large span structures, High rise buildings, Pre-fabrication in building construction, Modular co-ordination, and advance building material.

## **UNIT-1: INTRODUCTION TO ADVANCE MATERIAL AND TECHNOLOGY IN ARCHITECTURE**

**[6]**

- Materials and Architecture
- The contemporary design context
- The phenomenological boundary
- Characteristics of smart materials

## **UNIT-2: CONCEPTUAL UNDERSTANDING OF VARIOUS LARGE SPAN STRUCTURES**

**[9]**

- Conceptual Understanding of various large span structures, like Geodesic domes, hyperbolic paraboloids, and free form shapes etc. used for Airports, Stadia, Industrial buildings, public spaces etc.
- Construction details understanding, Service systems, Structural Systems, Sequence of erection and facilitating maintenance of such structures.
- Identify specialized equipment required for erection of such structures.
- Case study/ies of such structures and reporting.

## **UNIT-3: STUDY OF ADVANCE BUILDING MATERIALS**

**[9]**

- Study of advance building materials like Special alloys of steel & other metals, glass, polymer, fabric,
- Various types of finishes & treatments, Construction chemicals, specially manufactured items from manufacturers catalogues, etc. and
- Specialized equipment required for erection used in erection of structures mentioned IN Unit 2.
- Market survey and collection of information about the materials.

## **UNIT-4: CONCEPTUAL UNDERSTANDING OF HIGH RISE BUILDINGS**

**[9]**

- Conceptual Understanding of High rise buildings in normal and adverse conditions considering topography of the site, water-logging, marine structures, et.
- Construction details understanding, Service systems, Structural Systems, Sequence of erection and facilitating maintenance of such structures.
- Identify specialized equipment required for erection of such structures.
- Case studies of such structures and reporting.

## UNIT-5: CONCEPTUAL UNDERSTANDING OF PRE-FABRICATION & CONCEPT OF MODULAR CO-ORDINATION

[9]

- Conceptual Understanding of Pre-fabrication in building construction.
- Concept of Modular co-ordination.
- Construction details understanding, Service systems, Structural Systems, Sequence of erection and facilitating maintenance of such structures.
- Essential process of manufacturing, handling of pre-fabricated components.
- Identify specialized equipment required for erection of such structures.
- Case studies of such structures and reporting.

### TEXT BOOKS/REFERENCE BOOKS:

1. Smart Materials and New Technologies for architecture and design professions by Michelle Addington and Daniel Schodek.
2. Advanced Materials and Techniques for Reinforced Concrete Structures by Mohamed Abdallah El Reedy
3. Advanced Materials, Technology and Application: Proceedings of the 2016 International Conference on Advanced Materials, Technology and Application by Qingzhou Xu
4. Integrating Innovation in Architecture: Design, Methods and Technology for Progressive and Research

Course outcomes:	
1.	Understand the properties characteristics, Strength, manufacturing process of various advanced construction materials. Which in turn help them to choose the suitable materials according to the contact – In response to the surroundings
2.	Understanding of advanced technologies in terms of its properties, manufacture and their applications in architectural construction.
3.	The students are made to be aware of various types of finishes & treatments, Construction chemicals, specially manufactured items from manufacturers catalogues, etc. and specialized equipment.

Course code	Course title	L	T	P	Credits
MAR-624	ADVANCE ARCHITECTURAL ILLUMINATION SYSTEM AND DESIGN	2	1	0	3

### Course Objectives:

To understand the different terms related to illumination.  
To expose the students to the Illuminating Engineering, Day Lighting and Control.  
To understand different methods of lighting calculations.  
To understand the Modelling of Daylighting system and Electric Lighting Integration  
To understand the different controls of Illumination

## **UNIT-1: ILLUMINATION FUNDAMENTALS**

**[6]**

- Terms used in Illumination
- Laws of Illumination
- Polar Curves
- Photometry
- Sources of light

## **UNIT-2: ILLUMINATING ENGINEERING**

**[9]**

- Units
- Lamp & Luminaire Photometry
- Light Loss Factors
- Lighting Calculations – Point to Point; Surface to Point; Surface to Surface
- The Lumen Method

## **UNIT-3: DAY LIGHTING**

**[9]**

- Solar Position
- Daylight Availability
- Daylight Delivery Systems
- Glazing Materials
- Performance Metrics
- Modelling of Day lighting Systems & Electric Lighting Integration

## **UNIT-4: CONTROLS**

**[9]**

- Switching & Dimming
- Code Requirements
- Occupancy Sensors
- Scene Controls
- Communicating Control Intent
- Control Protocols
- Emergency Lighting

## **UNIT-5: BASIC CONCEPTS OF LIGHTING DESIGN**

**[9]**

- Basic concepts of lighting design

- Design objectives,
- Design parameters,
- Qualitative & quantitative evaluation of lighting systems

#### **TEXT BOOKS/REFERENCE BOOKS:**

1. Interior Lighting for Designers by Gary Gordon
2. Architectural Lighting: Designing with Light and Space (Architectural Briefs) by HeveDescottes with Cecilia E. Ramos
3. The architecture of light: Architectural lighting design concepts and techniques by Sage Russel

<b>Course outcomes:</b>	
1.	The students are exposed to Fundamentals of Lighting and Lighting design
2.	Understanding of different terms related to illumination and various calculation methods.
3.	Understand the Modelling of Daylighting system, Electric Lighting Integration and different controls of Illumination

Course code	Course title	L	T	P	Credits
<b>MAR-625</b>	<b>ARCHITECTURAL ARBITRAION, LAWS AND LEGISLATIONS</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **Course Objectives:**

This subject focuses on business and legal aspects of architecture. Because of the broad range of topics, it is necessarily an overview.

Nevertheless, the course is designed to provide a comprehensive understanding of:

- The nature of architectural practice
- Business aspects of firm management
- Career management and decision making
- The legal basis for architectural practice
- The role of architects in the design and construction process.
- Strategies to enhance architectural leadership in the design and construction industry.

#### **UNIT-1: THE ARCHITECT IN ARBITRATION**

**[6]**

- The Nature of Arbitration.
- The Arbitration Acts 1954 – 1980
- The Preliminaries to Arbitration.
- Control of Arbitration by the High Court.

- The Arbitration Hearing.
- The Arbitrator's Award.

**UNIT-2: THE ARCHITECT AND THE CONTRACTOR**  
**[6]**

- Arbitration Agreement
- Architects Duties and Responsibilities
- Contractors Duties and Responsibilities

**UNIT-3: THE ARCHITECT AND THE CLIENT**  
**[6]**

- Arbitration Agreement
- Architects Duties and Responsibilities
- Clients Duties and Responsibilities

**UNIT-4: THE ARCHITECT AND THE LAW**  
**[6]**

- Appointment of Arbitrators
- Removal of Arbitrators
- Composition Of Arbitral Tribunal
- Jurisdiction Of Arbitral Tribunals
- Conduct Of Arbitral Proceedings

**UNIT-5: CONCILIATION**  
**[4]**

- Application and Scope
- Appointment of Conciliators
- Role of Conciliator
- Settlement Agreement

**TEXT BOOKS/REFERENCE BOOKS:**

1. The Arbitration And Conciliation Act, 1996
2. Law, Practice and Procedure of Arbitration - Second Edition by SundraRajoo
3. Professional Practice with Elements of Estimating, Valuation, Contract and Arbitration by Dr. Roshan H. Namavati
4. Mckenzie's Law of Building and Engineering Contracts and Arbitration by P. Ramsden. P. Ramsden. Juta& Company Ltd.

<b>Course outcomes:</b>	
1.	Understanding of the business and legal aspects of architecture
2.	Understanding of professional and ethical responsibility



3.	Understanding of the roles and responsibilities of an architect as an arbitrator as well as the challenges face by them.
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### **THIRD SEMESTER**

Course code	Course title	L	T	P	Credits
<b>MAR-711</b>	<b>ADVANCE DESIGN STUDIO (URBAN REDEVELOPMENT)</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>10</b>

#### **Course Objectives:**

To develop and promote international standards in urban design education and practice, with particular emphasis on the practical implementation of design-based planning and development. To enhance research and provides technical expertise in the urban redevelopment.

#### **ASSIGNMENT:**

**[140]**

Students are required to design commercial centre OR Community Centre

Report will be submitted in following format:

1. Layout plan
2. Form of structure
3. Understanding of construction details
4. Locational Attributes (Conditions & Topography of the site, water logging & marine structures)
5. Service System
6. Structural System
7. Identifying Sequence of Erection
8. How the maintenance is being facilitated

Lecture, demonstration, presentation & site visit will be done.

#### **TEXT BOOKS/REFERENCE BOOKS:**

1. Urban Redevelopment: A North American Reader 1st Edition by Barry Hersh
2. The Death and Life of Great American Cities by Jane Jacobs
3. The Politics of Urban Redevelopment: A Study of Old Delhi by Ajay K. Mehra
4. Urban Redevelopment: A Study of High-rise Buildings Book by K. Narayan Reddy
5. The Image of the City by Kevin Lynch

#### **Course outcomes:**

- |    |  |
|----|--|
| 1. | To develop awareness and understanding of Urban Redevelopment. |
|----|--|

	Improvement of the urban design skills and community representatives.
2.	Development of innovative urban design processes and tools.
3.	Enhancement of public awareness of urban design issues and opportunities

Course code	Course title	L	T	P	Credits
<b>MAR-712</b>	<b>ISSUES IN ARCHITECTURE AND URBANISM</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

### **Course Objectives:**

The Urbanism engages architecture with the challenges of contemporary urban strategies. Today's metropolitan regions show tremendous diversity and complexity, with significant global shifts in the patterns of urban growth and decline. Architecture has a central role to play in this dynamic context, developing spatial strategies as part of urban policies, and generating new urban clusters and types. This subject focuses on important changes in the contemporary urban condition and investigates how architectural intelligence helps us to understand and respond to these trends. Current issues in architecture and urbanism, explored through seminars and case studies introducing methods and theories of architectural research.

To introduce and enable understanding various aspects of urbanism through historical and theoretical perspectives.

To understand issues of contemporary urban form.

To study about urban design interventions.

## **UNIT-1: INTRODUCTION**

**[6]**

- Introduction to origin and evolution of cities and urbanism
- Historic review of the development of the urban design discipline and principles.
- Planning Typology:
  - Regional Planning
  - Urban Planning
  - Local Area Planning
  - Auxiliary planning
  - Disaster Management Planning
  - Environmental Planning,
  - Infrastructure Planning

## **UNIT-2: READING THE URBAN FABRIC**

**[9]**

- Introduction to different ways of reading and interpreting the urban fabric/city such as imageability, type, phenomenology.

### **UNIT-3: ISSUES OF CONTEMPORARY URBAN FORM**

**[9]**

- Introduction to various issues and aspects that impinge on the urban condition today such as globalisation, digital revolution, contemporary processes, sustainability, splintering urbanism through changes in information and communication networks and transportation.

### **UNIT-4: URBAN INTERVENTIONS- SUSTAINABLE DEVELOPMENT**

**[9]**

- Sustainable development
- Sustainable Cities Program
- Revitalization of brown field sites
- Transit Metropolis
- Case Studies

### **UNIT-5: URBAN INTERVENTIONS- RESTRUCTURING THE CITY**

**[9]**

- Contemporary Processes in Urban Design
- Place making in the Digital Age
- Reconfiguring public Realm
- Urbanisation and Excursions on density

#### **TEXT BOOKS/REFERENCE BOOKS:**

1. A.E.J. Morris, History of Urban Form before the Industrial Revolution, Prentice Hall 1996
2. Edmund Bacon, Design of Cities, Penguin, 1976
3. Gordon Cullen, The Concise Townscape, The Architectural Press, 1978
4. Kevin Lynch, Image of the City, MIT Press 1960.
5. Christian Norberg Schulz- Towards a Phenomenology of Architecture, Rizzoli New York, 1980
6. Jonathan Barnett, An Introduction to Urban Design
7. Gosling and Maitland, Urban Design, St. Martin's Press, 1984
8. William J. Mitchell, City of Bits: Space, Place and the infobahn, MIT Press, 1996.
9. Charles Correa, Housing and Urbanisation, Thames and Hudson, 1999
10. Donald Appleyard, Kevin Lynch, John R. Myer, The View from the Road, MIT Press 1965
11. Peter Calthorpe, The Next American Metropolis, Princeton Architectural Press, 1993
12. Thomas A, Horan, Digital Places: Building our city of bits, Urban Land Institute, 2000
13. Tridib Banerjee, Anastasia Loukaitou- Sideris, Companion to Urban Design, Routledge 2014

<b>Course outcomes:</b>
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1.	Awareness of urbanism as a phenomenon.
2.	Knowledge about different ways of addressing urban issues.
3.	Understanding various aspects of urbanism through historical and theoretical perspectives.

Course code	Course title	L	T	P	Credits
<b>MAR-713</b>	<b>PLANNING TYPOLOGY</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**Course Objectives:**

Strategic planning relies on a number of methods and tools to define and interpret information for comparing alternatives. This chapter identifies selected planning methods according to four purposes:

1. Methods to clarify issues and problems.
2. Methods to examine spatial and inter-sectoral relationships.
3. Methods for social, environmental, and economic analysis.
4. Methods to discuss the future.

**UNIT-1: INTRODUCTION**

**[4]**

- Introduction to Planning Typology

**UNIT-2: URBAN FABRIC**

**[6]**

- Introduction to different ways of reading and interpreting the urban fabric/ city such as imageability, type, phenomenology.

**UNIT-3: URBANISM**

**[6]**

- Introduction to urbanism through changes in information and communication networks and transportation.

**UNIT-4: SUSTAINABLE DEVELOPMENT**

**[6]**

- Sustainable development
- Case Studies

**UNIT-5: CONTEMPORARY PROCESSES**

**[6]**

- Contemporary Processes in Urban Design
- and Excursions on density

**TEXT BOOKS/REFERENCE BOOKS:**

1. A.E.J. Morris, History of Urban Form before the Industrial Revolution, Prentice Hall 1996
2. Edmund Bacon, Design of Cities, Penguin, 1976
3. Gordon Cullen, The Concise Townscape, The Architectural Press, 1978
4. Kevin Lynch, Image of the City, MIT Press 1960.
5. Christian Norberg Schulz- Towards a Phenomenology of Architecture, Rizzoli New York, 1980

<b>Course outcomes:</b>	
1.	Awareness of urbanism as a phenomenon.
2.	Knowledge about different ways of addressing urban issues.
3.	Understanding various aspects of urbanism through historical and theoretical perspectives.

Course code	Course title	L	T	P	Credits
<b>MAR-714</b>	<b>REAL ESTATE &amp; FINANCIAL MANAGEMENT</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

<b>Course Objectives:</b>
To enable the students understand the concept of Real Estate management and to give an overview of the Real Estate Market.

## **UNIT-1: INTRODUCTION TO REAL ESTATE**

**[6]**

- Terms used in Real Estate
- Real Estate Acts
- Registration Of Real Estate Project And Registration Of Real Estate Agents
- Functions And Duties Of Promoter
- Rights And Duties Of Allottees
- The Real Estate Regulatory Authority
- The Real Estate Appellate Tribunal
- Offences, Penalties And Adjudication

## **UNIT-2: REAL ESTATE DEVELOPMENT & PROJECT FINANCING**

**[9]**

- Fundamental concepts and techniques, recognizing institutional and entrepreneurial elements,
- Issues encountered in various phases of development like site evaluation and land procurement,
- development team assembly,

- market study and development scheme,
- construction and project management,
- project marketing and hand-over of completed projects.
- Project Feasibility,
- Development Financing,
- Asset Disposal and Redevelopment Options,
- Analyses of Development Sites and Case Studies,
- integrated case study on a specific development project, which requires reviewing, analysing and resolving the problems or strategic issues.

### **UNIT-3: URBAN POLICY & REAL ESTATE MARKETS**

**[9]**

- Impact of Government Regulations and Public Policies on Real Estate Markets, including urban land rent and location theories,
- land use structures,
- community and neighbourhood dynamics,
- degeneration and renewal in urban dynamics,
- private-public participation,
- government policies on public and private housing, and
- urban fiscal policy including property taxation, local government finance.

### **UNIT-4: CORPORATE REAL ESTATE ASSET MANAGEMENT**

**[9]**

- Strategic plans to align real estate needs with corporate business plans;
- Performance measurement techniques to identify asset acquisition or disposal;
- methods for enhancing value through alternative uses,
- efficient space utilization or improving user satisfaction.

### **UNIT-5: COMMERCIAL REAL ESTATE APPRAISAL**

**[9]**

- Determination of the capitalization rates across different types of properties;
- Appraisal of freehold and leasehold interests;
- Critical analysis of the valuation approaches adopted for securitized real estate;
- Asset pricing models;
- investment flexibility and future redevelopment opportunities.
- Contemporary Processes in Urban Design and Excursions on density

#### **TEXT BOOKS/REFERENCE BOOKS:**

1. The Real Estate (Regulation And Development) Act, 2016

2. Gerald R Cortesi, "Mastering Real estate principles" (2001); Dearborn Trade Publishing, New York, U.S.A.
3. Fillmore W Galaty, "Modern Real estate practice" (2002); Dearborn Trade Publishing, New York, U.S.A.
4. Frank Harris, "Modern Construction management", (2006), Blackwell publishing, U.S.A.
5. Terrence M Clauritie, "Real estate finance: Theory & practice", (2005), Prentice hall, U.S.A
6. Steve Bergsman, "Maverick real estate financing", (2006), John Wiley & Sonss Inc, New Jersey, U.S.A.

Course outcomes:					
1.	Understand land as a resource and be aware of the tactical aspects of marketing the completed property.				
2.	To understand the implications of the urbanisation on urban land.				
3.	To capture the form and pattern of cities growth and market prices				
Course code	Course title	L	T	P	Credits
MAR-715	HOUSING	2	1	0	3

Course Objectives:
<p>To understand strategies adopted in Mass Housing projects of various nature and issues related to Design considerations.</p> <p>Four Case studies with analysis of the mass housing projects with respect to Need / Demand of the project considering socio-economic conditions, Government policies for promotion, Development control, Finance and Pricing, Technology and Time constraints, Geography, local conditions and Climatic conditions, Evolving Design Brief for the Project, Progress of construction commencement/completion, Special design considerations for the user, etc. The projects to be include:</p> <p>Mass housing project for higher income group or combinations of income groups in Urban areas.</p> <p>Mass housing project for Slum Improvement schemes by Government or private organization.</p> <p>Mass housing project for Old Age people.</p> <p>Rehabilitation / transit accommodation /camps for people affected by natural disasters like earthquake, floods, refugees, or other disasters.</p>

## UNIT-1: CONCEPTS AND DEFINITIONS

[6]

- Shelter as a basic requirement, determinants of housing form,
- Census of India definitions, Introduction to policies, housing need, demand and supply, dilapidation, structural conditions, materials of constructions, housing age, occupancy rate, crowding, housing shortage, income and affordability, poverty and slums, houseless population.
- Various housing typologies viz. traditional houses,
- Plotted development, group housing, multi-storied housing, villas, chawls,
- etc., slums and squatters, night shelters,
- public health issues related to housing,
- various theories of housing,
- concept of green housing,
- green rating of housing projects.

## **UNIT-2: SOCIAL AND ECONOMY DIMENSIONS**

**[9]**

- Housing as social security, role of housing in development of family and community wellbeing, status and prestige related to housing, safety, crime and insecurity, deprivation and social vulnerability, ghettoism, gender issues, housing and the elderly.
- Contribution of housing to micro and macro economy, contribution to national wealth and GDP, housing taxation, national budgets, fiscal concessions, forward and backward linkages.

## **UNIT-3: HOUSING AND THE CITY**

**[9]**

- Understanding housing as an important land use component of city plan / master plan, considerations for carrying out city level housing studies, projections, land use provisions,
- Suitability of land for housing, housing stress identification, projecting housing requirements, calculating housing shortages, housing allocation.

## **UNIT-4: PLANNING FOR NEIGHBOURHOODS**

**[9]**

- Approaches to neighbourhood living in traditional and contemporary societies, elements of neighbourhood structure, Planning and design criteria for modern neighbourhoods, norms and criteria for area distribution, housing and area planning standards, net residential density and gross residential density, development controls and building byelaws, UDPFI guidelines, NBC 2005 provisions.
- Case studies of neighbourhood planning

## **UNIT-5: NEW FORMS OF LIVING & HOUSING IN DIGITAL ERA**

**[9]**



- Hyper Housing
- Multi cultural Housing
- Lab rooms and cyber homes
- Network housing
- hybrid buildings
- Individual sheltered residences
- Residence cities and bio homes for senior citizens
- Works of UN Studio, FOA, OMA

#### **TEXT BOOKS/REFERENCE BOOKS:**

1. Jingmin ZHOU; Urban housing Forms; Architectural Press; 2005
2. Adrienne Schmitz; Multifamily Housing Development Handbook; Urban Land Institute; 2001
3. Carles Bronto; Innovative Public Housing; Gingko Press; 2005
4. People and Housing in Third World Cities by Dwyer, D.J.; 1981
5. Shelter in India - Sustainable Development Series by Aromar Revi; 1990

<b>Course outcomes:</b>	
1.	Understanding the basic Definitions, Concepts and Socio-economic Dimensions related to Housing.
2.	Basic understanding of Housing at the Neighborhood and City level and to appreciate the Housing Sector as an Integral Sector of Overall Town Planning System.
3.	The students will understand the latest development, issues and design strategies governing the Housing in National and international level.

Course code	Course title	L	T	P	Credits
<b>MAR-716</b>	<b>ENVIRONMENTAL LAWS AND LEGISLATIONS</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **Course Objectives:**

An introduction to the concepts and principles which underpin environmental law from the international to the local level. The course will address Constitutional responsibilities and roles relating to the environment; sustainable development and the law; environmental planning through environmental impact assessment and land-use law; environmental protection principles, climate change water resources law; heritage issues and the protection of biological diversity.

- Remedies under law of torts,
- Law of crimes and
- Other common law remedies

**UNIT-2: THE CONSTITUTION OF INDIA [6]**

- Salient features
- Fundamental Rights and Directive principles of State Policy
- Write Petitions
- Public Interest Litigations

**UNIT-3: ENVIRONMENTAL LAWS AND LEGISLATIONS [6]**

- Water Act 1974
- Air Act 1981
- Environmental protection Act 1986
- Energy Conservation Act 2001
- Public Liability Insurance Act 1991

**UNIT-4: ENVIRONMENTAL NOTIFICATIONS [6]**

- Coastal Regulation Zones
- Dahanutaluka Eco-Fragile Area
- Environment Impact Assessment of Development Projects
- Matheran Eco-Sensitive Zones
- Bio\_Medical Waste (M&H) Rules 1998
- Hazardous Waste (M&H) Rules 1989
- Municipal Solid Waster (M&H) Rules 2000

**UNIT-5: INTERNATIONAL ENVIRONMENTAL LAWS [6]**

- An introduction to International law;
- sources of international law;
- law of treaties; signature, ratification
- Evolution of international environmental law: Customary principles; Common but differentiated responsibility, Polluter pays.

**TEXT BOOKS/REFERENCE BOOKS:**

1. Environmental Law in India, P. Leelakrishnan
2. Divan S. and Rosencranz A. (2005) Environmental Law and Policy in India, 2nd ed., Oxford, New Delhi
3. Handbook of Environmental Law (Second Edition), P. B. Sahasranaman
4. Environmental Law in Indian Country: to 1:28, William H Rodgers
5. Environmental Law in India, Mohammad Naseem and SamanNaseem
6. Birnie P. (2009) et al., International Law and the Environment, 3rd ed., Oxford

<b>Course outcomes:</b>	
1.	To understand and appreciate the ethical dimensions of the role of lawyers, and the functioning of law and legal systems;
2.	To be able to apply those principles to problem-solving exercises;
3.	To develop an ability to critically analyse and apply legislation, rules and cases in context.

## **FOURTH SEMESTER**

Course code	Course title	L	T	P	Credits
<b>MAR-721</b>	<b>ARCHITECTURAL THESIS</b>	<b>2</b>	<b>0</b>	<b>14</b>	<b>16</b>

<b>Course Objectives:</b>
<ul style="list-style-type: none"> <li>The purpose of a thesis is to enable the student to develop deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study. The thesis should be written at the end of the programme and offers the opportunity to delve more deeply into and synthesize knowledge acquired in previous studies. A thesis for a Master of Architecture should place emphasis on the technical/scientific/artistic aspects of the subject matter.</li> <li>The overall goal of the thesis is for the student to display the knowledge and capability required for independent work as a Master of Architecture.</li> </ul>

## **ASSIGNMENT**

**[224]**

<b>Course outcomes:</b>	
1.	Deeper knowledge of methods in the major subject/field of study.
2.	A capability to contribute to research and development work.
3.	<p>The capability to use a holistic view to critically, independently and creatively identify, formulate and deal with complex issues.</p> <p>The capability to plan and use adequate methods to conduct qualified tasks in given frameworks and to evaluate this work.</p>

### SCHEME FOR B. VOC (3<sup>RD</sup> YR.)

B. VOC					Semester		I
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	ARC-101	Principles of Architecture - I	2	0	0	2	
2	ARC-102	History of Architecture - I	2	0	0	2	
3	ARC-103	Building Material and Processes -I	2	0	0	2	
4	ARC-104	Architectural Psychology	2	0	0	2	
5	CEA101	Environmental Science and Ecology	2	0	0	2	
PRACTICAL							
1	ARC-155	Basic Design and Visual Arts - I	0	0	6	3	

2	ARC-156	Architectural Drawing and Graphics - I	0	0	6	3
3	ARC-157	Building Construction Technology - I	0	0	6	3
4	ARC-158	Model Making Workshop - I	0	0	2	1
5	ARC-159	Computer Applications in Architecture - I	0	0	2	1
6	PD-191A	Hobby Club	0	1	0	1
		<b>TOTAL</b>	<b>10</b>	<b>0</b>	<b>24</b>	<b>22</b>

<b>B. VOC</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	IN-111	History of Interior Furniture-II	2	0	0	2
2	IN-112	Building Materials and Processes-II	2	0	0	2
3	IN-113	Furnishing & Fittings	2	0	0	2
<b>PRACTICAL</b>						
1	IN-163	Furniture Design-I	0	0	2	1
2	IN-164	Basic design and Visual Arts-II	0	0	6	3
3	IN-165	Drawing and Graphic II	0	0	6	3
4	IN-166	Building Construction Technology-II	0	0	6	3
5	IN-167	Model Making Workshop-II	0	0	4	2
6	IN-168	Computer application in architecture -II	0	0	4	2
7	IN-170	Interior Project I	0	0	4	2
		<b>Total</b>	<b>6</b>	<b>0</b>	<b>32</b>	<b>22</b>

### SCHEME FOR B. VOC (3<sup>RD</sup> YR.)

<b>B. VOC</b>			<b>Semester</b>			<b>III</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	IN-201	History of Interior Furniture-II	2	0	0	2
2	IN-202	Building Services-I	2	0	0	2
3	IN-203	Landscape	2	0	0	2
<b>PRACTICAL</b>						
1	IN-204	Building Material & Construction III	1	0	4	3
2	IN-205	Interior Design & Landscape-I	0	0	4	2

3	IN-206	Display Design - II	0	0	4	2
4	IN-207	Furniture Design-II	0	0	4	2
5	IN-258	Computer Application-III	1	0	2	2
6	IN-209	Interior Project-II	0	0	4	2
7	PD-292	Effective Communication	0	0	4	2
		Total	8	0	26	21

B. VOC			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	IN- 211	Building Services-II	2	0	0	2
2	IN-313	Estimating , Costing & Specification	2	0	0	2
PRACTICAL						
1	IN-242	Interior Design & Landscape-II	0	0	6	3
2	IN-243	Display Design-III	0	0	4	2
3	IN-244	Furniture Design-III	0	0	4	2
4	IN-245	Interior Construction-I	2	0	4	4
5	IN-246	Interior Project-III	0	0	8	4
6	PD-293	Intra & Interpersonal Skills	0	0	2	1
			6	0	28	20

### SYLLABUS FOR B. VOC (3<sup>RD</sup> YR.)

Course code	Course title	L	T	P	Credits
ARC -101	PRINCIPLES OF ARCHITECTURE - I	2	0	0	2

#### Course Objectives:

- To introduce the student to the world of architecture and establish the key elements involved in the creation of aesthetically appealing and practically appropriate architecture.
- The subject is designed to provide an insight into the principles and processes that underpin the discipline of architecture.
- It is aimed to teach students the key practical and theoretical influences that inform

architectural practice enabling students to understand and analyse architecture.

**UNIT-1:** [6]

**INTRODUCTION TO ARCHITECTURE:** Description of architecture; architecture compared to visual and temporal arts; architecture and science and technology; Architecture and social science; the work of an architect compared to that of an artist, technologist and a designer/craftsman, scope of architecture; definition and concepts of architecture.

**UNIT-2:** [4]

**ARCHITECTURE AS AN OCCUPATION:** Types of architectural projects, career opportunities in the field of architecture, role, responsibilities and duties of an architect in a building project.

**UNIT-3:** [10]  
**ELEMENTS OF DESIGN –**

**FUNCTIONAL** Study of functional, aesthetic and structural components of architecture: parameters of design; anthropometrics; human activity and the use of spaces; spaces – their relation, interaction and information in a structure.

**AESTHETIC:** Elements and principles of visual composition, forms; functions of spaces and their flexibility; natural forms and shapes and their relation in designing; problems related to the understanding of the elements of architectural design; concepts of space and form and their perception; ordering principles.

**STRUCTURAL:** Elements of structure; elements of construction and their thoughtful use to enhance designs;

**UNIT-4:** [4]

**ANALYSIS OF BUILDINGS:** Analysis of architectural buildings through literature reviews and case studies, based on the functional, aesthetic and structural parameters.

**UNIT-5:** [4]

**DESIGN PROCESS:** Integration of aesthetics and function; understanding of formative ideas, organization concepts, spatial characteristics; massing and circulation in design analysis

**TEXT BOOKS/REFERENCE BOOKS:**

1. Snyder, J and Catanese, A, "Introduction to Architecture", McGraw-Hill, 1979
2. Farrelly, Lorraine, "The Fundamentals of Architecture", Ava Publishing, 2007
3. Voordt and Wegen, "Architecture in Use", Architectural Press, 2005
4. Smithies, K.W., "Principles of Design in Architecture", Van Nostrand Reinhold Co, 1981
5. Roger H. Clark and Michael Pause, "Precedents in Architecture", Van Nostrand Reinhold Co, 1996

Course outcomes:	
1.	Awareness of basic aspects and expectations of the career as an architect , exact notes and data on role and responsibility
2.	Students know about the initial process of designing , understanding and application of ideas and calculation basics for a design
3.	Selection of various famous buildings with their specific data and complete study for better understanding of pre existing architectural marvels.

Course code	Course title	L	T	P	Credits
ARC-102	HISTORY OF ARCHITECTURE - I	2	0	0	2

Course Objectives:
<ul style="list-style-type: none"> <li>➤ History of Architecture provides the connection, context, and roots central for the identity of who we were, who we are, and who we might be. Since architecture is a coherent chain of events, styles, tendencies, beliefs and techniques,</li> <li>➤ Studying history of architecture enables the student to gain a direct understanding of how and why architecture is made today, and clues to how architecture can be tomorrow.</li> </ul>

**UNIT-1:****[4]**

**INTRODUCTION TO ANCIENT WORLD ARCHITECTURE:** Art and culture of pre-historic man; stone henge; a brief outline of the Neolithic revolution and its impact on built forms– brief study of a few ancient settlements – Jericho, CatalHuyuk, Hassuna, Koln-Lindenthal&Skara Brae.

**UNIT-2:****[4]**

**ART AND ARCHITECTURE OF EGYPT:** Evolution of Egyptian architecture- factors affecting development; spatial planning and characteristic features; tombs- mastabas, pyramids; temples; sphinx, obelisks etc.



### **UNIT-3:**

**[4]**

**ART AND ARCHITECTURE OF MESOPOTAMIA:** Factors affecting the development of art and architecture of Mesopotamia; spatial planning and characteristic features of the architecture of Sumerian, Babylonian, Assyrian and Persian periods; Ziggurats etc

### **UNIT-4:**

**[6]**

**ART AND ARCHITECTURE OF GREECE & ROME:** Evolution of Greek architecture- factors affecting development; characteristic features of Aegean and Helladic architecture; Hellanic and Hellenistic periods; Greek classic orders; agora and other important public buildings/ spaces. Evolution of Roman architecture- factors affecting development; characteristic features Roman classic orders; forums; basilicas; coliseum and other important public buildings/ spaces.

### **UNIT-5:**

**[10]**

**EARLY CHRISTIAN ARCHITECTURE , ROMANESQUE AND GOTHIC ARCHITECTURE:** Factors affecting evolution and development of early Christian and Byzantine, characteristic features basilican church and centralized church typology Factors affecting evolution and development of Romanesque and Gothic architecture, characteristic features and typical examples, spatial planning, construction and other features- rib and panel vaulting etc; church and the precinct, cathedrals, monastic establishments, parish churches; elements of special attributes .English and French church planning; secular architecture- manor houses, castles; town planning principles.

#### **TEXT BOOKS/REFERENCE BOOKS:**

1. Cruickshank, D., Fletcher, B., Saint A., “Banister Fletcher's - A History of Architecture”, Architectural Press, 1996.
2. Risebero, Bill, “ The Story of Western Architecture”, MIT Press, 2001
3. Ching Francis D.K., Jarzombek, Mark M., Prakash, Vikramaditya, “A Global History of Architecture”, Wiley, 2006.
4. Hiraskar, G.K., “The Great Ages of World Architecture (with Introduction to Landscape Architecture)”, DhanpatRai Publications (P) Ltd, 2009

<b>Course outcomes:</b>	
1.	This central thought of the civilization has permeated the students in various related fields such as religion, arts, science, literature, social and economic setup, which in turn were instrumental to the evolution of architecture specific to the area
2.	Prehistoric age and Early Civilizations, attempts at sensitizing the students to view architecture as one of the many products of the civilization.

Course code	Course title	L	T	P	Credits
ARC-103	BUILDING MATERIALS AND PROCESSES-I	2	0	0	2

#### Course Objectives:

- The course is designed to expose the students to both vernacular and contemporary construction methods and materials, their properties, testing and uses.

### UNIT-1: [6]

**SOILS , CLAY AND CLAY MATERIALS :** Formation–index property, specific gravity, grain size distribution, plasticity, characteristics and phase relationship, identification and local names; ISI classification; sources and uses of sand; fineness modulus; Bricks, terracotta, tiles etc; Bricks: types of bricks; study of properties of constituent components, manufacturing process, quality test of bricks.

### UNIT-2: [6]

**RURAL AND TRADITIONAL MATERIALS (Mud & Stone):** Mud: mud as a building material; soil stabilization: need for soil stabilization, stabilized soil blocks; rural materials: bamboo, casuarina, coconut, palm, hay, coir – properties and uses; fire retardant treatment and insect proofing; Types of stones; study of properties of constituent components; methods of quarrying of stones; properties and uses of principal building stones.

### UNIT-3: [6]

**TIMBER:** Study of properties of timber, uses, seasoning process, quality tests; types of timber and defects in timber; protection from termites; techniques of preserving and finishing of timber; plywood, particle boards, block boards, PVC, laminates etc.

### UNIT-4: [6]

**LIME, CEMENT AND CEMENT PRODUCTS:** Lime: fat and hydraulic lime, their uses and properties; manufacture of lime; preparation of lime mortar; functions and requirements of a good mortar; mix properties for various works; Concrete: study of properties of constituent components, manufacturing process, quality tests of cement, lime, sand, aggregates, concrete and mortar.

### UNIT-5: [4]

**METALS:** Study of properties of constituent components, manufacturing process, quality test

of ferrous and non-ferrous metals (lead, copper, zinc, tin, Al & Steel); weathering effects on such metals, preventive measures. Usage in building Industry.

## REFERENCE BOOKS

1. Farrelly, Lorraine, “Basic Architecture 02: Construction + Materiality”, Ava Publishing, 2008.
2. Watson, Donald, “Time-saver Standards for Building Materials and Systems”, Tata McGraw Hill, 2010.

Course code	Course title	L	T	P	Credits
ARC-104	ARCHITECTURAL PSYCHOLOGY	2	0	0	2

### Course Objectives:

- This course is aimed at helping the student understand the built environment by providing a look at architecture within the framework of human sciences:
- Human psychology and society influence and inform architecture and how in turn architecture affects our lives.
- Students develop critical observation skills and investigate buildings as manifestations of religious, social, and personal values.

### UNIT-1:

[8]

**ENVIRONMENTAL PSYCHOLOGY & PERCEPTION:** Relation to architecture and planning; meaning of environment; measurement of environmental stimuli from psychological aspect; behavioral effects of environmental conditions: physical - noise, temperature and air pollution; social- overcrowding and isolation; extra ordinary- catastrophe. spatial perception: perception of distance, size and movement; meaning of colour and form; depth perception; visual illusions in architecture; spatial thinking- social and cultural influences on environmental perception.

### UNIT-2:

[6]

**TERRITORIAL BEHAVIOUR AND PERSONAL SPACE:** Concept of personal space and territoriality, individual and situational as determinants of personal space; consequences of too much or too little of personal space; personal space and environmental space as implications for design aspects; adaptation to environment - behavioral aspects of adaptation to familiar and unfamiliar environment; spatial experience; living requirements and satisfaction, etc.

### UNIT-3:

[6]

**ARCHITECTURAL PSYCHOLOGY & PSYCHOLOGICAL AESTHETICS:** Psychological effects of various architectural means: line, form, space, textures, colour, light, scale etc; case studies. Measurement of communication through art and architecture; signs and symbols in architecture; determination of pleasantness and unpleasantness as psychological factors in environmental design.

### UNIT-4:

[6]

**ENVIRONMENTAL SETTINGS:** Nature and effects of home, work, educational or institutional (e.g. nursing home, hospital, prison, etc.) environments as they affect human health and cognitive functioning; restorative effects of natural environments

**UNIT-5:**

**[2]**

**LOCAL IDENTITY:** Concept of local identity, globalization and identity, maintaining a distinct identity in a globalised world etc.

Course outcomes:	
1.	Detail study of spaces, behavior, environmental aspects etc
2.	Understanding of environmental settings and its impacts on human health, functioning and restorative effects.
3.	Theory and understanding on local identity , globalization in architectural terms.

**TEXT BOOK:** Parmar, V. S., “Design Fundamentals in Architecture”, Somaiya Publications Pvt. Ltd., 1973.

**REFERENCE BOOKS**

1. Bell, P.A., Greene, T.C., Fisher, J.D., & Baum, A. “Environmental Psychology”, 5th edition, Harcourt, Inc.: Fort Worth, TX, 2001.
2. Gallagher, W., “The Power of Place”, Harper Perennial, New York, 1994.
3. Rapoport, Amos, “House Form and Culture”, Prentice Hall, 1969.
4. Broadbent, Geoffrey. “Design in Architecture: Architecture and the Human Sciences”, John Wiley and Sons, 1973.

**SCHOOL OF BASICS SCIENCES & HUMANITIES**

**SCHEME FOR B. SC MATHEMATICS**

<b>B. SC. (Hons.) MATHEMATICS</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BMA-117	Algebra	5	1	0	6
2	BMA-111	Calculus	5	1	0	6
3	BEN-101	English Communication (AECC-1)	2	0	0	2
4	BMA-116	Object Oriented Programming inC++(GE-1)	4	0	0	4
5	BMA-166	Object Oriented Programming inC++(Lab)	0	0	2	1
6	PD-191A	Hobby club	0	1	0	1
		<b>Total</b>	<b>16</b>	<b>3</b>	<b>2</b>	<b>20</b>

<b>B. SC. (Hons.) MATHEMATICS</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BMA-114	Real Analysis	5	1	0	6
2	BMA-113	Ordinary Differential Equations	5	1	0	6
3	BMA-115	Econometrics& Statistics (GE-2)	5	1	0	6
4	CEA-101A	Environmental Science (AECC-2)	3	1	0	4
5	PD-192A	Hobby Club	0	1	0	1
		<b>Total</b>	<b>18</b>	<b>5</b>	<b>0</b>	<b>23</b>

## SCHEME FOR B. SC MATHEMATICS

B. SC. (Hons.) MATHEMATICS			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA-220	Group Theory-I	5	1	0	6
2	BMA-221	Theory of Real function	5	1	0	6
3	BMA-222	PDE and systems of ODE	5	1	0	6
4	BMA-223	Logic and sets(SEC-1)	4	0	0	4
5	BMA-224	Information Security (GE-3)	5	1	0	6
		<b>Total</b>	<b>24</b>	<b>4</b>	<b>0</b>	<b>28</b>

B. SC. (Hons.) MATHEMATICS			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA-229	Numerical Methods	4	0	0	4
2	BMA-279	Numerical Methods Lab	0	0	2	1
3	BMA-225	Riemann Integration and series of functions	5	1	0	6
4	BMA-226	Ring Theory and Linear Algebra-I	5	1	0	6
5	BMA-227	Graph Theory (SEC-2)	4	0	0	4
	BMA-228	Application of Algebra (GE-4)	5	1	0	6
	PD-293	PDP/Interpersonal Skills	0	1	0	1
		<b>Total</b>	<b>23</b>	<b>4</b>	<b>2</b>	<b>28</b>

### SCHEME FOR B. SC MATHEMATICS

B. SC. (Hons.) MATHEMATICS			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA-325	Multi Variate Calculus	5	1	0	6
2	BMA-326	Group Theory II	5	1	0	6
3	BMA-327	Analytical Geometry (DSE-1)	5	1	0	6
4	BMA-328	Probability Theory(DSE 2)	5	1	0	6
5	PD-392	PDP/Interpersonal Skills	2	0	0	2
		<b>Total</b>	<b>22</b>	<b>4</b>	<b>0</b>	<b>26</b>

B. SC. (Hons.) MATHEMATICS			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA-329	Metric space and Complex analysis	5	1	0	6
2	BMA-330	Ring Theory and Linear algebra II	5	1	0	6
3	BMA-331	Linear Programming (DSE 3)	5	1	0	6
4	BMA-332	Mechanics (DSE 4)	5	1	0	6
5	BMA-333	Minor project/seminar	4	0	0	4
		<b>Total</b>	<b>24</b>	<b>4</b>	<b>0</b>	<b>28</b>

## SYLLABUS FOR B. SC MATHEMATICS

### Semester I

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Code Name Credit(6)

BMA-111 Calculus 5-1-0

Course Objectives:

1. Understand the major problems of differential and integral calculus.
2. Appreciate how calculus allows us to solve important practical problems in an optimal way.

Unit-I Limit & Continuity: The real line and its geometrical representation;  $\epsilon$ - $\delta$  treatment of limit and continuity; Properties of limit and classification of discontinuities; Properties of continuous functions.



Unit-II: Differentiability: Successive differentiation; Leibnitz Theorem; Statement of Rolle's Theorem; Mean Value Theorem; Taylor and Maclaurin's Theorems; Indeterminate forms.

Unit-III: Applications of Differentiation : Asymptotes; Concavity, convexity and points of inflection; Curvature; Extrema; elementary curves, tangent and normal in parametric form; Polar Coordinates.

Unit-IV: Partial Differentiation: Limits and continuity of functions of two variables; Partial derivatives; Taylor's theorem and Maclaurin's Theorem for function of two variable; Maxima and minima for function of two variable.

Unit-V: Double and triple integrals; Change of order in double integrals. Application of Integration: length of a curve; Arc length as a parameter; Evolute & Envelope; Volumes and surface areas of solids of revolution.

Reference Books:

1. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.
2. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.

3. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar Inc. New York 1975.
4. Shanti Narayan, Elements of Real Analysis, S. Chand & Company, New Delhi. 5Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Company, New Delhi.
6. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
7. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
8. H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P. Ltd.,Singapore, 2002.

Course outcomes:

1. Interpret a function from an algebraic, numerical, graphical and verbal perspective and extract information relevant to the phenomenon modeled by the function.
2. Calculate the limit of a function at a point numerically and algebraically using appropriate techniques including L'Hospital's rule.

Code Name Credit(6)

Course Objectives:

- 1) Students should be helped to make connections and build relationships between algebra and arithmetic, geometry, and probability and statistics.
- 2) The course will enhance research, inquiry and analytical thinking abilities of students.

Unit-I: Polar representation of complex numbers,  $n$ th roots of unity, De Moivre's theorem for rational indices and its applications. Unit-II: Equivalence relations, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

Unit-III: Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation  $Ax=b$ , solution sets of linear systems, applications of linear systems, linear independence.

Unit -IV: Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices.

Unit V: Subspaces of  $R^n$ , dimension of subspaces of  $R^n$  and rank of a matrix, Eigen values, Eigen Vectors and Characteristic Equation of a matrix, special matrices.

#### Books Recommended

1. Titu Andreescu and Dorin Andrica, Complex Numbers from A to Z, Birkhauser, 2006.
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
3. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.

Course outcomes:

1. Students will learn to transform between bases, including the creation, geometric connections, and the application of orthogonal and orthonormal bases.
2. Students will learn Fundamental Theorem of Arithmetic

Code Name Credit(4)

**BMA-116 OBJECT ORIENTED PROGRAMMING IN C++ 4-0-0**

Course Objective:

To develop programming skills of students, using object oriented programming concepts, learn the concept of class and object using C++ and develop classes for simple applications.

Unit-I: OOP Paradigm: Comparison of Programming paradigms, Characteristics of Object- Oriented Programming Languages, Object-based programming languages C++: Brief History of C++, Structure of a C++ program, Difference between C and C++ - cin, cout, new, delete operators, ANSI/ISO Standard C++, Comments, Working with Variables and const Qualifiers. Enumeration, Arrays and Pointer.

Unit-II: Implementing oops concepts in C++ Objects, Classes, Functions, Passing Data to Functions, Scope and Visibility of variables in Functions, Structures in C++, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic

Binding, Message Passing, Default Parameter Value, Using Reference variables with Functions.

Unit-III: Abstract data types, Class Component, Object & Class, Constructors Default and Copy Constructor, Assignment operator deep and shallow coping, Access modifiers – private, Public and protected.

Unit-IV: Implementing Class Functions within Class declaration or outside the Class declaration. Instantiation of objects, Scope resolution operator, Working with Friend Functions, Using Static Class members.

Unit-V: Understanding Compile Time Polymorphism function overloading

Rules of Operator Overloading (Unary and Binary) as member function/friend function, Implementation of operator overloading of Arithmetic Operators, Overloading Output/Input, Prefix/ Postfix Increment and decrement Operators, Overloading comparison operators, Assignment, subscript and function call Operator , concepts of namespaces.

Practical to be performed in lab.

Books Recommended

1. A. R. Venugopal, Rajkumar, and T. Ravishanker, Mastering C++, TMH, 1997.
2. S. B. Lippman and J. Lajoie, C++ Primer, 3rd Ed., Addison Wesley, 2000.
3. Bruce Eckel, Thinking in C++, 2nd Ed., President, Mindview Inc., Prentice Hall.
4. D. Parsons, Object Oriented Programming with C++, BPB Publication.

Course outcome:

Program using objects and data abstraction, class, and methods in function abstraction. Analyze, write, debug, and test basic C++ codes using the approaches introduced in the

course. Analyze problems and implement simple C++ applications using an object-oriented software engineering approach.

Code Name Credit(4)

BMA-166 OBJECT ORIENTED PROGRAMMING IN C++ Lab 4-0-0

Course Objective:

Introduces object-oriented programming concepts using the C++ language,  
Introduces the principles of data abstraction, inheritance and polymorphism,  
Introduces exception handling

1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. Write a C++ program to declare Struct. Initialize and display contents of member variables.
3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Write a program to find the largest, smallest & second largest of three numbers. (use inline function MAX and MIN to find largest & smallest of 2 numbers).
5. Write a program to calculate the volume of different geometric shapes like cube, cylinder and sphere and hence implement the concept of Function Overloading.
6. Write a C++ program to allocate memory using new operator.



7. . Write a C++ program to create an array of pointers. Invoke functions using array objects.
8. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.
9. Write a C++ program Program to test arithmetic operators.
10. Write a C++ program Print the month name using switch statement.
11. Write a C++ program To check whether a given number is palindrome or not.

#### Reference Books:

1. The C++ Programming Language, 3rd Edition, B. Stroutstrup, Pearson Education. C++ Programming Lab Manual / II-I SEM / 2019-20 Page 9
2. OOP in C++, 3rd Edition, T. Gaddis, J. Walters and G. Muganda, Wiley Dream Tech Press.
3. Object Oriented Programming in C++, 3rd Edition, R. Lafore, Galigotia Publications Pvt Ltd.

#### Course outcome:

Ability to develop applications for a range of problems using object-oriented programming techniques

## Semester II

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Code Name Credit (6)

BMA-113 Ordinary Differential Equations

5-1-0

### Course Objectives:

- 1) Identify essential characteristics of ordinary differential equations.
- 2) Develop essential methods of obtaining closed form solutions.

Unit-I: Geometrical meaning of a differential equation. Exact differential equations, integrating factors. First order higher degree equations solvable for  $x, y, p$  Lagrange's equations, Clairaut's equations.

Unit-II: Orthogonal trajectories: in Cartesian coordinates and polar coordinates. Self orthogonal family of curves.. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Equations reducible to homogeneous .

Unit-III: Method of variations of parameters. Method of undetermined coefficients. Reduction of order of a differential equation. Linear differential equations of second order: Reduction to normal form.

Unit-IV: Transformation of the equation by changing the dependent variable/ the independent variable. Solution by operators of non-homogeneous linear differential equations.

Unit-V: Ordinary simultaneous differential equations. Solution of simultaneous differential equations involving operators  $x$  ( $d/dx$ ) or  $t$  ( $d/dt$ ) etc. Simultaneous equation of the form  $dx/P = dy/Q = dz/R$ . Total differential equations. Condition for  $Pdx + Qdy + Rdz = 0$  to be exact. General method of solving  $Pdx + Qdy + Rdz = 0$  by taking one variable constant. Method of auxiliary equations. The existence and uniqueness of solutions. The method of successive approximations, Picards theorem, Systems, The second order linear equations.

Reference Books:

1. B.Rai & D.P. Chaudhary : Ordinary Differential Equations; Narosa, Publishing House Pvt. Ltd.
2. D.A. Murray : Introductory Course in Differential Equations. Orient Longaman (India)

Course outcomes:

1. Distinguish between initial value problems and boundary value problems.

. 2. Solve standard constant coefficient nonhomogeneous ordinary differential equations by the methods of undetermined coefficients.

Code Name Credit (6)

BMA-114 Real Analysis 5-1-0

Course Objectives:

1. To describe fundamental properties of the real numbers that lead to the formal development of real analysis.
2. To comprehend rigorous arguments developing the theory underpinning real analysis

Unit-I Algebraic and Order Properties of  $\mathbb{R}$ ,  $\delta$ -neighborhood of a point in  $\mathbb{R}$ . Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of  $\mathbb{R}$ , The Archimedean Property, Density of Rational (and Irrational) numbers in  $\mathbb{R}$ , Intervals.

Unit-II- Limit points of a set, Isolated points, Derived sets, Examples of derived sets, Bolzano- Weierstrass theorem, Illustrations of Bolzano-Weierstrass theorem for sets. Idea of countable sets, uncountable sets and uncountability of  $\mathbb{R}$

.Weierstrass Approximation Theorem, Generalised Stone-Weierstrass Theorem, Baire Category Theorem and its Applications, Contraction Mapping.

Unit-III- Sequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria.

Unit-IV- Monotone Subsequence Theorem (statement only), Bolzano Weierstrass Theorem for Sequences. Cauchy sequence, Cauchy's Convergence Criterion.

Unit-V – Infinite series, convergence and divergence of infinite series, Cauchy

Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

#### Books Recommended

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis (3rd Edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
2. Gerald G. Bilodeau , Paul R. Thie, G.E. Keough, An Introduction to Analysis, Jones & Bartlett, Second Edition, 2010.

Course outcomes:

1. Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.

. 2. Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration

Code Name Credit (6)

BMA-115 ECONOMETRICS& STATISTICS 5-1-0

Course Objectives:

1. To understanding the tools of econometrics and applying them in practice.
2. To provide you with the skills helpful in filling the gap between being “a student of economics” and being “a practicing economist.

Unit-I: Basic Statistics: Statistical Concepts, Partition Values, Quartiles, deciles, percentiles, Measures of variation, Range, IQR, quartile deviation.

Unit-II: Correlation Analysis: Correlation coefficient, Assumption of Correlation analysis coefficient of determination and correlation, Measurement of correlation, Karl person's method, spearman's rank correlation, Concurrent deviation of the correlation coefficient.

Unit-III: Distribution & Estimation of parameter: Random variable, Normal distribution; chi- square, t and F-distributions; estimation of parameters; properties of estimators.

Unit-IV: Hypothesis Testing: Testing of hypotheses: defining statistical hypotheses; distributions of test statistics; testing hypotheses related to population parameters; Type I and Type II errors; power of a test; tests for comparing parameters from two samples.

Unit V: Regression Analysis: Simple Linear Regression Model: Two Variable Case Estimation of model by method of ordinary least squares; properties of estimators; goodness of fit; tests of hypotheses; scaling and units of measurement; confidence intervals; Gauss-Markov theorem; forecasting, Multiple Linear Regression Model Estimation of parameters.

#### Books Recommended

1. Jay L. Devore, Probability and Statistics for Engineers, Cengage Learning, 2010.
2. John E. Freund, Mathematical Statistics, Prentice Hall, 1992.
3. Richard J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall, 2011.

4. D. N. Gujarati and D.C. Porter, Essentials of Econometrics, McGraw Hill, 4th Ed., International Edition, 2009.

Course outcomes:

1. Able to critique reported regression results in applied academic papers and interpret the results for someone who is not trained as an economist.
2. Able to use a statistics to estimate an econometric model

Semester III

Code Name Credit (6)

BMA-220 Group Theory I

5-1-0

Course Objectives:

- 1) Students will be able to understand the concept of group theory.
- 2) Understand the properties of homomorphism and isomorphism.



Unit-I: Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), elementary properties of groups.

Unit-II: Subgroups and examples of subgroups, centralizer, normalizer, center of a group, product of two subgroups. Properties of cyclic groups, classification of subgroups of cyclic groups.

Unit-III: Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group, properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.

Unit-IV: External direct product of a finite number of groups, normal subgroups, factor groups, Cauchy's theorem for finite abelian groups.

Unit-V: Group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, First, Second and Third isomorphism theorems.

#### Books Recommended

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa Publishing House, New Delhi, 1999.

4. Joseph J. Rotman, An Introduction to the Theory of Groups, 4th Ed., Springer Verlag, 1995.

5. I.N. Herstein, Topics in Algebra, Wiley Eastern Limited, India, 1975.

Course outcomes:

1. Explain the concept of group homomorphism and the application of these concepts

2. Be able to produce examples and counter examples illustrating the mathematical concepts presented in the course.

Code Name Credit (6)

BMA-221 Theory of Real Functions

5-1-0

Course Objectives:

1) Students will be able to describe fundamental properties of continuous functions that lead to the formal development of real analysis.

2) Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.

Unit-I: Limits of functions (  $\epsilon$  approach), sequential criterion for limits, divergence criteria.

Limit theorems, one sided limits. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions.

Unit-II: Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.

Unit-III: Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem.

Unit-IV: Rolle's theorem, Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials, Taylor's theorem to inequalities. Cauchy's mean value theorem.

Unit-V: Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex

functions, relative extrema. Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions,  $\ln(1 + x)$ ,  $1/ax+b$  and  $(1 + x)^n$

#### Books Recommended

1. R. Bartle and D.R. Sherbert, Introduction to Real Analysis, John Wiley and Sons, 2003.
2. K.A. Ross, Elementary Analysis: The Theory of Calculus, Springer, 2004.
3. A. Mattuck, Introduction to Analysis, Prentice Hall, 1999.
4. S.R. Ghorpade and B.V. Limaye, A Course in Calculus and Real Analysis, Springer, 2006.

#### Course outcomes:

1. Demonstrate an understanding of limits and how that are used in sequences, series and differentiation.
2. Construct rigorous mathematical proofs of basic results in real analysis.

Code Name Credit (6)

BMA-222 PDE and Systems of ODE

5-1-0

#### Course Objectives:

1.Introduce students to partial differential equations

2.Introduce students to how to solve linear Partial Differential with different methods

Unit-I: Partial Differential Equations – Basic concepts and Definitions, Mathematical Problems. First-Order Equations: Classification, Construction and Geometrical Interpretation. Method of Characteristics for obtaining General Solution of Quasi Linear Equations.

Unit-II:Canonical Forms of First-order Linear Equations. Method of Separation of Variables for solving first order partial differential equations. Derivation of Heat equation, Wave equation and Laplace equation. Solve linear second order PDEs using canonical variables for initial-value problems, Separation of Variables and Fourier series for boundary value problems.

Unit-III:Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order Linear Equations to canonical forms.

Unit-IV: Systems of linear differential equations, types of linear systems, differential operators, an operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form.

Unit-V: Homogeneous linear systems with constant coefficients: Two Equations in two unknown functions, The method of successive approximations, the Euler method, the modified Euler method, The Runge-Kutta method.

#### Books Recommended

1. Tyn Myint-U and Lokenath Debnath, Linear Partial Differential Equations for Scientists and Engineers, 4th edition, Springer, Indian reprint, 2006.
2. S.L. Ross, Differential equations, 3rd Ed., John Wiley and Sons, India, 2004.
3. Martha L Abell, James P Braselton, Differential equations with MATHEMATICA, 3rd Ed., Elsevier Academic Press, 2004.

#### Course outcomes:

1. Classify partial differential equations and transform into canonical form.
2. Solve linear partial differential equations of both first and second order.

Code Name Credit (6)

BMA-224 INFORMATION SECURITY 5-1-0

#### Course Objectives:

1. To give basic understanding about system security.
2. To understand the salient facets of information security basics and the basics of risk management.

Unit-I: Overview of Security: Protection versus security; aspects of security—data integrity, data availability, privacy; security problems, user authentication, Orange Book.

Unit-II: Security Threats: Program threats, worms, viruses, Trojan horse, trap door, stack and buffer overflow; system threats- intruders; communication threats- tapping and piracy.

Unit-III: Cryptography: Substitution, transposition ciphers, symmetric-key algorithms-Data Encryption Standard, advanced encryption standards, public key encryption - RSA; Diffie- Hellman key exchange, ECC cryptography, Message Authentication- MAC, hash functions.

Unit-IV: Digital signatures: Symmetric key signatures, public key signatures, message digests, public key infrastructures.

Unit-V: Security Mechanisms: Intrusion detection, auditing and logging, tripwire, system-call monitoring.

## Books Recommended

1. W. Stallings, Cryptography and Network Security Principles and Practices, 4th Ed., Prentice- Hall of India, 2006.
2. C. Pfleeger and S.L. Pfleeger, Security in Computing , 3rd Ed., Prentice-Hall of India, 2007.
3. D. Gollmann, Computer Security, John Wiley and Sons, NY, 2002.
4. J. Piwprzyk, T. Hardjono and J. Seberry, Fundamentals of Computer Security, Springer- Verlag Berlin, 2003.
5. J.M. Kizza, Computer Network Security, Springer, 2007.
6. M. Merkow and J. Breithaupt, Information Security: Principles and Practices, Pearson Education, 2006.

## Course Outcomes:

- To appreciate the difficulties that arise when valuable information needs to be shared
- To identify the five leading-edge resources that have up-to-date information on information security.



Code Name Credit (4)

BMA-223 Logic and Sets

4-0-0

Course Objectives:

1.) Students will be able to explain the concepts of sets, relations and functions with a counter example.

2.) To understand the difference between tautology and contradiction

Unit-I: Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.

Unit-II: Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.

Unit-III: Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.

Unit-IV: Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections.

Unit-V: Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations, n-ary relations.

#### Books Recommended

1. R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
2. P.R. Halmos, Naive Set Theory, Springer, 1974.
3. E. Kamke, Theory of Sets, Dover Publishers, 1950.

#### Course outcomes:

1. Students can formalise first-order properties with formulas of predicate logic.
2. Students can prove simple first-order properties about sets, relations and functions using calculation style reasoning

#### Semester IV

BMA-229 NUMERICAL METHODS L-T-P Credits

## Course Objectives:

- 1) Derive appropriate numerical methods to solve algebraic and transcendental equations
- 2) Develop appropriate numerical methods to approximate a function

## UNIT-1     ERRORS     AND APPROXIMATIONS,     SOLUTION OF NONLINEAR

EQUATIONS :Introduction to numbers and their accuracy; absolute, relative and percentage errors. Bisection method; Regular falsi method; secant method; fixed point iteration method; Newton- Raphson method; convergence criteria of methods.

## UNIT-2     SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS : Gauss elimination

method; Gauss-Jordan method; UV factorization method; Jacobi's iteration method; Gauss- Seidal iteration method; .

## UNIT-3     INTERPOLATION     AND     CURVE     FITTING:     Introduction     to interpolation; Newton's forward and backward interpolation formulae; Gauss's forward and backward interpolation formulae; Stirling formula; Lagrange

interpolation; Newton's divided difference formula; Principle of least squares; curve fitting.

#### UNIT-4      NUMERICAL      DIFFERENTIATION      AND INTEGRATION: Numerical

differentiation formulae: differentiation by using forward interpolation formula; backward interpolation formula; Stirling formula; Newton-Cotes formula for numerical integration: Trapezoidal rule; Simpson's rules; Boole's rule and Weddle's rule; Romberg's method.

#### UNIT-5      NUMERICAL SOLUTION OF ORDINARY AND PARTIAL DIFFERENTIAL

EQUATION : ,Taylor series method; Euler method; Euler modified method; Runge kutta method; Milne's predictor -corrector method; Adams-Bashforth method for finding solution of differential equation.

#### BOOKS Recommended:

- 1) Grewal, B. S., "Numerical methods in Engineering and Science".

- 2) M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 6th Ed., New age International Publisher, India, 2007
- 3) Sastry, S.S.,” “ Introductory Methods of Numerical Analysis”.
- 4) Curtis F “Applied Numerical Analysis”.Books Recommended
- 5) Brian Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.

Course outcomes:

1. Solve an algebraic or transcendental equation using an appropriate numerical method
2. Approximate a function using an appropriate numerical method

Code Name Credits(2)

BMA-279 Numerical Methods Lab 0-0-2

List of Practicals (Using any software)

- (1) Bisection Method.
- (2) Newton Raphson Method.
- (3) Secant Method.

- (4) Regular Falsi Method.
- (5) LU decomposition Method.
- (6) Gauss-Jacobi Method.
- (7) Gauss-Siedel Method.
- (8) Lagrange Interpolation or Newton Interpolation.
- (9) Simpson's rule.
- (10) Trapezoidal Rule

Code Name Credits(6)

BMA-225 Riemann Integration and Series of Functions

5-1-0

Course Objectives:

- 1) To describe a regular partition of an interval, a Riemann sum for a function on a given interval (including the specific cases of left, right, and mid-point Riemann sums), and how they can be used to approximate area.
- 2) Compute specific Riemann sums for a function on a given interval.

Unit 1: Riemann integration; inequalities of upper and lower sums; Riemann conditions of integrability. Riemann sum and definition of Riemann integral through Riemann sums; equivalence of two definitions;

Unit 2: Riemann integrability of monotone and continuous functions, Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions.

Unit 3: Intermediate Value theorem for Integrals; Fundamental theorems of Calculus. Improper integrals; Convergence of Beta and Gamma functions. Pointwise and uniform convergence of sequence of functions.

Unit 4: Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test.

Unit 5: Limit superior and Limit inferior. Power series, radius of convergence, Cauchy Hadamard Theorem, Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.

Books Recommended

1. K.A. Ross, Elementary Analysis, The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
2. R.G. Bartle D.R. Sherbert, Introduction to Real Analysis, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
3. Charles G. Denlinger, Elements of Real Analysis, Jones & Bartlett (Student Edition), 2011.

Course outcomes:

1. Read and interpret an expression in sigma notation as the sum of a series of numbers.
2. Express Riemann sums for a function  $f(x)$  on a given interval using sigma notation, and identify a function and an interval which give rise to a given Riemann sum in sigma notation.

Code Name Credits(6)

BMA-226 Ring Theory and Linear Algebra I 5-1-0p

Course Objectives:

1. Students will have the capacity to work with the classes of rings and fields appearing in the course, particularly specific calculations around finite fields and polynomials.



2. Be able to produce examples and counter examples illustrating the mathematical concepts presented in the course.

Unit 1: Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring.

Unit 2: Ideal, ideal generated by a subset of a ring, factor rings, operations on ideals, prime and maximal ideals.

Unit 3: Ring homomorphisms, properties of ring homomorphisms, Isomorphism theorems I, II and III, field of quotients.

Unit 4: Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Unit 5: Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

Books Recommended:

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.

2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., PrenticeHall of India Pvt. Ltd., New Delhi, 2004.
4. Joseph A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa Publishing House, New Delhi, 1999.
5. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.
6. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.
7. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.
8. Kenneth Hoffman, Ray Alden Kunze, Linear Algebra, 2nd Ed., Prentice-Hall of India Pvt. Ltd., 1971.
9. D.A.R. Wallace, Groups, Rings and Fields, Springer Verlag London Ltd., 1998.

Course outcomes:

1. Will be able to write the statements and proofs of important theorems and be able to explain the key steps in proofs, sometimes with variation
2. Facility with the ring homomorphisms and presentations, and the application of these in order to describe aspects of the intrinsic structure of rings, both abstractly and in specific examples

Code Name Credits(4)

BMA-227 Graph Theory 4-0-0

Course Objectives:

1) It has a aim to know about different types of graph.

2) To understand Shortest Path.

Unit1: Definition, examples and basic properties of graphs, pseudo graphs, complete graphs Adjacency and incidence matrices,.

Unit 2:Bi-partite graphs, isomorphism of graphs, paths and circuits, Eulerian circuits Paths, walks, cycles, components, cut-edges, cut-vertices..

Unit-3:Hamiltonian cycles, the adjacency matrix, weighted graph,.

Unit4: Tree, Spanning trees, radius and diameter, Minimum spanning trees (Kruskal's algorithm) ,travelling salesman's problem,shortest path.

Unit 5: Network flow problems, flows and source/sink cuts, Ford-Fulkerson algorithm, Max-flow min-cut theorem. Vertex colorings, bounds on chromatic numbers, Dijkstra's algorithm,Floyd-Warshall algorithm.

Books Recommended :

1. B.A. Davey and H.A. Priestley, Introduction to Lattices and Order, Cambridge University Press, Cambridge, 1990.
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 2nd Edition, Pearson Education (Singapore) P. Ltd., Indian Reprint 2003.
3. Rudolf Lidl and Gunter Pilz, Applied Abstract Algebra, 2nd Ed., Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.

Course outcomes:

1. Students will be able to learn applications of matrix in graph.
2. It will help to understand Networking.

Code Name Credit (6)

BMA-228 Application of Algebra

5-1-0

Course Objectives:

- 1. To recognize technical terms and appreciate some of the uses of algebra.
- 2. Multiply out brackets.

Unit 1: Balanced incomplete block designs (BIBD): definitions and results, incidence matrix of a BIBD, construction of BIBD from difference sets,

construction of BIBD using quadratic residues, difference set families, construction of BIBD from finite fields.

Unit 2: Coding Theory: introduction to error correcting codes, linear codes, generator and parity check matrices, minimum distance, Hamming Codes, decoding and cyclic codes.

Unit 3: Symmetry groups and color patterns: review of permutation groups, groups of symmetry and action of a group on a set; colouring and colouring patterns, Polya theorem and pattern inventory, generating functions for non-isomorphic graphs.

Unit 4: Special types of matrices: idempotent, nilpotent, involution, and projection tri diagonal matrices, circulant matrices, Vandermonde matrices, Hadamard matrices, permutation and doubly stochastic matrices, Frobenius-König theorem, Birkhoff theorem. Positive Semi-definite matrices: positive semi-definite matrices, square root of a positive semi-definite matrix, a pair of positive semi-definite matrices, and their simultaneous diagonalization. Symmetric matrices and quadratic forms: diagonalization of symmetric matrices, quadratic forms, constrained optimization.

Unit 5: Applications of linear transformations: Fibonacci numbers, incidence models, and differential equations. Least squares methods: Approximate solutions of system of linear equations, approximate inverse of an  $m \times n$  matrix,

solving a matrix equation using its normal equation, finding functions that approximate data.

#### Books Recommended:

1. I. N. Herstein and D. J. Winter, Primer on Linear Algebra, Macmillan Publishing Company, New York, 1990.
2. S. R. Nagpaul and S. K. Jain, Topics in Applied Abstract Algebra, Thomson Brooks and Cole, Belmont, 2005.
3. Richard E. Klima, Neil Sigmon, Ernest Stitzinger, Applications of Abstract Algebra with Maple, CRC Press LLC, Boca Raton, 2000.
4. David C. Lay, Linear Algebra and its Applications. 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.

#### Course Outcomes:

- 1. To recognize technical terms and appreciate some of the uses of algebra.
- 2. To collect like terms and simplify expressions term by term.

Semester V

Code Name Credit (6)

## BMA-325 Multivariate Calculus

5-1-0

### Course Objectives:

The goal of this chapter is to see that many quantities in various scientific fields depend on more than one variable: the strength of the gravitational force between two bodies depend on their masses and their distance apart.

The understand how the value of a multivariable function changes as one of its independent variables is allowed to vary with all other variables fixed at constants

Unit 1: Functions of several variables, limit and continuity of functions of two variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability.

Unit 2:Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained voptimization problems, Definition of vector field, divergence and curl

Unit 3: Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates.

Unit 4: Change of variables in double integrals and triple integrals. Line integrals, Applications of line integrals: Mass and Work. Fundamental theorem for line integrals, conservative vector fields, independence of path.

Unit 5: Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.

#### Books Recommended

1. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
2. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
3. E. Marsden, A.J. Tromba and A. Weinstein, Basic Multivariable Calculus, Springer (SIE), Indian reprint, 2005.
4. James Stewart, Multivariable Calculus, Concepts and Contexts, 2nd Ed., Brooks /Cole, Thomson Learning, USA, 2001.



Course outcomes:

1. Handle vectors fluently in solving problems involving the geometry of lines, curves, planes, and surfaces in space.
2. Visualize and draw graphs of surfaces in space

Code Name Credit (6)

BMA-326 Group Theory II

5-1-0

Course Objectives:

This lecture course unit aims to introduce students to some more sophisticated concepts and results of group theory as an essential part of general mathematical culture and as a basis for further study of more advanced mathematics.

Provide knowledge of some fundamental results and techniques from the theory of finite groups

Unit 1: Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups.

Unit 2:Characteristic subgroups, Commutator subgroup and its properties.

Properties of external direct products, the group of units modulo  $n$  as an external direct product, internal direct products, Fundamental Theorem of finite abelian groups.

Unit 3:Group actions, stabilizers and kernels, permutation representation associated with a given group action, Applications of group actions: Generalized Cayley's theorem, Index theorem.

Unit 4:Groups acting on themselves by conjugation, class equation and consequences, conjugacy in  $S_n$ ,

Unit 5: $p$ -groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of  $A_n$  for  $n$

$\geq 5$ , non-simplicity tests.

#### Books Recommended

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa Publishing House, 1999.

4. David S. Dummit and Richard M. Foote, Abstract Algebra, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2004.
5. J.R. Durbin, Modern Algebra, John Wiley & Sons, New York Inc., 2000.
6. D. A. R. Wallace, Groups, Rings and Fields, Springer Verlag London Ltd., 1998.

Course outcomes:

1. Verify group properties in particular examples
2. Understand and use the concept of conjugacy

Code Name Credit (6)

BMA-327 Analytical Geometry

5-1-0

Course Objectives:

Model spatial problems with vectors, lines, planes, curves and surfaces in space. The use of differentiation for vector-valued functions to compute tangent lines and also differentiation for multivariate functions to find extrema and rates of change. This course is use iterated integrals to measure areas, compute volumes and find centers of mass

Unit 1:Transformation of axes in two dimensions: Shifting of origin, rotation of axes, invariants.

Unit 2: Pair of Straight Lines : Joint equation of pair of straight lines and angle between them, Condition of parallelism and perpendicularity, Joint equation of the angle bisectors, Joint equation of lines joining origin to the intersection of a line and a curve. Skew lines and shortest distance between skew lines

Unit 3: Circle : General equation of circle, Circle through intersection of two lines, tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, angle of intersection and orthogonality, power of a point w.r.t. circle, radical axis, co-axial family of circles, limiting points.

Unit 4: Conic : General equation of a conic, tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, diameter.

Unit 5: Conjugate diameters of ellipse and hyperbola, special properties of parabola, ellipse and hyperbola, conjugate hyperbola, asymptotes of hyperbola, rectangular hyperbola. Identification of conic in general second degree equations. Equation of a sphere in different forms, plane section of a sphere,

Equation of a circle. Sphere through a given circle. Intersection of a sphere and a line. Equation of tangent plane to standard sphere and general sphere.

#### Books Recommended

1. S. L. Loney : The Elements of Coordinate Geometry, Macmillan and Company, London, 2<sup>nd</sup> Edition 2007.
2. P.K. Jain and Khalil Ahmad : A Text Book of Analytical Geometry of Two Dimensions, Wiley Eastern Ltd., 1999.
3. Erwin Kreyszig : Advanced Engineering Mathematics, John Wiley & Sons, 1999.
4. Gorakh Prasad and H.C. Gupta : Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad, 1955.

#### Course outcomes:

1. Construct and apply symbolic and graphical representations of functions
2. Model real-life problems mathematically
3. Use technology appropriately to analyze mathematical problems

Code Name Credit (6)

BMA-328 Probability Theory

5-1-0

### Course Objectives:

We will study about the Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables. Provide the knowledge about discrete time Markov chain .

Unit 1: Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments Mathematical Expectations: Definition, Expected value of random variable, expected value of function of a random variable, properties of expectations.

Unit 2: Moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial.

Unit 3: Continuous distributions: uniform, normal, exponential. Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions.

Unit 4: Expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution, joint moment generating function (jmgf) and calculation of covariance(from jmgf).

Unit 5: Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers, Central Limit theorem for independent and identically distributed random variables with finite variance, Markov Chains, Chapman-Kolmogorov equations, classification of states.

#### Books Recommended

1. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, Introduction to Mathematical Statistics, Pearson Education, Asia, 2007.
2. Irwin Miller and Marylees Miller, John E. Freund, Mathematical Statistics with Applications, 7th Ed., Pearson Education, Asia, 2006.

#### Course outcomes:

1. How to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions

2. Discrete time Markov chains and methods of finding the equilibrium probability distributions

3. How to translate real-world problems into probability models

Semester VI

Code Name Credit (6)

BMA-329 Metric Spaces and Complex Analysis

5-1-0

Course Objectives:

Students will have been introduced to point-set topology and will know the central importance of complex variables in analysis. Students will have grasped a deeper understanding of differentiation and integration in this setting and will know the tools and results of complex analysis including Cauchy's Theorem, Cauchy's integral formula, Liouville's Theorem, Laurent's expansion and the theory of residues

Unit 1: Metric spaces: definition and examples. Sequences in metric spaces, Cauchy sequences. Complete Metric Spaces. Open and closed balls, neighbourhood, open set, interior of a set. Limit point of a set, closed set,



diameter of a set, Cantor's theorem. Subspaces, dense sets, separable space, closure of a subset of a metric spaces.

Unit 2: Continuous mappings, sequential criterion and other characterizations of continuity. Uniform continuity. Homeomorphism, Contraction mappings, Banach Fixed point Theorem. Connectedness, connected subsets of  $\mathbb{R}$ .

Unit 3: Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability. Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions.

Unit 4: Definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula. Liouville's theorem and the fundamental theorem of algebra.

Unit 5: Convergence of sequences and series, Taylor series and its examples. Laurent series and its examples, absolute and uniform convergence of power series.

### Books Recommended

1. Satish Shirali and Harikishan L. Vasudeva, Metric Spaces, Springer Verlag, London, 2006.
2. S. Kumaresan, Topology of Metric Spaces, 2nd Ed., Narosa Publishing House, 2011.
3. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill, 2004.
4. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, 8th Ed., McGraw – Hill International Edition, 2009.
5. Joseph Bak and Donald J. Newman, Complex Analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

### Course outcomes:

1. Explain the fundamental concepts of real analysis and their role in modern mathematics and applied contexts
2. Demonstrate accurate and efficient use of complex analysis techniques

Code Name Credit (6)

BMA-330 Ring Theory and Linear Algebra II

Course Objectives:

Demonstrate understanding of the idea of a group, a ring and an integral domain, and be aware of examples of these structures in mathematics. Appreciate the significance of unique factorization in rings and integral domains. To learn the basic terminology and results concerning abstract algebra

Unit 1: Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests.

Unit 2: Eisenstein criterion, unique factorization in  $\mathbb{Z}[x]$ . Divisibility in integral domains, irreducible, primes, unique factorization domains, Euclidean domains.

Unit 3: Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators, Eigen spaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator.

Unit 4: Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal Complements.

Unit 5: Bessel's inequality, the adjoint of a linear operator, Least Squares Approximation, minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.

#### Books Recommended

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa Publishing House, 1999.
4. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice- Hall of India Pvt. Ltd., New Delhi, 2004.
5. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.
6. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.
5. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.

6. Kenneth Hoffman, Ray Alden Kunze, Linear Algebra, 2nd Ed., Prentice-Hall of India Pvt.Ltd., 1971.

Course outcomes:

1. Students completing this course will be able to find the null space of a matrix and represent it
2. Apply the theory in the course to solve a variety of problems at an appropriate level of difficulty.

Code Name Credit (6)

BMA-331 Linear Programming

5-1-0

Course Objectives:

1. Evaluate the computational performance of search, satisfaction, optimization and learning algorithms.
2. Apply search, satisfaction, optimization and learning algorithms to real world problems

Unit 1: Introduction to linear programming problem, Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, Interior point methods.

Unit 2: Introduction to artificial variables, two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual.

Unit 3: Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem.

Unit 4: Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem .Network flow problems.

Unit 5: Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games. Algebraic and graphical methods

Books Recommended

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India, 2004.
2. F.S. Hillier and G.J. Lieberman, Introduction to Operations Research, 9th Ed., Tata McGraw Hill, Singapore, 2009.
3. Hamdy A. Taha, Operations Research, An Introduction, 8th Ed., Prentice-Hall India, 2006.
4. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.

Course outcomes:

1. Describe at an intuitive level the process of artificial intelligence and operations research: a real-time cycle of problem understanding, formulation, solution and implementation
2. Formulate simple reasoning, learning and optimization problems, in terms of the representations and methods presented.

Code Name Credit (6)

BMA-332 Mechanice

5-1-0

Course Objectives:

Develop within the student an understanding of the scientific processes and theories designed to provide answers to the questioning mind. Apply calculus techniques in solving problems.

Unit 1: Moment of a force about a point and an axis, couple and couple moment, Moment of a couple about a line, resultant of a force system, distributed force system, free body diagram, free body involving interior sections, general equations of equilibrium, two point equivalent loading, problems arising from structures, static indeterminacy.

Unit 2: Laws of Coulomb friction, application to simple and complex surface contact friction problems, transmission of power through belts, screw jack, wedge, first moment of an area and the centroid, other centers.

Unit 3 : Theorem of Pappus-Guldinus, second moments and the product of area of

a plane area, transfer theorems, relation between second moments and products of area, polar moment of area, principal axes.

Unit 4: Conservative force field, conservation for mechanical energy, work energy equation, kinetic energy and work kinetic energy expression based on center of mass, moment of



momentum equation for a single particle and a system of particles, translation and rotation of rigid bodies.

Unit 5: Chasles' theorem, general relationship between time derivatives of a vector for different references, relationship between velocities of a particle for different references, acceleration of particle for different references.

#### Books Recommended

1. I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics,

(4thEd.), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2009.

2. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics, 11th Ed., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.

#### Course outcomes:

1. Determine the resultant of a system of forces
2. Students will learn Law of Coulomb

## SCHEME FOR B. SC PHYSICS

B. SC. (Hons.) PHYSICS			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BPH-120	Mathematical Physics-I	4	0	0	4
2	BPH-121	Mechanics	4	0	0	4
3	BMA-111	Calculus	5	1	0	6
4	EN-101	Communication Skill-I	3	0	0	3
5	BPH-170	Mathematical Physics-I Lab	0	0	4	2
6	BPH-171	Mechanics Lab	0	0	4	2
7	PD-191A	Hobby Club	0	1	0	1
TOTAL			16	2	8	22

B. SC. (Hons.) PHYSICS			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BPH-122	Electricity and Magnetism	4	0	0	4
2	BPH-123	Waves and Optics	4	0	0	4
3	BCH-115	Physical Chemistry	4	0	0	4
4	CEA-101A	Environmental Science	3	0	0	3
5	BPH-172	Electricity and Magnetism Lab	0	0	4	2
6	BPH-173	Waves & Optics Lab	0	0	4	2
7	BCH-165	Physical Chemistry Lab	0	0	4	2
8	PD-192A	Hobby Club	0	1	0	1
TOTAL			15	1	12	22

### SCHEME FOR B. SC PHYSICS

B. SC. (Hons.) PHYSICS			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BPH-220	Thermal Physics	4	0	0	4
2	BPH-221	Digital Systems and Applications	4	0	0	4
3	BPH-222	Mathematical Physics- II	4	0	0	4
4	BPH-223	Applied Optics	4	0	0	4
5	BCS-201	Computer Science	3	0	0	3
6	BPH-270	Thermal Physics Lab	0	0	4	2
7	BPH-271	Digital Systems and Applications Lab	0	0	4	2
8	BPH-272	Mathematical Physics-II Lab	0	0	4	2
9	BCS-251	Computer Science Lab	0	0	2	1
TOTAL			19	0	14	26

B. SC. (Hons.) PHYSICS			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BPH-224	Elements of Modern Physics	4	0	0	4
2	BPH-225	Analog Systems and Applications	4	0	0	4
3	BPH-226	Mathematical Physics- III	4	0	0	4
4	BCH-220	Inorganic Chemistry/Co-ordination Chemistry	4	0	0	4
5	BMA-232	Numerical Methods	5	1	0	6
6	PD-293A	PDP	0	1	0	1
7	BPH-276	Mathematical Physics- III Lab	0	0	4	2
8	BPH-274	Elements of Modern Physics Lab	0	0	4	2
9	BPH-275	Analog Systems and Applications Lab	0	0	4	2
10	BPH-270	GE-04 Lab/Inorganic Lab	0	0	4	2
TOTAL			21	2	16	31

### SCHEME FOR B. SC PHYSICS

B. SC. (Hons.) PHYSICS			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BPH-320	Quantum Mechanics & Applications	4	0	0	4
2	BPH-321	Solid State Physics	4	0	0	4
3	BPH-322	Physics of Devices and Communication	4	0	0	4
4	BPH-323	Nuclear & Particle Physics	5	1	0	6
5	BPH-370	Quantum Mechanics & Applications Lab	0	0	4	2
6	BPH-371	Solid State Physics Lab	0	0	4	2
7	BPH-372	Physics of Devices and Communication Lab	0	0	4	2
8	PD-392	PDP	0	1	0	1
TOTAL			17	2	12	25

B. SC. (Hons.) PHYSICS			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BPH-324	Electro-Magnetic Theory	4	0	0	4
2	BPH-325	Statistical Mechanics	4	0	0	4
3	BPH-326	Nano-Materials and Applications	4	0	0	4
4	BPH-327	Biophysics	4	0	0	4
5	BPH-374	Electro-Magnetic Theory Lab	0	0	2	1
6	BPH-375	Statistical Mechanics Lab	0	0	4	2
7	BPH-376	Nano-Materials and Applications Lab	0	0	2	1
8	BPH-377	Dissertation& Seminar	0	2	10	7
			16	2	18	27

## **SYLLABUS FOR B. SC. (Hons.) PHYSICS**

### **Course Objectives:**

The emphasis of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen and unseen.

### **Unit-I: Calculus:**

Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). First

Order Differential Equations and Integrating Factor. (6 Lectures)

Second Order Differential equations: Homogeneous Equations with constant coefficients. Wronskian and general solution. (12 Lectures)

Calculus of functions of more than differentials. Integrating factor, with Lagrange Multipliers. (6 Lectures)

one variable: Partial derivatives, exact and inexact simple illustration. Constrained Maximization using

### **Unit-II: Vector Calculus:**

Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. (5 Lectures)

Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities, Gradient, divergence, curl (10 Lectures)

Unit-III: Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs). (14 Lectures)

Unit-IV: Orthogonal Curvilinear Coordinates:

Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. (5 Lectures)

Unit-V: Probability & Dirac Delta function and its properties:

Independent random variables: Probability distributions functions, binomial, Gaussian, and Poisson, with examples, Mean and Variance

Definition of Dirac delta function. Properties of Dirac delta function. (2 Lectures)

Reference Books:

□ Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.

- An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning
- Differential Equations, George F. Simmons, 2007, McGraw Hill.
- Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.
- Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Book
- Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning
- Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
- Essential Mathematical Methods, K.F.Riley & M.P.Hobson, 2011, Cambridge Univ. Press

Course outcomes:

In this course the students should learn to master the tools from vector and calculus analysis that are important prerequisites for other theoretical physics courses like electrodynamics or continuum mechanics.

This module have initial- and boundary value problems for linear partial differential equations which are important in electrodynamics, quantum mechanics etc. The students should learn to formulate specific physics problems through mathematical models of this kind, to master various important analytical and numerical methods to solve such models, and to give physical interpretations of the solutions of such models.

SUBJECT NAME: MATHEMATICAL PHYSICS-I LAB

SUBJECT CODE: BPH-170

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- ☐ Highlights the use of computational methods to solve physical problems
- ☐ The course will consist of lectures (both theory and practical) in the Lab
- ☐ Evaluation done not on the programming but on the basis of formulating the problem
- ☐ Aim at teaching students to construct the computational problem to be solved
- ☐ Students can use any one operating system Linux or Microsoft Windows and programming language MATLAB or Scilab.

Topics Description with Applications

Introduction and Overview    Computer architecture and organization, memory and

Input/output devices Basics of scientific computing Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow & overflow- emphasize the importance of making equations in terms of dimensionless variables, Iterative methods Errors and error Analysis    Truncation and round off errors, Absolute and relative errors, Floating point computations.

EXP-1 Mat Lab Programs:    Sum & average of a list of numbers, largest of a given

list of numbers and its location in the list, sorting of

numbers in ascending descending order, Binary search



EXP-2 Random number generation    Area of circle, area of square, volume of sphere,  
value

of Pi

Exp-3 Solution of Algebraic and

Transcendental        Solution of linear and quadratic equation, solving

equations by Bisection, Newton Raphson     $\alpha$      $\alpha$     I    Io  $[(\sin\alpha)/\alpha]^2$  in optics

and Secant methods

Evaluation of trigonometric function e.g.

Exp-4 Interpolation Method     $\sin$      $\cos$      $\tan$

Exp-5 Solution of ordinary differential        First order differential equation

Equation         $\square$         Radioactive decay

Exp-6 First order differential equation         $\square$         Current in RC,LC Circuits and DC circuits

Differential equation describing the motion of a

Pendulum

Sum and average of a list of numbers, largest of a given list of number, sorting of numbers in  
ascending and

Exp-7 Programs:        descending order.

Exp-8 Plotting Basic curve and their fitting

Roots of a polynomial

Roots of a Quadratic equation

Conversion of Temp.

Exp-9 Roots

Note: Each student is required to perform at least seven experiments.

Referred Books:

- ☐ Introduction to Numerical Analysis, S.S. Sastry, 5th Edn. , 2012, PHI Learning Pvt. Ltd.
- ☐ Numerical Recipes in C: The Art of Scientific Computing, W.H. Press et al, 3rd Edn. , 2007, Cambridge University Press.
- ☐ A first course in Numerical Methods, U.M. Ascher & C. Greif, 2012, PHI Learning.
- ☐ Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn. , 2007 , Wiley India Edition.
- ☐ Numerical Methods for Scientists & Engineers, R.W. Hamming, 1973, Courier Dover Pub.
- ☐ An Introduction to computational Physics. T.Pang, 2nd Edn. ,

2006,Cambridge Univ. Press

Course outcomes:-

1. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
2. Students will demonstrate knowledge of classical mechanics, electromagnetism, quantum mechanics, and thermal physics, and be able to apply this knowledge to analyze a variety of physical phenomena.
3. Students will show that they have learned laboratory skills, enabling them to take measurements in a physics laboratory and analyze the measurements to draw valid conclusions.
4. Students will be capable of oral and written scientific communication, and will prove that they can think critically and work independently.

SUBJECT NAME: MECHANICS

SUBJECT CODE: BPH-121

Course Objectives:

: To acquire skills allowing the student to identify and apply formulas of optics and wave physics using course literature.

:To be able to identify and illustrate physical concepts and terminology used in optics and to be able to explain them in appropriate detail.

To be able to make approximate judgments about optical and other wave phenomena when necessary.

To acquire skills allowing the student to organize and plan simpler laboratory course experiments and to prepare an associated oral and written report

Unit-I Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket.

Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. (10 Lectures)

Unit-II Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. (10 Lectures)

Unit-III Work Energy and Collisions: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium.

Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. (4 Lectures)

Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. (3 Lectures)

Unit-IV: Rotational Dynamics and Elasticity: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.

(12 Lectures)

Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire.

Unit-V: Gravitation, Central Force Motion and Oscillations: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 Lectures)

Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts. (6 Lectures)

Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 Lectures)

## Reference Books:

- An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
- Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
- Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
- Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.
- Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands, 2008, Pearson Education
- Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
- University Physics. F.W Sears, M.W Zemansky, H.D Young 13/e, 1986, Addison Wesley
- Physics for scientists and Engineers with Modern Phys., J.W. Jewett, R.A. Serway, 2010, Cengage Learning
- Theoretical Mechanics, M.R. Spiegel, 2006, Tata McGraw Hill.

Course outcomes: Students will be able to articulate and describe:

- ☐ Relative motion. Inertial and non inertial reference frames.
- ☐ Parameters defining the motion of mechanical systems and their degrees of freedom.
- ☐ Study of the interaction of forces between solids in mechanical systems.
- ☐ Centre of mass and inertia tensor of mechanical systems.
- ☐ Newton's laws of motion and conservation principles.
- ☐ Application of the vector theorems of mechanics and interpretation of their results.
- ☐ Introduction to analytical mechanics as a systematic tool for problem solving.
  
- ☐ Use of mechanical simulation software.

SUBJECT NAME: MECHANICS LAB

SUBJECT CODE: BPH-171

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. To study the random error in observations.
3. To determine the height of a building using a Sextant.
4. To study the Motion of Spring and calculate (a) Spring constant, (b)  $g$  and (c) Modulus of rigidity.
5. To determine the Moment of Inertia of a Flywheel.
6. To determine  $g$  and velocity for a freely falling body using Digital Timing Technique

7. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
8. To determine the Young's Modulus of a Wire by Optical Lever Method.
9. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
10. To determine the elastic Constants of a wire by Searle's method.
11. To determine the value of  $g$  using Bar Pendulum.
12. To determine the value of  $g$  using Kater's Pendulum.

Note: Each student is required to perform at least seven experiments.

#### Reference Books

□ Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House

□ Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

Course outcomes: Students will be able to articulate and describe:

1. Design and conduct experiments, test hypotheses, analyze and interpret data in Physics areas.

SUBJECT NAME: Calculus (With Elective)



SUBJECT CODE: BMA-111

Course Objectives:

- ☐ Understand the major problems of differential and integral calculus.
- ☐ Appreciate how calculus allows us to solve important practical problems in an optimal way.

Unit-1: Limit & Continuity : The real line and its geometrical representation;  $\epsilon$ - $\delta$  treatment of limit and continuity; Properties of limit and classification of discontinuities; Properties of continuous functions.

Unit-2: Differentiability: Successive differentiation; Leibnitz Theorem; Statement of Rolle's Theorem; Mean Value Theorem; Taylor and Maclaurin's Theorems; Indeterminate forms.

Unit 3: Applications of Differentiation : Asymptotes; Concavity, convexity and points of inflection; Curvature; Extrema; elementary curves, tangent and normal in parametric form; Polar Coordinates.

Unit-4: Partial Differentiation: Limits and continuity of functions of two variables; Partial derivatives; Taylor's theorem and Maclaurin's Theorem for function of two variable; Maxima and minima for function of two variable.

Unit-5: Double and triple integrals; Change of order in double integrals. Application of Integration

:length of a curve; Arc length as a parameter; Evolute & Envelope; Volumes and surface areas of solids of revolution.

### Reference Books:

1. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.
2. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.
3. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar Inc. New York 1975.
4. Shanti Narayan, Elements of Real Analysis, S. Chand & Company, New Delhi. 5Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Company, New Delhi.
6. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
7. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
8. H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P. Ltd.,Singapore, 2002.

### Course outcomes:

- Interpret a function from an algebraic, numerical, graphical and verbal perspective and extract information relevant to the phenomenon modeled by the function
- Calculate the limit of a function at a point numerically and algebraically using appropriate techniques including L'Hospital's rule

Semester II

SUBJECT NAME: ELECTRICITY AND MAGNETISM

SUBJECT CODE: BPH-122

Course Objectives:

This module discusses the basic phenomena of electricity and magnetism as they relate to effects animation.

Unit-I Electric Field and Electric Potential

Electric field: Electric field lines. Electric field due to a ring of charge. Electric flux. Gauss' law and its differential form. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. (6 Lectures)

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole. (6 Lectures)

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. (10 Lectures)

Unit-II Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges. Polarization vector. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector  $D$ . Relations between  $E$ ,  $P$  and  $D$ . Gauss' Law in dielectrics. (8 Lectures)

Unit-III Magnetic Field: Magnetic force between current elements and definition of Magnetic Field  $B$ . Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of  $B$ : curl and

divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. (9 Lectures)

Unit-IV Electromagnetic Induction & Ballistic Galvanometer: Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell's Equations. Charge Conservation and Displacement current. (6 Lectures)

Torque on a current Loop. Potential energy of current loop. Ballistic Galvanometer: Current and Charge Sensitivity.

Electromagnetic damping. Logarithmic damping. CRD

(6 Lectures)

Unit-V Electrical Circuits & Network theorems: AC Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit.

Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem,, Maximum Power Transfer theorem. (4 Lectures)

Reference Books:

□ Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, Tata McGraw

- ☐ Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education
- ☐ Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.
- ☐ Feynman Lectures Vol.2, R.P.Feynman, R.B.Leighton, M. Sands, 2008, Pearson Education

- ☐ Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press.
- ☐ Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press.

Course outcomes:

Having successfully completed this module, you will be able to demonstrate knowledge and understand of

- ☐ The use of Coulomb's law and Gauss' law for the electrostatic force
- ☐ The relationship between electrostatic field and electrostatic potential
- ☐ The use of the Lorentz force law for the magnetic force
- ☐ The use of Ampere's law to calculate magnetic fields
- ☐ The use of Faraday's law in induction problems
- ☐ The basic laws that underlie the properties of electric circuit elements

SUBJECT NAME: ELECTRICITY AND MAGNETISM LAB

SUBJECT CODE: BPH-172

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. To determine an unknown Low Resistance using Potentiometer.
4. To determine an unknown Low Resistance using Carey Foster's Bridge.
5. To compare capacitances using De'Sauty's bridge.
6. Measurement of field strength B and its variation in a solenoid (determine  $dB/dx$ )
7. To verify the Thevenin and Norton theorems.
8. To verify the Superposition, and Maximum power transfer theorems.
9. To determine self inductance of a coil by Anderson's bridge.
10. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
11. To study the response curve of a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q.
12. Measurement of charge and current sensitivity of Ballistic Galvanometer
13. To determine the Dielectric Constant of a Dielectric placed inside a parallel plate capacitor using a B.G.

14. Determine a high resistance by leakage method using Ballistic Galvanometer.
15. To determine self-inductance of a coil by Rayleigh's method.
16. To determine the mutual inductance of two coils by Absolute method.

NOTE: Each student is required to perform at least seven experiments.

□ Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House

□ A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal

□ Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

□ A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

SUBJECT NAME: WAVE AND OPTICS

SUBJECT CODE: BPH-123

Course Objectives:

The course aims to introduce the basic concepts required for a mathematical description of oscillations and waves, and to provide expertise for solving the differential equations which arise in simple mathematical models for oscillations and waves.

Unit-I Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle.

Superposition of two collinear oscillations having (1) equal frequencies and

(2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with

(1) equal phase differences and (2) equal frequency differences. (5 Lectures)

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods.

Lissajous Figures (1:1 and 1:2) and their uses. (2 Lectures)

Unit-II: Wave Motion & Velocity of Waves: : Plane and Spherical Waves. Longitudinal and

Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave

Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport.

Intensity of Wave. Water Waves: Ripple and Gravity Waves. (4 Lectures)

Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a

Fluid in a Pipe. Newton's Formula for Velocity of Sound waves and Laplace's Correction.

(6 Lectures)

Unit-III: Superposition of Two Harmonic Waves: Standing (Stationary) Waves in a String:

Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect

to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of

Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing

Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves.

(7 Lectures)

Unit-IV: Wave Optics: Electromagnetic nature of light. Definition and properties of wave front.

Huygens Principle. Temporal and Spatial Coherence. (3 Lectures)



Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (9 Lectures)

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. (4 Lectures)

Unit-V:Diffraction: Kirchhoff's Integral Theorem, Fresnel-Kirchhoff's Integral formula and its application to rectangular slit. (5 Lectures)

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. (8 Lectures)

FresnelDiffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave.

Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone

Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 Lectures)

Reference Books

□ Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.

- Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
- Principles of Optics, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.
- Optics, Ajoy Ghatak, 2008, Tata McGraw Hill
- The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.
- The Physics of Waves and Oscillations, N.K. Bajaj, 1998, Tata McGraw Hill.

Course outcomes: Students shall be able to:

1. Solve for the solutions and describe the behavior of a damped and driven harmonic oscillator in both time and frequency domains
2. Understand and implement Fourier series
3. Construct travelling and standing solutions to the wave equation
4. Describe the behavior of waves at interfaces (reflection, transmission, impedance) and their behavior in dissipative media (damping)
5. Collect and analyze experimental data
6. Write clear lab reports containing all necessary detail

SUBJECT NAME: WAVE AND OPTICS LAB

SUBJECT CODE: BPH-173

1. To determine the frequency of an electric tuning fork by Melde's experiment and verify  $\lambda^2 \propto T$  law.

2. To investigate the motion of coupled oscillators.
3. To study Lissajous Figures.
4. Familiarization with: Schuster's focusing; determination of angle of prism.
5. To determine refractive index of the Material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
7. To determine the wavelength of sodium source using Michelson's interferometer.
8. To determine wavelength of sodium light using Fresnel Biprism.
9. To determine wavelength of sodium light using Newton's Rings.
10. To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
11. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
12. To determine dispersive power and resolving power of a plane diffraction grating.

Note: Each student is required to perform at least seven experiments.

#### Reference Books:

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House

□ A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal

□ Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

□ A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

SUBJECT NAME: PHYSICAL CHEMISTRY (ELECTIVE)

SUBJECT CODE: BCH-115

Unit-I Thermochemistry-I:

Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics.

First law: Concept of heat,  $q$ , work,  $w$ , internal energy,  $U$ , and statement of first law; enthalpy,  $H$ , relation between heat capacities, calculations of  $q$ ,  $w$ ,  $U$  and  $H$  for reversible

Unit-II Thermochemistry-II :

Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data.

Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes.

Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.

Free Energy Functions: Gibbs and Helmholtz energy; variation of  $S$ ,  $G$ ,  $A$  with  $T$ ,  $V$ ,  $P$ ; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.

#### Unit-III Systems of Variable Composition:

Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs-Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

#### Unit-IV Chemical Equilibrium:

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases, Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium constants  $K_p$ ,  $K_c$  and  $K_x$ .

#### Unit-V Solutions and Colligative Properties:

Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure] and amount of solute.

Applications in calculating molar masses of normal, dissociated and associated solutes in solution.

Reference Books:

- Peter, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxford University Press (2011).
- Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
- Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S. Commonly Asked Questions in Thermodynamics. CRC Press: NY (2011).
- Levine, I. N. Physical Chemistry 6th Ed., Tata Mc Graw Hill (2010).
- Metz, C.R. 2000 solved problems in chemistry, Schaum Series (2006)

SUBJECT NAME: PHYSICAL CHEMISTRY LAB

SUBJECT CODE: BCH-165

- (a) Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).
- (b) Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.

- (c) Calculation of the enthalpy of ionization of ethanoic acid.
- (d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.
- (e) Determination of basicity/proticity of a polyprotic acid by the thermochemical method in terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step.
- (f) Determination of enthalpy of hydration of copper sulphate.
- (g) Study of the solubility  $\Delta$  of benzoic acid in water and determination of  $H$ .

Any other experiment carried out in the class.

Semester III

SUBJECT NAME: THERMAL PHYSICS

SUBJECT CODE: BPH-220

Theory: 60 Lectures

Course Objectives:

The objective of this course is to develop a working knowledge of the laws and methods of thermodynamics and elementary statistical mechanics and to use this knowledge to explore various applications. Many of these applications will relate to topics in materials science and the physics of condensed matter. The three laws of classical thermodynamics, which deal with the existence of state functions for energy and entropy, and the value of entropy at the absolute zero of temperature, are developed along phenomenological lines; the existence and properties

of the entropy; different thermodynamic potentials and their uses; phase diagrams; introduction to statistical mechanics and its relation to thermodynamics; treatment of ideal gases.

#### Unit I Introduction to Thermodynamics

Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Zeroth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, First Law & various processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient.

#### Unit II (10 Lectures)

Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale.

#### Unit III (15 Lectures)

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of



Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Entropy Changes in Reversible and Irreversible Processes. Principle of Increase of Entropy. Temperature–Entropy diagrams for Carnot's Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero.

Thermodynamic Potentials: Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy. Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature.

#### Unit IV (14 Lectures)

Maxwell's Thermodynamic Relations: Derivations and applications of Maxwell's Relations, Maxwell's Relations: (1) Clausius Clapeyron equation, (2) Values of  $C_p - C_v$ , (3)  $TdS$  Equations, (4) Energy equations, (5) Change of Temperature during Adiabatic Process.

Kinetic Theory of Gases:

Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases.

#### Unit V (14 Lectures)

Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path.

Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion.

Brownian Motion and its Significance.

Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO<sub>2</sub> Gas. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. P-V Diagrams. Joule's Experiment.

Reference Books:

Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill.

A Treatise on Heat, Meghnad Saha, and B.N.Srivastava, 1958, Indian Press

Thermal Physics, S. Garg, R. Bansal and Ghosh, 2nd Edition, 1993, Tata McGraw-Hill

Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer.

Thermodynamics, Kinetic Theory & Statistical Thermodynamics, Sears & Salinger.

1988, Narosa.

Concepts in Thermal Physics, S.J. Blundell and K.M. Blundell, 2nd Ed., 2012, Oxford University Press

Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. Chand Publications.

Course outcomes: On satisfying the requirements of this course, students will have the knowledge and skills to:

1. Identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, chemical potential, Free energies, partition functions.
2. Use the statistical physics methods, such as Boltzmann distribution, Gibbs distribution, Fermi-Dirac and Bose-Einstein distributions to solve problems in some physical systems.
3. Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems
4. Apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.

SUBJECT NAME: THERMAL PHYSICS LAB

SUBJECT CODE: BPH-270

1. To determine Mechanical Equivalent of Heat,  $J$ , by Callender and Barne's constant flow method.
2. To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.
3. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
4. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
5. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).

6. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
7. To calibrate a thermocouple to measure temperature in a specified Range using (1) Null Method,  
(2) Direct measurement using Op-Amp difference amplifier and to determine Neutral Temperature.

Note: Each students is required to perform at least seven experiments.

Reference Books

Publishing House

orn, 4th Edition,

reprinted 1985, Heinemann Educational Publishers

SUBJECT NAME: DIGITAL SYSTEM AND APPLICATION

SUBJECT CODE: BPH-221

Course Objectives:

More broadly, they will be ready to handle substantial and challenging design problems. In particular, students will be able to

- Explain the elements of digital system abstractions such as digital representations of information, digital logic, Boolean algebra, state elements and finite state machine (FSMs).

- Design simple digital systems based on these digital abstractions, using the "digital paradigm" including discrete sampled information.
- Use the "tools of the trade": basic instruments, devices and design tools.
- Work in a design team that can propose, design, successfully implement and report on a digital systems project.
- Communicate the purpose and results of a design project in written and oral presentations.

#### Unit I (06 Lectures)

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.

Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs.

#### Unit II (12 Lectures)

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR

and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers.

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.

### Unit III (12 Lectures)

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor.

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops.

Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop.

Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator.

### Unit IV (12 Lectures)

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

Counters(4 bits): Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter. Computer Organization: Input/Output Devices. Data storage (idea of RAM and

ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.

#### Unit V (12 Lectures)

Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Components.

Pin-out diagram. Buses. Registers. ALU. Memory. Stack memory. Timing & Control circuitry.

Timing states. Instruction cycle, Timing diagram of MOV and MVI.

Introduction to Assembly Language: 1 byte, 2 byte & 3 byte instructions.

#### Reference Books:

- Digital Principles and Applications, A.P. Malvino, D.P. Leach and Saha, 7th Ed., 2011, Tata McGraw
- Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Digital Electronics G K Kharate, 2010, Oxford University Press
- Digital Systems: Principles & Applications, R.J. Tocci, N.S. Widmer, 2001, PHI Learning
- Logic circuit design, Shimon P. Vingron, 2012, Springer.
- Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.

- Digital Electronics, S.K. Mandal, 2010, 1st edition, McGraw Hill
- Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.

Course outcomes: After reading this course, a student will be able to

- Create the appropriate truth table from a description of a combinational logic function
- Create a gate-level implementation of a combinational logic function described by a truth table using and/or/inv gates, muxes or ROMs, and analyze its timing behavior

Create a state transition diagram from a description of a sequential logic function and then convert the

- diagram into an implementation of a finite-state machine with the appropriate combinational and sequential components
- Describe the operation and timing constraints for latches and registers

SUBJECT NAME: DIGITAL SYSTEM AND APPLICATION LAB

SUBJECT CODE: BPH-271

1. To measure (a) Voltage, and (b) Time period of a periodic waveform using CRO.
2. To test a Diode and Transistor using a Multimeter.
3. To design a switch (NOT gate) using a transistor.
4. To verify and design AND, OR, NOT and XOR gates using NAND gates.



5. To design a combinational logic system for a specified Truth Table.
6. To convert a Boolean expression into logic circuit and design it using logic gate ICs.
7. To minimize a given logic circuit.
8. Half Adder, Full Adder and 4-bit binary Adder.
9. Half Subtractor, Full Subtractor, Adder-Subtractor using Full Adder I.C.
10. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
11. To build JK Master-slave flip-flop using Flip-Flop ICs
12. To build a 4-bit Counter using D-type/JK Flip-Flop ICs and study timing diagram.
13. To make a 4-bit Shift Register (serial and parallel) using D-type/JK Flip-Flop ICs.
14. To design an astable multivibrator of given specifications using 555 Timer.
15. To design a monostable multivibrator of given specifications using 555 Timer.
16. Write the following programs using 8085 Microprocessor
  - a) Addition and subtraction of numbers using direct addressing mode
  - b) Addition and subtraction of numbers using indirect addressing mode
  - c) Multiplication by repeated addition.
  - d) Division by repeated subtraction.
  - e) Handling of 16-bit Numbers.
  - f) Use of CALL and RETURN Instruction.

- g) Block data handling.
- h) Other programs (e.g. Parity Check, using interrupts, etc.).

Note: Each student is required to perform at least seven experiments

Reference Books:

Modern Digital Electronics, R.P. Jain, 4th Edition, 2010, Tata McGraw Hill.

Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill. Microprocessor Architecture Programming and applications with 8085, R.S. Goankar, 2002, Prentice Hall.

SUBJECT NAME: MATHEMATICAL PHYSICS-II

SUBJECT CODE: BPH-222

Course Objectives:

The emphasis of the course is on applications in solving problems of interest to physicists.

Students are to be examined on the basis of problems, seen and unseen.

The main objective of this course is to familiarize students with a range of mathematical methods that are essential for solving advanced problems in theoretical physics.

Unit I (10 Lectures)

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary

period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity.

## Unit II (24 Lectures)

Special Functions: Legendre, Bessel, Hermite and Laguerre Differential Equations.

Properties of

Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. Zeros of Bessel Functions ( $J_0(x)$  and  $J_1(x)$ ) and Orthogonality.

## Unit III (04 Lectures)

Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral).

## Unit IV (06 Lectures)

Theory of Errors: Systematic and Random Errors. Propagation of Errors. Normal Law of Errors.

Standard and Probable Error. Least-squares fit. Error on the slope and intercept of a fitted line.

## Unit V (14 Lectures)

Partial Differential Equations: Solutions to partial differential equations, using separation of

variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry.  
Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes. Diffusion Equation.

#### Reference Books:

- Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.
- Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
- Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
- Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
- Partial Differential Equations for Scientists & Engineers, S.J. Farlow, 1993, Dover Pub.
- Engineering Mathematics, S.Pal and S.C. Bhunia, 2015, Oxford University Press
- Mathematical methods for Scientists & Engineers, D.A. McQuarrie, 2003, Viva Books

Course outcomes: - After successfully completed course, student will be able to

- Use complex analysis in solving physical problems.
- Solve ordinary and partial differential equations of second order that are common in the physical sciences.
- Use Green functions.
- Use the orthogonal polynomials and other special functions.

- Use Fourier series and integral transformation.
- Use the calculus of variations.

SUBJECT NAME: MATHEMATICAL PHYSICS – II LAB

SUBJECT CODE: BPH-272

Course Objectives:

The aim of this Lab is to use the computational methods to solve physical problems. Course will consist of lectures (both theory and practical) in the Lab. Evaluation done not on the programming but on the basis of formulating the problem.

Topics	Description with Applications
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Introduction to Numerical	Introduction to Scilab, Advantages and
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Computation software	disadvantages, Scilab environment, Command window, Figure, window, Edit window, Variables Scilab, Matlab and arrays, Initialising variables in Scilab, Multidimensional arrays, Subarray, Special values, Displaying output data, data file, Scalar and array operations, Hierarchy of operations, Built in Scilab functions,
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Introduction to plotting, 2D and 3D plotting (2), Branching Statements and program design, Relational & logical operators, the while loop, for loop, details of loop operations, break &	continue statements, nested loops, logical arrays and vectorization (2)
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User defined functions, Introduction to Scilab functions, Variable passing in Scilab, optional arguments, preserving data between calls to a function, Complex and Character data, string function, Multidimensional arrays (2) an introduction to	
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Scilab file processing, file opening and closing, Binary I/o functions, comparing binary and formatted functions, Numerical methods and developing the skills of writing a program

(2) Curve fitting, Least square fit, Ohms law to calculate R, Hooke's law to calculate

Goodness of fit, standard deviation spring constant Solution of Linear system of equations

Solution of mesh equations of electric circuits (3 by Gauss elimination method and

meshes) Solution of coupled spring mass systems (3 Gauss Seidal method.

Diagonalization masses) of matrices, Inverse of a matrix, Eigen vectors, eigen values problems

Generation of Special functions using Generating and plotting Legendre Polynomials

User defined functions in Scilab Generating and plotting Bessel function Solution of ODE

First order differential equation

- Radioactive decay
- Current in RC, LC circuits with DC source
- Newton's law of cooling first order Differential equation Euler,
- Classical equations of motion modified Euler and Runge-Kutta second order

methods Second order Differential Equation

- Harmonic oscillator (no friction)
- Damped Harmonic oscillator
- Over damped Second order differential equation Fixed
- Critical damped difference method
- Oscillatory

- Forced Harmonic oscillator
- Transient and
- Steady state solution
- Solve

With the boundary condition at In the range  $1 \leq x \leq 3$ . Plot y and against x in the given range on the same graph.

#### Partial Differential Equation

- Wave equation
- Heat equation
- Poisson equation
- Laplace equation Partial differential equations
- Generating square wave, sine wave, saw tooth Using Scicos / xcos wave
- Solution to harmonic oscillator
- Study of beat phenomenon
- Phase space plots

Note; Each students is required to perform at least seven experiments.

## Reference Books:

Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press

Complex Variables, A.S. Fokas & M.J. Ablowitz, 8th Ed., 2011, Cambridge Univ. Press First course in complex analysis with applications, D.G. Zill and P.D. Shanahan,

1940, Jones & Bartlett

Computational Physics, D.Walker, 1st Edn., 2015, Scientific International Pvt. Ltd. A Guide to MATLAB, B.R. Hunt, R.L. Lipsman, J.M. Rosenberg, 2014, 3rd Edn., Cambridge University Press

Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific and Engineering Applications: A.V. Wouwer, P. Saucez, C.V. Fernández. 2014 Springer

Scilab by example: M. Affouf 2012, ISBN: 978-1479203444

## Course outcomes:-

1. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
2. Students will demonstrate knowledge of classical mechanics, electromagnetism, quantum mechanics, and thermal physics, and be able to apply this knowledge to analyze a variety of physical phenomena.
3. Students will show that they have learned laboratory skills, enabling them to take measurements in a physics laboratory and analyze the measurements to draw valid conclusions.



4. Students will be capable of oral and written scientific communication, and will prove that they can think critically and work independently.

SUBJECT NAME: APPLIED OPTICS

SUBJECT CODE: BPH-223

Course Objectives:

1. To make the student understand the principles of Lasers.
2. To enable the student to explore the field of Holography and Nonlinear optics.

Unit-I Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence.

Interference: Division of amplitude and wavefront. Young's double slit experiment.

Lloyd's Mirror and Fresnel's Biprism. Newton's Rings: Measurement of wavelength and refractive index.

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required),

Diffraction: Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating.

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light

Unit II: Basic Laser Theory & Laser Systems

Historical background of laser, Einstein coefficients and stimulated light amplification: population inversion, creation of population inversion in three level & four level lasers. Gas Laser: CO<sub>2</sub> laser, Solid State Laser: Host material and its characteristics, doped ions, Nd:YAG laser, Liquid laser: Dye laser, Semiconductor laser.

### Unit III: Laser Beam Propagation

Laser beam propagation, properties of Gaussian beam, resonator, stability, various types of resonators, resonator for high gain and high energy lasers, Gaussian beam focusing. Concept of spatial frequency filtering, Fourier transforming property of a thin lens.

### Unit IV: Nonlinear Optics & Fourier Optics

Origin of nonlinearity, susceptibility tensor, phase matching, second harmonic generation, methods of enhancement, frequency mixing processes, nonlinear optical materials.

### Unit V: Holography

Importance of coherence, resolution, types of hologram, white light reflection, hologram, Principle of holography and characteristics, Recording and reconstruction, classification of hologram and application, non-destructive testing.

### Reference Book:

5. Principles of lasers- O Svelto
6. Solid State Laser Engineering- W Koechner
7. Laser- B A Labgyel

8. Gas laser- A J Boom
9. Methods of Experimental Physics Vol. 15B ed. By C L Tang
10. Industrial Application of Lasers – J F Ready
11. Handbook of Nonlinear Optics- R L Sautherland

Course outcomes:

- The student should have had knowledge on the different types of lasers.
- The student should have understood the basics of nonlinear optics

Semester IV

SUBJECT NAME: MATHEMATICAL PHYSICS - III

SUBJECT CODE: BPH-223

Theory: 60 Lectures

Course Objectives:

The course aims to demonstrate the utility and limitations of a variety of powerful calculation techniques and to provide a deeper understanding of the mathematics underpinning theoretical physics. The course will review and develop the theory of: complex analysis and applications to special functions; asymptotic expansions; ordinary and partial differential equations, in particular, characteristics, integral transform and Green function techniques

Unit-I Complex Analysis I: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. (15 Lectures)

Unit II Complex Analysis II :

Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals.

(15 Lectures)

Unit III Integral Transforms I:

Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives. Inverse

Fourier transform, Convolution theorem. (10 Lectures)

Unit IV Integral transforms II

Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations.

Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs:

Change of Scale Theorem, Shifting Theorem. .

#### Unit V Laplace Transform

LTs of 1st and 2nd order Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to 2nd order Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits, Coupled differential equations of 1st order. Solution of heat flow along infinite bar using Laplace transform.

(10 Lectures)

#### Reference Books:

- Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
- Mathematics for Physicists, P. Dennery and A.Krzywicki, 1967, Dover Publications
- Complex Variables, A.S.Fokas & M.J.Ablowitz, 8th Ed., 2011, Cambridge Univ. Press
- Complex Variables, A.K. Kapoor, 2014, Cambridge Univ. Press
- Complex Variables and Applications, J.W. Brown & R.V. Churchill, 7th Ed. 2003, Tata McGraw-Hill
- First course in complex analysis with applications, D.G. Zill and P.D. Shanahan, 1940, Jones & Bartlett

Course outcomes:

1. define and derive convergent and asymptotic series
2. apply techniques of complex analysis, such as contour integrals and analytic continuation, to the study of special functions of mathematical physics
3. calculate approximations to integrals by appropriate saddle point methods
3. define and manipulate the Dirac Delta and other distributions and be able to derive their various properties
4. be fluent in the use of Fourier and Laplace transformations to solve differential equations and derive asymptotic properties of solutions

SUBJECT NAME: MATHEMATICAL PHYSICS-III LAB

SUBJECT CODE: BPH-273

Scilab/C++ based simulations experiments based on Mathematical Physics problems like

1. Solve differential equations:
2. Dirac Delta Function, Evaluate

and show it tends to 5.

2. Fourier Series:
3. Program to sum

Evaluate the Fourier coefficients of a given periodic function (square wave)

4. Frobenius method and Special functions:

Show recursion relation

5. Calculation of error for each data point of observations recorded in experiments done in previous semesters (choose any two).
6. Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program.
7. Evaluation of trigonometric functions e.g.  $\sin \theta$ , Given Bessel's function at N points find its value at an intermediate point. Complex analysis: Integrate  $1/(x^2+2)$  numerically and check with computer integration.
8. Compute the nth roots of unity for  $n = 2, 3$ , and 4.
9. Find the two square roots of  $-5+12j$ .
10. Integral transform: FFT of
11. Solve Kirchoff's Current law for any node of an arbitrary circuit using Laplace's transform.
12. Solve Kirchoff's Voltage law for any loop of an arbitrary circuit using Laplace's transform.
13. Perform circuit analysis of a general LCR circuit using Laplace's transform.

Note: Each students is required to perform at least seven experiments

Reference Books:

- Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press

- Mathematics for Physicists, P. Dennery and A. Krzywicki, 1967, Dover Publications
- Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández. 2014 Springer ISBN: 978-3319067896
- A Guide to MATLAB, B.R. Hunt, R.L. Lipsman, J.M. Rosenberg, 2014, 3rd Edn., Cambridge University Press
- Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
- Scilab (A free software to Matlab): H.Ramchandran, A.S.Nair. 2011 S.Chand & Company
- Scilab Image Processing: Lambert M. Surhone. 2010 Betascript Publishing
- [https://web.stanford.edu/~boyd/ee102/laplace\\_ckts.pdf](https://web.stanford.edu/~boyd/ee102/laplace_ckts.pdf)
- [ocw.nthu.edu.tw/ocw/upload/12/244/12handout.pdf](http://ocw.nthu.edu.tw/ocw/upload/12/244/12handout.pdf)

SUBJECT NAME: ELEMENTS OF MODERN PHYSICS

SUBJECT CODE: BPH-224

Course Objectives:

Students will apply understanding and skill related to the principles and concepts of modern physics essential for graduate school and/or professional employment in the field.

Theory: 60 Lectures



## Unit I

Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions.

(10 Lectures)

## Unit II

Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction. Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude. (10 Lectures)

## Unit III

Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension- across a step potential & rectangular potential barrier.

(15 Lectures)

#### Unit IV

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force,  $N/Z$  graph, Liquid Drop model: semi -empirical mass formula and binding energy, Nuclear Shell Model and magic numbers

Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. (15 Lectures)

#### Unit V

Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions).

Lasers: Einstein's  $A$  and  $B$  coefficients. Metastable states. Spontaneous and

Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and

Four-Level Lasers. Ruby Laser and He-Ne Laser. Basic lasing, solid state laser, CO<sub>2</sub> laser.

(10 Lectures)

Reference Books:

- Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
- Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
- Introduction to Quantum Mechanics, David J. Griffiths, 2005, Pearson Education.
- Physics for scientists and Engineers with Modern Physics, Jewett and Serway, 2010, Cengage Learning.
- Modern Physics, G.Kaur and G.R. Pickrell, 2014, McGraw Hill
- Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan

Additional Books for Reference

- Modern Physics, J.R. Taylor, C.D. Zafiratos, M.A. Dubson, 2004, PHI Learning.
- Theory and Problems of Modern Physics, Schaum's outline, R. Gautreau and W. Savin, 2nd Edn, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Physics, Berkeley Physics, Vol.4. E.H.Wichman, 1971, Tata McGraw-Hill Co.

- Basic ideas and concepts in Nuclear Physics, K.Heyde, 3rd Edn., Institute of Physics Pub.

Course outcomes:

- Demonstrated ability to solve relativity of space and time problems
- Demonstrated ability to solve relativistic mass, energy, and momentum problems
- Demonstrated ability to solve problems involving the quantization of mass, charge, light, and energy including Avogadro's number, black-body radiation, photoelectric effect, and Compton scattering
- Described various models of the atom and explained why each was proposed and rejected except for the quantum model
- Demonstrated ability to apply wave-particle duality and uncertainty principle to solve physics problems
- Demonstrated ability to solve quantum mechanical eigenvalue equations for various operators and obtain expectation values of the corresponding observables
- Demonstrated ability to solve 1-D quantum problems including the quantum particle in a box, a well, the simple harmonic oscillator, and the transmission and reflection of waves

SUBJECT NAME: ELEMENTS OF MODERN PHYSICS LAB

SUBJECT CODE: BPH-274

1. Measurement of Planck's constant using black body radiation and photo-detector

2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine work function of material of filament of directly heated vacuum diode.
4. To determine the Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the ionization potential of mercury.
7. To determine the absorption lines in the rotational spectrum of Iodine vapour.
8. To determine the value of  $e/m$  by (a) Magnetic focusing or (b) Bar magnet.
9. To setup the Millikan oil drop apparatus and determine the charge of an electron.
10. To show the tunneling effect in tunnel diode using I-V characteristics.
11. To determine the wavelength of laser source using diffraction of single slit.
12. To determine the wavelength of laser source using diffraction of double slits.
  
13. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating

Note: Each students is required to perform at least seven experiments

#### Reference Books

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House

Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal

SUBJECT NAME: ANALOG SYSTEM AND APPLICATIONS

SUBJECT CODE: BPH-225

Course Objectives:

Ability to apply knowledge of mathematics, science and engineering to the solution of complex engineering problems Strong b Ability to design and conduct experiments, analyze, interpret data and synthesize valid conclusions. Average c Ability to design a system, component, or process, and synthesize solutions to achieve desired needs. Strong d Ability to identify, formulate, research through relevant literature review, and solve engineering problems reaching substantiated conclusions. Average e Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints. Strong f Ability to communicate effectively. n.a. g Ability to recognize the need for, and have the ability to engage in life-long learning.

Unit I Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram.

Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea).

Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow

Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Current Flow Mechanism in Forward

and Reverse Biased Diode. (12 Lectures)

Unit II Two-terminal Devices and their Applications: (1) Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, C-filter (2) Zener Diode and Voltage Regulation . Principle and structure of (1) LEDs, (2) Photodiode and (3) Solar Cell.

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB,CE and CC Configurations. Current gains  $\alpha$  and  $\beta$  Relations between  $\alpha$  and  $\beta$ . Load

Line analysis of Transistors.

Unit III Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C

Amplifiers. (10 Lectures)

#### Unit IV AMPLIFIER

Coupled Amplifier: Two stage RC-coupled amplifier and its Frequency response.

Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input

Impedance, Output Impedance, Gain, Stability, Distortion and Noise.

Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency.

Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground.

Unit V Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator.

Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D

Conversion (successive approximation) (12 Lectures)

Reference Books:

- Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
- Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
- Solid State Electronic Devices, B.G.Streetman & S.K.Banerjee, 6th Edn.,2009, PHI Learning
- Electronic Devices & circuits, S.Salivahanan & N.S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill
- OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall 2 9
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.
- Electronic circuits: Handbook of design & applications, U.Tietze, C.Schenk,2008, Springer



- Semiconductor Devices: Physics and Technology, S.M. Sze, 2nd Ed., 2002, Wiley India
- Microelectronic Circuits, M.H. Rashid, 2nd Edition, Cengage Learning
- Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

Course outcomes :-

- Design CMOS inverters, logic circuits and transmission gates to specifications. a, c, e
- Design latches and flip-flops as the basic circuit for Random-Access- Memory (RAM) and Read-Only-Memory (ROM) cells. Understand the mechanism of sense amplifier and address decoder. a, c, d, e, g, h
- Analyze the effects of ideal feedback network on gain sensitivity, noise, distortion, bandwidth and impedance. Understand the loading effect of feedback networks. a, c, e, g, h

SUBJECT NAME: ANALOG SYSTEM AND APPLICATION LAB

SUBJECT CODE: BPH-275

1. To study V-I characteristics of PN junction diode, and Light emitting diode.
2. To study the V-I characteristics of a Zener diode and its use as voltage regulator.
3. Study of V-I & power curves of solar cells, and find maximum power point & efficiency.
4. To study the characteristics of a Bipolar Junction Transistor in CE configuration.
5. To study the various biasing configurations of BJT for normal class A operation.

6. To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias.
7. To study the frequency response of voltage gain of a RC-coupled transistor amplifier.
8. To design a Wien bridge oscillator for given frequency using an op-amp.
9. To design a phase shift oscillator of given specifications using BJT.
10. To study the Colpitt's oscillator.
11. To design a digital to analog converter (DAC) of given specifications.
12. To study the analog to digital convertor (ADC) IC.
13. To study the zero-crossing detector and comparator.
14. To add two dc voltages using Op-amp in inverting and non-inverting mode
15. To design a precision Differential amplifier of given I/O specification using Op-amp.
16. To investigate the use of an op-amp as an Integrator.
17. To investigate the use of an op-amp as a Differentiator.
18. To design a circuit to simulate the solution of a 1st/2nd order differential equation.

Note: Each students is required to perform at least seven experiments

#### Reference Books:

- Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.

- OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
- Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.
- Electronic Devices & circuit Theory, R.L. Boylestad & L.D. Nashelsky, 2009, Pearson

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
BPH-276	MATHEMATICAL PHYSICS-III LAB	3	1	-	4

Scilab/C++ based simulations experiments based on Mathematical Physics problems like

1. Solve differential equations:
2. Dirac Delta Function, Evaluate and show it tends to 5.

### 3. Fourier Series:

Program to sum

Evaluate the Fourier coefficients of a given periodic function (square wave)

### 4. Frobenius method and Special functions:

Show recursion relation

5. Calculation of error for each data point of observations recorded in experiments done in previous semesters (choose any two).

6. Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program.

7. Evaluation of trigonometric functions e.g.  $\sin \theta$ , Given Bessel's function at N points find its value at an intermediate point. Complex analysis: Integrate  $1/(x^2+2)$  numerically and check with computer integration.

8. Compute the nth roots of unity for  $n = 2, 3$ , and 4.

9. Find the two square roots of  $-5+12j$ .

Note: Each students is required to perform at least seven experiments

#### TEXT BOOKS/REFERENCE BOOKS:

- Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
- Mathematics for Physicists, P. Dennery and A. Krzywicki, 1967, Dover Publications
- Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific and Engineering

Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández. 2014 Springer ISBN: 978-3319067896

- A Guide to MATLAB, B.R. Hunt, R.L. Lipsman, J.M. Rosenberg, 2014, 3rd Edn., Cambridge University Press
- Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
- Scilab (A free software to Matlab): H.Ramchandran, A.S.Nair. 2011 S.Chand & Company
- Scilab Image Processing: Lambert M. Surhone. 2010 Betascript Publishing

- [https://web.stanford.edu/~boyd/ee102/laplace\\_ckts.pdf](https://web.stanford.edu/~boyd/ee102/laplace_ckts.pdf)
- [ocw.nthu.edu.tw/ocw/upload/12/244/12handout.pdf](http://ocw.nthu.edu.tw/ocw/upload/12/244/12handout.pdf)

## SEMESTER-V

SUBJECT NAME: QUANTUM MECHANICS AND APPLICATIONS

SUBJECT CODE: BPH-320

Course Objectives: After successfully completed course, students will be able to:

This course develops concepts in quantum mechanics such that the behaviour of the physical universe can be understood from a fundamental point of view. It provides a basis for further study of quantum mechanics. Content will include: Review of the Schrodinger equation, operators, eigenfunctions, compatible observables, infinite well in one and three dimensions, degeneracy; Fourier methods and momentum space; Hermiticity; scalar products of wave functions, completeness relations, matrix mechanics; harmonic oscillator in one and three dimensions; sudden approximation; central potentials, quantisation of angular momentum, separation of radial and angular variables, spherical harmonics, hydrogen atom, spin.

### Unit-I

Time dependent Schrodinger equation: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition

Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators.

(8 Lectures)

## Unit-II

Time independent Schrodinger equation: Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Position-momentum uncertainty principle.

(10 Lectures)

Unit-III General discussion of bound states in an arbitrary potential: continuity of wave function, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle.

(12 Lectures)

Unit-IV Quantum theory of Hydrogen-like atoms: time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability

densities for ground & first excited states; Orbital angular momentum quantum numbers  $l$  and  $m$ ; s, p, d,... shells;

Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic table. Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum. Vector Model. Spin-orbit coupling in atoms L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.).

Unit-V Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magnetron;

Reference Books:

- A Text book of Quantum Mechanics, P.M. Mathews and K. Venkatesan, 2nd Ed., 2010, McGraw Hill
- Quantum Mechanics, Robert Eisberg and Robert Resnick, 2nd Edn., 2002, Wiley.
- Quantum Mechanics, Leonard I. Schiff, 3rd Edn. 2010, Tata McGraw Hill.
- Quantum Mechanics, G. Aruldas, 2nd Edn. 2002, PHI Learning of India.
- Quantum Mechanics, Bruce Cameron Reed, 2008, Jones and Bartlett Learning.
- Quantum Mechanics: Foundations & Applications, Arno Bohm, 3rd Edn., 1993, Springer
- Quantum Mechanics for Scientists & Engineers, D.A.B. Miller, 2008, Cambridge University Press

Additional Books for Reference:

•Quantum Mechanics, EugenMerzbacher, 2004, John Wiley and Sons, Inc.

- Introduction to Quantum Mechanics, D.J. Griffith, 2nd Ed. 2005, Pearson Education
- Quantum Mechanics, Walter Greiner, 4th Edn., 2001, Springer

Course outcomes:

- Pinpoint the historical aspects of development of quantum mechanics.
- Understand and explain the differences between classical and quantum mechanics.
- Understand the idea of wave function.
- Understand the uncertainty relations.
- Solve Schroedinger equation for simple potentials.
- spot, identify and relate the eigenvalue problems for energy, momentum, angular momentum and central potentials explain the idea of spin.

SUBJECT NAME: QUANTUM MECHANICS AND APPLICATION LAB

SUBJECT CODE: BPH-370

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom:



$$\frac{d^2 y}{dr^2} + \frac{2m}{\hbar^2} (V(r) - E) y = 0$$

Here,  $m$  is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is  $-13.6$  eV. Take  $e = 3.795$  (eVÅ) $^{1/2}$ ,  $\hbar c = 1973$  (eVÅ) and  $m = 0.511 \times 10^6$  eV/c $^2$ .

2. Solve the s-wave radial Schrodinger equation for an atom:

$$\frac{d^2 y}{dr^2} + \frac{2m}{\hbar^2} (V(r) - E) y = 0$$

$$\frac{d^2 y}{dr^2} + \frac{2m}{\hbar^2} (V(r) - E) y = 0$$

where  $m$  is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential

$$V(r) = -\frac{e^2}{r(1 + ar)}$$

Find the energy (in eV) of the ground state of the atom to an accuracy of three

significant digits. Also, plot the corresponding wavefunction. Take  $e = 3.795$  (eVÅ) $^{1/2}$ ,  $m = 0.511 \times 10^6$  eV/c $^2$ , and  $a = 3$  Å,  $5$  Å,  $7$  Å. In these units  $\hbar c = 1973$

(eVÅ). The ground state energy is expected to be above  $-12$  eV in all three cases.

3. Solve the s-wave radial Schrodinger equation for a particle of mass

$$m \frac{d^2 y}{dr^2} + \frac{2m}{\hbar^2} (V(r) - E) y = 0$$

dr 2h 2

For the anharmonic oscillator potential

$$V(r) = \frac{1}{2}kr^2 - \frac{1}{3}br^3$$

for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose  $m = 940 \text{ MeV}/c^2$ ,  $k = 100.33 \text{ MeV fm}^{-2}$ ,  $b = 0, 10, 30 \text{ MeV fm}^{-3}$ . In these units,  $\hbar c = 197.3 \text{ MeV fm}$ . The ground state energy I expected to lie between 90 and 110 MeV for all three cases.

4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen

$$\text{molecule: } \frac{d^2 y}{dr^2} + \frac{2m}{\hbar^2} (V(r) - E) y = 0$$

Where  $\mu$  is the reduced mass of the two-atom system for the Morse potential

$$V(r) = D(e^{-2\alpha(r-r_0)} - e^{-\alpha(r-r_0)})^2$$

Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take:  $m = 940 \times 10^6 \text{ eV}/C^2$ ,  $D = 0.755501 \text{ eV}$ ,  $\alpha = 1.44$ ,  $r_0 = 0.131349 \text{ \AA}$

Laboratory based experiments:

5. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
6. Study of Zeeman effect: with external magnetic field; Hyperfine splitting
7. To show the tunneling effect in tunnel diode using I-V characteristics.

8. Quantum efficiency of CCDs

NOTE: Each student is required to perform at least seven experiments.

Reference Books:

- Schaum's outline of Programming with C++.J.Hubbard, 2000,McGraw-Hill Publication
  
- Numerical Recipes in C: The Art of Scientific Computing, W.H. Press et al., 3rd Edn., 2007, Cambridge University Press.
- An introduction to computational Physics, T.Pang, 2nd Edn.,2006, Cambridge Univ. Press
- Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific & Engineering Applications: A. VandeWouwer, P. Saucez, C. V. Fernández.2014 Springer.
- Scilab(A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011 S. Chand & Co.
- A Guide to MATLAB, B.R. Hunt, R.L. Lipsman, J.M. Rosenberg, 2014, 3rd Edn., Cambridge University Press

SUBJECT NAME: SOLID STATE PHYSICS

SUBJECT CODE: BPH-321

Course Objectives:

The aim of this course is to give you an extended knowledge of the principles and techniques of solid state physics. The course covers the physical understanding of matter from an atomic view point. Topics covered include the structure, thermal and electrical properties of matter. Fundamental theories in solid state physics are introduced and then extended to show the relevance to important applications in current -day technology, industry, and research. The course has a theoretical lecture component and makes extensive use of examples and exercises to illustrate the material.

Unit-I Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.

(12 Lectures)

Unit-II Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T<sup>3</sup> law

Unit-III Properties of Matter: Magnetic Properties: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.; Dielectric Properties: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius-Mosotti Equation. Classical Theory of Electric

Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeier relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. Ferroelectric Properties: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law,

Ferroelectric domains, PE hysteresis loop. (20 lectures)

Unit-IV Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. (10 Lectures)

Unit-V Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) (8 Lectures)

#### Reference Books:

- Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
- Elements of Solid State Physics, J.P. Srivastava, 4th Edition, 2015, Prentice-Hall of India
- Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
- Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning

- Solid-state Physics, H. Ibach and H. Luth, 2009, Springer • Solid State Physics, Rita John, 2014, McGraw Hill
- Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
- Solid State Physics, M.A. Wahab, 2011, Narosa Publications

Course outcomes: Students should gain basic knowledge of solid state physics. This implies that the student will:

- Be able to account for interatomic forces and bonds and have a basic knowledge of crystal systems and spatial symmetries.
- Be able to account for how crystalline materials are studied using diffraction and be able to perform structure determination of simple structures.
- Understand the concept of reciprocal space and be able to use it as a tool.
- Know the significance of Brillouin zones.
- Know what phonons are, and be able to perform estimates of their dispersive and thermal properties.
- Know the fundamental principles of semiconductors, including pn-junctions, and be able to estimate the charge carrier mobility and density.

SUBJECT NAME: SOLID STATE PHYSICS LAB

SUBJECT CODE: BPH-371

1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency
5. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR)
6. To determine the refractive index of a dielectric layer using SPR
7. To study the PE Hysteresis loop of a Ferroelectric Crystal.
8. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
9. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150 °C) and to determine its band gap.
10. To determine the Hall coefficient of a semiconductor sample.

Note: Each student is required to perform at least seven experiments.

Reference Books :

•Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.

- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
- A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Ed., 2011, KitabMahal
- Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India.

SUBJECT NAME: PHYSICS OF DEVICE AND COMMUNICATION

SUBJECT CODE: BPH-322

Course Objectives:

- ☐ To understand the basic working of Electronic devices and Linear Integrated Circuits.
- ☐ To give an emphasis to the student to know the various semiconductor devices and its working.
- ☐ To give clear understanding of various fabrication techniques of electronic devices.
- ☐ To introduce the basic building blocks of linear integrated circuits.

Unit I: Measurement Science

Static characteristics of measuring instruments - accuracy, precision sensitivity, non-linearity, hysteresis - dynamic characteristics - I order and II order instruments - Standards and calibration- errors and error analysis.



## Unit II: Transducers

Variable resistance transducers - potentiometer, strain gauge RTD, thermistor, hygrometer-

Variable inductance transducers - LVDT - variable reluctance accelerometer – variable capacitance transducers for differential pressure, sound and thickness measurement- piezoelectric transducer – smart transducers.

## Unit III: Industrial Instruments

Temperature measurement - thermocouples, cold-junction compensation for thermocouple, radiation and optical pyrometers - pressure measurements - bourdon gauge, bellows, diaphragm, differential pressure transmitter, vacuum gauges, manometer gauge, Pirani gauge-flow measurement-orifice meter, venturimeter, electro-magnetic flow meter, ultrasonic flow meter, rotameter positive displacement meters, mass flowmeters.

## Unit IV: Fundamentals of Networks:

Dc And Ac Series And Parallel Circuits - Kirchhoff's Law - Network Graph – Matrix Representation- Solution Of Steady State, equations - transients in AC networks-frequency response of RL, RC, RLC series and parallel circuits.

## Unit V: Fundamentals Electronics and Bio-Medical Measurements:

Electronics Instruments: BJT, FET and MOSFET voltmeters - solid state multimeter - DMM - audio and Radio frequency signal generators - AM signal generator

Bio-Medical Instruments: Measurement of biological signals - ECG, EEG, EMG - blood pressure and blood flow measurements-defibrillators-pace maker.

Reference Books:

1. Electrical Measurements and Measuring Instruments By S. Kamakshaiah, J. Amarnath, KrishnaMurthy, Published by I K International Publishing House Pvt. Ltd, 2011.
2. Helfrick and Cooper, “Modern Electronic Instrumentation and
3. Jones, B.E., “Instrumentation Measurement and Feedback”, Tata McGraw-Hill, 1986.
4. Golding, E.W., “Electrical Measurement and Measuring Instruments”, 3rd Edition, Sir Issac Pitman and Sons, 1960.
5. Buckingham, H. and Price, E.N., “Principles of Electrical Measurements”, 1961.

Course outcomes:

- Understand the fundamentals of Electronics Device Physics
- Know the physical principles crucial to the functionality and operation of basic semiconductor devices.
- Enrich their knowledge in understanding the linear and non-linear applications of operational amplifiers.

SUBJECT NAME: NUCLEAR AND PARTICLE PHYSICS

SUBJECT CODE: BPH-323

Course Objectives:

1. Introduce students to the fundamental principles and concepts governing nuclear and particle physics and have a working knowledge of their application to real-life problems; and
2. Provide students with opportunities to develop basic knowledge and understanding of: scientific phenomena, facts, laws, definitions, concepts, theories, scientific vocabulary, terminology, conventions, scientific quantities and their determination, order of magnitude estimates, scientific and technological applications as well as their social, economic and environmental implications.
3. Knowledge of basic properties of nuclei and nuclear structure. Capability of elementary problem solving in nuclear and particle physics, and relating theoretical predictions and measurement results. Critical evaluation of results in nuclear and particle physics.

#### Unit I: Structure of Nuclei and Radioactivity

Basic Properties of Nuclei: (1) Mass, (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (5) Magnetic Moment ( $\mu$ ), (6) Stability and (7) Binding Energy.

Radioactivity: Law of Radioactive Decay. Half-life, Theory of Successive Radioactive Transformations. Radioactive Series, Binding Energy, Mass Formula.  $\alpha$ -decay :- Range of  $\alpha$ -particles, Geiger-Nuttall law and  $\alpha$ -particle Spectra. Gamow Theory of Alpha Decay,  $\beta$ -decay. Energy Spectra and Neutrino Hypothesis,  $\gamma$ -decay :- Origin of  $\gamma$ -rays, Nuclear Isomerism and Internal Conversion.

#### Unit II: Nuclear Reactions

Types of Reactions and Conservation Laws. Concept of Compound and Direct Reaction. Compound Nucleus. Scattering Problem in One Dimension : Reflection and Transmission by a Finite Potential Step. Stationary Solutions, Attractive and Repulsive Potential Barriers, Scattering Cross-section. Reaction Rate. Q-value of Reaction. Fission and Fusion.

### Unit III: Nuclear Models and Accelerators

Liquid Drop Model. Mass formula. Shell Model. Meson Theory of Nuclear Forces and Discovery of Pion. Van de Graaff Generator, Linear Accelerator, Cyclotron, Betatron,

### Unit IV: Detectors of Nuclear Radiations

Interaction of Energetic particles with matter. Ionization chamber. GM Counter. Cloud Chambers. Wilson Cloud Chamber. Bubble Chamber. Scintillation Detectors. Semiconductor Detectors (Qualitative Discussion Only).

### Unit V: Elementary Particles

Cosmic Rays :- Nature and Properties, Fundamental Interactions, Classification of Elementary Particles. Particles and Antiparticles. Baryons, Hyperons, Leptons, and Mesons. Elementary Particle Quantum Numbers : Baryon Number,

Lepton Number, Strangeness, Electric Charge, Hypercharge and Isospin<sup>0</sup>. Conservation Laws and Symmetry. Different Types of Quarks and Quark Contents of Spin  $\frac{1}{2}$  Baryons. Photons,

### Reference Books:

1. Concepts of Modern Physics by Arthur Beiser (McGraw-Hill Book Company, 1987)

2. Concepts of nuclear physics by Bernard L.Cohen.(New Delhi: Tata Mcgraw Hill, 1998).
3. Introduction to the physics of nuclei and particles by R.A. Dunlap.(Singapore: Thomson Asia, 2004).
4. Nuclear physics by Irving Kaplan. (Oxford & IBH, 1962).
5. Introductory nuclear physics by Kenneth S. Krane.( John Wiley & Sons, 1988)

Course outcomes:

1. Understand the fundamental principles and concepts governing classical nuclear and particle physics and have a working knowledge of their application to real-life problems.
- 2.
2. Demonstrate knowledge and understanding of: scientific phenomena, facts, laws, definitions, concepts, theories, scientific vocabulary, terminology, conventions, scientific quantities and their determination, order-of-magnitude estimates, scientific and technological applications as well as their social, economic and environmental implications.
3. Demonstrate comprehension of physical reality through estimation, approximation, and mathematical modeling, and understand how a small number fundamental physical principles underlie a huge variety of interconnected natural phenomena.

SUBJECT CODE PD-392

SUBJECT NAME: PDP (Personality development program)

SEMESTER – V

### Course Objectives:

To enable the students with an understanding of how to create self-development by equipping them with good inter-personal skills for effective social communication to succeed in maintaining professional and social environments. Group discussion, interviewing skills and simulation games will equip them for employability and professionalism.

UNIT 1 –Employability Quotient - Resume Writing, Types of Resume, Profile Building

Resume Writing Practice

UNIT 2 – Group Discussion – Definition of GD, Difference between GD and debate, Do's and don'ts of GD. Mock GD sessions

UNIT 3 – Interview Skills – Facing Personal, Technical & HR, FAQ and their answers

Mock interviews

UNIT 4 – Organizational Skills at Work place – focus & productivity, delegation, resource management & management skills

UNIT 5 – Corporate Policies, Corporate Life, Corporate Etiquette Corporate Truths for every Fresher

UNIT 6 – Presentation Skills – how to prepare an effective Presentation Skills, do and don'ts of presentation. Mock presentations

Semester VI

SUBJECT NAME: ELECTROMAGNETIC THEORY

SUBJECT CODE: BPH-324

## Course Objectives:

Obtain an understanding of Maxwell's equations and be able to apply them to solving practical electromagnetic fields problems. Fundamental concepts covered will include: laws governing electrodynamics, plane wave propagation in different media, power flow, polarization, transmission and reflection at an interface, transmission lines, microwave networks, waveguides, radiation and antennas, wireless systems design and examples.

### Unit-I: Maxwell Equations

Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density. (12 Lectures)

### Unit-II: EM Wave Propagation in Unbounded Media

Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere.

(10 Lectures)

### Unit-III: EM Wave in Bounded Media

Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction.

Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves.

Metallic reflection (normal Incidence) (10 Lectures)

### Unit-IV: Polarization of Electromagnetic Waves

Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of

Polarized Light. (12 Lectures)

Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter.

(5 Lectures)



## Unit-V: Wave Guides & Optical Fibres

Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface.

Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. (8 Lectures)

Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). (3 Lectures)

### Reference Books:

- ☐ Introduction to Electrodynamics, D.J. Griffiths, 3rd Ed., 1998, Benjamin Cummings.
- ☐ Elements of Electromagnetics, M.N.O. Sadiku, 2001, Oxford University Press.
- ☐ Introduction to Electromagnetic Theory, T.L. Chow, 2006, Jones & Bartlett Learning.
- ☐ Fundamentals of Electromagnetics, M.A.W. Miah, 1982, Tata McGraw Hill.
- ☐ Electromagnetic field Theory, R.S. Kshetrimayun, 2012, Cengage Learning.
- ☐ Engineering Electromagnetic, Willian H. Hayt, 8th Edition, 2012, McGraw Hill.

- ☐ Electromagnetic Field Theory for Engineers & Physicists, G. Lehner, 2010, Springer.

### Additional Books for Reference:

- ☐ Electromagnetic Fields & Waves, P. Lorrain & D. Corson, 1970, W. H. Freeman & Co.
- ☐ Electromagnetics, J.A. Edminster, Schaum Series, 2006, Tata McGraw Hill.

□ Electromagnetic field theory fundamentals, B. Guru and H. Hiziroglu, 2004, Cambridge University Press.

Course outcomes: After study through lectures and assignments, students will be able to:

1. Apply vector calculus to static electric-magnetic fields in different engineering situations
2. Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems
3. Examine the phenomena of wave propagation in different media and its interfaces and in applications of microwave engineering

SUBJECT NAME: ELECTROMAGNETIC THEORY LAB

SUBJECT CODE: BPH-374

1. To verify the law of Malus for plane polarized light.
2. To determine the specific rotation of sugar solution using Polarimeter.
3. To analyze elliptically polarized Light by using a Babinet's compensator.
4. To study dependence of radiation on angle for a simple Dipole antenna.
5. To determine the wavelength and velocity of ultrasonic waves in a liquid (Kerosene Oil, Xylene, etc.) by studying the diffraction through ultrasonic grating.
6. To study the reflection, refraction of microwaves
7. To study Polarization and double slit interference in microwaves.

8. To determine the refractive index of liquid by total internal reflection using Wollaston's air-film.
9. To determine the refractive Index of (1) glass and (2) a liquid by total internal reflection using a Gaussian eyepiece.
10. To study the polarization of light by reflection and determine the polarizing angle for air-glass interface.
11. To verify the Stefan's law of radiation and to determine Stefan's constant.
12. To determine the Boltzmann constant using V-I characteristics of PN junction diode.

Note: Each student is required to perform at least seven experiments.

Referred Books:

- ☐ Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia, Publishing House.
- ☐ Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
- ☐ A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal.
- ☐ Electromagnetic Field Theory for Engineers & Physicists, G. Lehner, 2010, Springer

SUBJECT NAME: STATISTICAL MECHANICS

SUBJECT CODE: BPH-325

## Course Objectives:

This course develops concepts in classical laws of thermodynamics and their application, postulates of statistical mechanics, statistical interpretation of thermodynamics, microcanonical, canonical and grand canonical ensembles; the methods of statistical mechanics are used to develop the statistics for Bose-Einstein, Fermi-Dirac and photon gases; selected topics from low temperature physics and electrical and thermal properties of matter are discussed.

### Unit-I: Classical Statistics

Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) – Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature.

(18 Lectures)

### Unit-II: Classical Theory of Radiation

Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoff's law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wien's Displacement law. Wien's Distribution Law. Saha's Ionization Formula. Rayleigh-Jean's Law. Ultraviolet Catastrophe.

(9 Lectures)

### Unit-III: Quantum Theory of Radiation

Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law.

(5 Lectures)

#### Unit-IV: Bose-Einstein Statistics

B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and Thermodynamic functions of photon gas. Bose derivation of Planck's law.

(13 Lectures)

#### Unit-V: Fermi-Dirac Statistics

Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas,

White Dwarf Stars, Chandrasekhar Mass Limit. (15 Lectures)

#### Reference Books:

- Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford University Press.
- Statistical Physics, Berkeley Physics Course, F. Reif, 2008, Tata McGraw-Hill.
- Statistical and Thermal Physics, S. Lokanathan and R.S. Gambhir. 1991, Prentice Hall.

- Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W. Sears and Gerhard L. Salinger, 1986, Narosa.
- Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer
- An Introduction to Statistical Mechanics & Thermodynamics, R.H. Swendsen, 2012, Oxford Univ. Press

Course outcomes: On completion of this course a student should be able to:

1. Define and discuss the concepts of microstate and macrostate of a model system
2. Define and discuss the concepts and roles of entropy and free energy from the view point of statistical mechanics.
3. Define and discuss the Boltzmann distribution and the role of the partition function.
4. Apply the machinery of statistical mechanics to the calculation of macroscopic properties resulting from microscopic models of magnetic and crystalline systems
5. Discuss the concept and role of indistinguishability in the theory of gases; know the results expected from classical considerations and when these should be recovered
6. Define the Fermi-Dirac and Bose-Einstein distributions; state where they are applicable; understand

how they differ and show when they reduce to the Boltzman distribution.

7 Apply the Fermi-Dirac distribution to the calculation of thermal properties of electrons in metals

8 Apply the Bose-Einstein distribution to the calculation of properties of black body radiation.

SUBJECT NAME: STATISTICAL MECHANICS LAB

SUBJECT CODE: BPH-375

Use C/C++/Scilab/other numerical simulations for solving the problems based on Statistical Mechanics like

13. Computational analysis of the behavior of a collection of particles in a box that satisfy Newtonian mechanics and interact via the Lennard-Jones potential, varying the total number of particles  $N$  and the initial conditions:

- a) Study of local number density in the equilibrium state (i) average; (ii) fluctuations
- b) Study of transient behavior of the system (approach to equilibrium)
- c) Relationship of large  $N$  and the arrow of time
- d) Computation of the velocity distribution of particles for the system and comparison with the Maxwell velocity distribution.
- e) Computation and study of mean molecular speed and its dependence on particle mass.
- f) Computation of fraction of molecules in an ideal gas having speed near the most probable speed

## Computation of the partition function $Z$

14. Computation of the partition function  $Z(\beta)$  for examples of systems with a finite number of single particle levels (e.g., 2 level, 3 level, etc.) and a finite number of non-interacting particles  $N$  under Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics:

- a) Study of how  $Z$  and average energy  $\langle E \rangle$ , energy fluctuation  $\langle E^2 \rangle$ , specific heat at constant volume  $C_V$ , depend upon the temperature, total number of particles  $N$  and the spectrum of single particle states.
- b) Ratios of occupation numbers of various states for the systems considered above.
- c) Computation of physical quantities at large and small temperature  $T$  and comparison of various statistics at large and small temperature  $T$ .

15. Plot Planck's law for Black Body radiation and compare it with Rayleigh-Jeans Law at high temperature and low temperature.

16. Plot Specific Heat of Solids (a) Dulong-Petit law, (b) Einstein distribution function, (c) Debye distribution function for high temperature and low temperature and compare them for these two cases.

17. Plot the following functions with energy at different temperatures

- a) Maxwell-Boltzmann distribution
- b) Fermi-Dirac distribution
- c) Bose-Einstein distribution



Note: Each student is required to perform at least ..... experiments.

#### Reference Books:

- ☐ Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn. 2007, Wiley India Edition.
- ☐ Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford University Press.
- ☐ Introduction to Modern Statistical Mechanics, D. Chandler, Oxford University Press, 1987.
- ☐ Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W. Sears and Gerhard L. Salinger, 1986, Narosa.
- ☐ Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer.
- ☐ Statistical and Thermal Physics with computer applications, Harvey Gould and Jan Tobochnik, Princeton University Press, 2010.
- ☐ Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández. 2014 Springer  
ISBN: 978-3319067896
- ☐ Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
- ☐ Scilab Image Processing: L.M. Surhone. 2010, Betascript Pub., ISBN: 978-6133459274

SUBJECT NAME: NANO-MATERIALS & APPLICATION

SUBJECT CODE: BPH-326

Course Objectives:

This course aims to provide a comprehensive overview of nanomaterials in terms of the synthesis, characterization, properties, and applications. It will cover the fundamental scientific principles for the different synthesis techniques, assembly of nanostructured materials and, new physical and chemical properties at the nanoscale. Existing and emerging applications will also be discussed through case studies.

Unit I: Nanomaterials and Nanotechnology

Basic concepts of Nano science and technology – Quantum wire – Quantum well – Quantum dot – Properties and technological advantages of Nanomaterials– Carbon Nanotubes and applications – Material processing by Sol – Gel method, Chemical Vapour deposition and Physical Vapour deposition – Microwave Synthesis of materials – Principles of SEM, TEM and AFM.

Unit II: Nanostructures

Electronic Structure of Nanoparticles- Kinetics in Nanostructured Materials- Zero dimensional, one-dimensional and two dimensional nanostructures- clusters of metals and semiconductors, nanowires, nanostructured beams, and nanocomposites-artificial atomic clusters-Size dependent properties-size dependent absorption spectra-phonons in nanostructures.

Unit III: Physical Properties of Nanomaterials

Melting point and phase transition processes- quantum-size-effect (QSE). Size-induced metal-insulator-transition (SIMIT)- nano-scale magnets, transparent magnetic materials, and

ultrahigh-density magnetic recording materials chemical physics of atomic and molecular clusters.

#### Unit IV: Surface and Micro-structural Properties of Nanomaterials

Surface energy – chemical potential as a function of surface curvature-Electrostatic stabilization-surface charge density-electric potential at the proximity of solid surface-Van der Waals attraction potential. Micro-structural Properties: Properties slightly dependent on temperature and grain size; properties strongly dependent on temperature and grain size; strengthening mechanisms; enhancement of available plasticity; grain size evolution and grain size control; HallPetch relation, microstructure – dislocation interactions at low and high temperatures; effects of diffusion on strength and flow of materials.

#### Unit V: Applications of Nanomaterials

Solar energy conversion and catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems,Linear and nonlinear optical and electrooptical properties, Applications in displays and other devices, Advanced organic materials for data storage,Photonics, Plasmonics ,Chemical and biosensors,Nanomedicine and Nanobiotechnology.

#### Referred Books:

4. Joel I. Gersten, “The Physics and Chemistry of Materials”, Wiley, 2001. 2. A. S. Edelstein and R. C. Cammarata, “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Pub., 1998.

5. Hari Singh Nalwa, “Nanostructured Materials and Nanotechnology”, Academic Press, 20024. S.Yang and P.Shen: “Physics and Chemistry of Nanostructured Materials”, Taylor & Francis, 2000.

Course outcomes: At the end of the course, the student will understand the following:

1. Understand the general physics and chemistry of nanomaterials
2. Understand processing techniques for nanomaterials – both chemical and physical approaches
3. Understand the important applications and properties of nanomaterials.
- 4 Understand the microstructure properties of Nanomaterials

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
BPH-327	BIO-PHYSICS	3	1	0	4

Course Objectives:

The objectives of this course are to impress on students that physical laws (laws of Physics) are valid in biological systems. To establish the relationship between structure and function at the molecular level. To prepare students for higher courses in environmental and medical biophysics, genomics and proteomics

UNIT-I: OPTICS IN BIOTECHNOLOGY:

Interference: Interference of light and its necessary conditions, path & Phase difference for reflected & transmitted rays, Interference in thin films (parallel and wedge shaped film), Newton's rings.

Diffraction: Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power.

## UNIT II: STRUCTURE & FUNCTIONS:

Intermolecular and surface forces relevant to bio-systems,( Vander Waals, hydration, steric, hydrophobic forces etc). Cell & its organelles - structure and function DNA, RNA and Protein - structure and function

## UNIT III: EXPERIMENTAL TECHNIQUES IN BIO-PHYSICS-I:

Spectroscopic techniques: Introduction to spectroscopy, basic principles, instrumentation and applications of UV-VIS absorption, infrared, Raman, atomic absorption, fluorescence, Laser spectroscopy, electron spin resonance, acoustic spectroscopy.

## UNIT IV: EXPERIMENTAL TECHNIQUES IN BIO-PHYSICS-II:

Microscopy: Principle, instrumentation and application of Microscopy, a) Electron Microscopy (i) Scanning Electron Microscopy (ii) Transmission Electron Microscopy b) Confocal fluorescence microscopy

## UNIT V: BIO INSTRUMENTATION:

X-Ray Diffractometer (XRD), positron emission topography whole body scanner, dose calibrators, gamma

scintillation camera, digital imaging techniques, acquisition, analysis and processing of data from gamma camera,

Enhancement.

#### TEXT BOOKS/REFERENCE BOOKS:

1. Physical Chemistry for Life Sciences, Peter Atkins and Julio de Paula, 2006, Oxford Press
2. Introduction to Biophysics by Cortell
3. Text Book of Biophysics , R N Roy, New Central Agency (P) Ltd, Calcutta
4. Methods in Molecular Biophysics, Igor N S, N Zaccai & J Zaccai, (2007) Cambridge
5. Principle of Biochemistry, D Voet, J Voet and CW Pratt, 3rd Ed,
6. Essential Biophysics, Narayanan, New Age Publications
7. Handbook of Molecular Biophysics (Methods & Application), 2009, HG Bohr, Wiley

Course outcomes: Upon successful completion of this course, the students will learn (knowledge based)

1. The major classes of biological macromolecules, their polymeric structures and role in the biological cell.
2. Detailed chemical structure of the polymers and their constituent monomers
3. Role of covalent and non-covalent bonds and experimental techniques used in Bio-Physics

4 Inter-and intramolecular interactions and their contribution to the native conformation of biomolecules

5 Biophysical techniques and their application in understanding structure and conformation of biological macromolecules, structure – function relationships, molecular transport within the cell and across membranes.

6 Understanding of instrument used for bio-physics.

Dissertation/Project

SUBJECT NAME: DISSERTATION

SUBJECT CODE: BPH-377

3. Identification of a research Topic, reading of relevant literature, Summary of National and International Scenario of course taught.

4. Understanding of the unsolved and unresolved problems in the literature, framing of objectives for dissertation.

5. Assessment about the feasibility of identified objectives within available resources, and fine tuning of objectives for future work.

6. Experimental / computational analysis, data analysis and writing of report.

7. Writing of manuscript and Poster making for presentation in scientific conferences or publication in Journal based on above work.

## SEMESTER-V

SUBJECT NAME: QUANTUM MECHANICS AND APPLICATIONS

SUBJECT CODE: BPH-320

Course Objectives:

Connect the historical development of quantum mechanics with previous knowledge and learn the basic properties of quantum world.

### Unit-I

Time dependent Schrodinger equation: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators; Expectation values of position and momentum. Wave Function of a Free Particle. (8

Lectures)

### Unit-II

Time independent Schrodinger equation: Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wavefunction; Position-momentum uncertainty principle.



(10 Lectures)

Unit-III General discussion of bound states in an arbitrary potential: continuity of wave function, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle.

(12 Lectures)

Unit-IV Quantum theory of Hydrogen-like atoms: time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum quantum numbers  $l$  and  $m$ ; s, p, d,... shells;

Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic table. Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum. Vector Model. Spin-orbit coupling in atoms L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.).

Unit-V Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton;

Atoms in External Magnetic Fields: Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only).

#### Reference Books:

- A Text book of Quantum Mechanics, P.M.Mathews and K.Venkatesan, 2nd Ed., 2010, McGraw Hill
- Quantum Mechanics, Robert Eisberg and Robert Resnick, 2nd Edn., 2002, Wiley.
- Quantum Mechanics, Leonard I. Schiff, 3rd Edn. 2010, Tata McGraw Hill.
- Quantum Mechanics, G. Aruldas, 2nd Edn. 2002, PHI Learning of India.
- Quantum Mechanics, Bruce Cameron Reed, 2008, Jones and Bartlett Learning.
- Quantum Mechanics: Foundations & Applications, Arno Bohm, 3rd Edn., 1993, Springer
- Quantum Mechanics for Scientists & Engineers, D.A.B. Miller, 2008, Cambridge University Press

#### Additional Books for Reference:

- Quantum Mechanics, Eugen Merzbacher, 2004, John Wiley and Sons, Inc.
- Introduction to Quantum Mechanics, D.J. Griffith, 2nd Ed. 2005, Pearson Education
- Quantum Mechanics, Walter Greiner, 4th Edn., 2001, Springer

#### Course outcomes:-

1. Pinpoint the historical aspects of development of quantum mechanics
2. Understand and explain the differences between classical and quantum mechanics

3. Understand the idea of wave function
- 4 Understand the uncertainty relations
- 5 Solve Schrodinger equation for simple potentials
- 6 Spot, identify and relate the eigenvalue problems for energy, momentum, angular momentum and central potentials explain the idea of spin

SUBJECT NAME: QUANTUM MECHANICS AND APPLICATION LAB

SUBJECT CODE: BPH-370

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like

5. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom:

$$\frac{d^2 y}{dr^2} + \frac{2m}{\hbar^2} (V(r) - E) y = 0 \quad \text{where } V(r) = -\frac{e^2}{r}$$

Here,  $m$  is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is  $-13.6$  eV. Take  $e = 3.795$  (eVÅ)<sup>1/2</sup>,  $\hbar c = 1973$  (eVÅ) and  $m = 0.511 \times 10^6$  eV/c<sup>2</sup>.

6. Solve the s-wave radial Schrodinger equation for an atom:

$$\frac{d^2 y}{dr^2} + \frac{2m}{\hbar^2} (V(r) - E) y = 0$$

where  $m$  is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential

$$V(r) = -\frac{e^2}{a + r}$$

Find the energy (in eV) of the ground state of the atom to an accuracy of three

significant digits. Also, plot the corresponding wavefunction. Take  $e = 3.795 \text{ (eV}\text{\AA})^{1/2}$ ,  $m = 0.511 \times 10^6 \text{ eV}/c^2$ , and  $a = 3 \text{ \AA}, 5 \text{ \AA}, 7 \text{ \AA}$ . In these units  $\hbar c = 1973$

(eV\AA). The ground state energy is expected to be above -12 eV in all three cases.

7. Solve the s-wave radial Schrodinger equation for a particle of mass

$$m = 1/2 \text{ y Atomic Units } 2m = V(r) = F$$

$$dr^2 h^2$$

For the anharmonic oscillator potential

$$V(r) = 1/2 kr^2 + 1/3 br^3$$

for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose  $m = 940 \text{ MeV}/c^2$ ,  $k = 100 \text{ 33 MeV fm}^{-2}$ ,  $b = 0, 10, 30 \text{ MeV fm}^{-3}$ . In these units,  $\hbar c = 197.3 \text{ MeV fm}$ . The ground state energy I expected to lie between 90 and 110 MeV for all three cases.

8. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen

$$\text{molecule: } d^2 y / dr^2 + 2m(V(r) - E)y = 0$$

$$dx^2 \quad h^2$$

Where  $\mu$  is the reduced mass of the two-atom system for the Morse potential

$V(r) = D(e^{-2\alpha(r-r_0)} - 2e^{-\alpha(r-r_0)} + 1)$ ,  $r$  is the internuclear distance. Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take:  $m = 940 \times 10^6 \text{ eV}/c^2$ ,  $D = 0.755501 \text{ eV}$ ,  $\alpha = 1.44$ ,  $r_0 = 0.131349 \text{ \AA}$

Laboratory based experiments:

4. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
6. Study of Zeeman effect: with external magnetic field; Hyperfine splitting
7. To show the tunneling effect in tunnel diode using I-V characteristics.
8. Quantum efficiency of CCDs

NOTE: Each student is required to perform at least seven experiments.

Reference Books:

- Schaum's outline of Programming with C++.J.Hubbard, 2000,McGraw-Hill Publication
- Numerical Recipes in C: The Art of Scientific Computing, W.H. Press et al., 3rd Edn., 2007, Cambridge University Press.
- An introduction to computational Physics, T.Pang, 2nd Edn.,2006, Cambridge Univ. Press

- Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific & Engineering Applications: A. VandeWouwer, P. Saucez, C. V. Fernández. 2014 Springer.
- Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011 S. Chand & Co.
- A Guide to MATLAB, B.R. Hunt, R.L. Lipsman, J.M. Rosenberg, 2014, 3rd Edn., Cambridge University Press

SUBJECT NAME: SOLID STATE PHYSICS

SUBJECT CODE: BPH-321

Course Objectives:

The aim of this course is to give an extended knowledge of the principles and techniques of solid state physics. The course covers the physical understanding of matter from an atomic view point. Topics covered include the structure, thermal, magnetic and electrical properties of matter. Fundamental theories in solid

state physics are introduced and then extended to show the relevance to important applications in current -day technology, industry, and research.

Unit-I Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.

(12 Lectures)

Unit-II Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the 34

Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T<sup>3</sup> law

Unit-III Properties of Matter: Magnetic Properties: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.; Dielectric Properties: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius-Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeier relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. Ferroelectric Properties: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. (20 lectures)

Unit-IV Elementary band theory: Kronig-Penney model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (4-probe method) & Hall coefficient. (10 Lectures)

Unit-V Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) (8 Lectures)

Reference Books:

• Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.

• Elements of Solid State Physics, J.P. Srivastava, 4th Edition, 2015, Prentice-Hall of India

• Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill

• Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning

• Solid-state Physics, H. Ibach and H. Luth, 2009, Springer • Solid State Physics, Rita John, 2014, McGraw Hill

• Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India

• Solid State Physics, M.A. Wahab, 2011, Narosa Publications

Course outcomes: After successfully completing this course students will be able to:

1. Explain the fundamental concepts of solid state physics such as what types of matter exist and the methods available to determine their structure and properties
2. Outline the physical origins which govern the properties of matter in the solid state
3. Apply the knowledge gained to solve problems in solid state physics using relevant mathematical tools.

SUBJECT NAME: SOLID STATE PHYSICS LAB

SUBJECT CODE: BPH-371

1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method)



2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency
5. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR)
6. To determine the refractive index of a dielectric layer using SPR
7. To study the PE Hysteresis loop of a Ferroelectric Crystal.
8. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
9. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150 o C) and to determine its band gap.
10. To determine the Hall coefficient of a semiconductor sample.

Note: Each student is required to perform at least seven experiments.

#### Reference Books :

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.

- A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Ed., 2011, KitabMahal
- Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India.

SUBJECT NAME: PHYSICS OF DEVICE AND COMMUNICATION

SUBJECT CODE: BPH-322

#### Unit I: Measurement Science

Static characteristics of measuring instruments - accuracy, precision sensitivity, non-linearity, hysteresis - dynamic characteristics - I order and II order instruments - Standards and calibration- errors and error analysis.

#### Unit II: Transducers

Variable resistance transducers - potentiometer, strain gauge RTD, thermistor, hygrometer- Variable inductance transducers - LVDT - variable reluctance accelerometer – variable capacitance transducers for differential pressure, sound and thickness measurement- piezoelectric transducer – smart transducers.

#### Unit III: Industrial Instruments

Temperature measurement - thermocouples, cold-junction compensation for thermocouple, radiation and optical pyrometers - pressure measurements - bourdon gauge, bellows, diaphragm, differential pressure transmitter, vacuum gauges, manometer gauge, Pirani gauge-flow measurement-orifice meter, venturimeter, electro-magnetic flow meter, ultrasonic flow meter, rotameter positive displacement meters, mass flowmeters.

#### Unit IV: Fundamentals of Networks:

Dc And Ac Series And Parallel Circuits - Kirchhoffs Law - Network Graph – Matrix

Representation- Solution Of Steady State, equations - transients in AC networks-frequency response of RL, RC, RIC series and parallel circuits.

Unit V: Fundamentals Electronics and Bio-Medical Measurements:

Electronics Instruments: BJT, FET and MOSFET voltmereters - solid state multimeter - DMM - audio and Radio frequency signal generators - AM signal generator

Bio-Medical Instruments: Measurement of biological signals - ECG,EEG, EMG - blood pressure and blood flow measurements-defibrillators-pace maker.

Reference Books:

1. Electrical Measurements and Measuring Instruments By S. Kamakshaiah, J. Amarnath, KrishnaMurthy, Published by I K International Publishing House Pvt. Ltd, 2011.
2. Helfrick and Cooper, “Modern Electronic Instrumentation and
3. Jones, B.E., “Instrumentation Measurement and Feedback”, Tata McGraw-Hill, 1986.
4. Golding, E.W., “Electrical Measurement and Measuring Instruments”, 3rd Edition, Sir Issac Pitman and Sons, 1960.
5. Buckingham, H. and Price, E.N., “Principles of Electrical Measurements”, 1961.

SUBJECT NAME: NUCLEAR AND PARTICLE PHYSICS

SUBJECT CODE: BPH-323

### Unit I: Structure of Nuclei and Radioactivity

Basic Properties of Nuclei: (1) Mass, (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (5) Magnetic Moment ( $\mu$ ), (6) Stability and (7) Binding Energy.

Radioactivity: Law of Radioactive Decay. Half-life, Theory of Successive Radioactive Transformations. Radioactive Series, Binding Energy, Mass Formula.  $\alpha$ -decay :- Range of  $\alpha$ -particles, Geiger-Nuttall law and  $\alpha$ -particle Spectra. Gamow Theory of Alpha Decay,  $\beta$ -decay. Energy Spectra and Neutrino Hypothesis,  $\gamma$ -decay :- Origin of  $\gamma$ -rays, Nuclear Isomerism and Internal Conversion.

### Unit II: Nuclear Reactions

Types of Reactions and Conservation Laws. Concept of Compound and Direct Reaction. Compound Nucleus. Scattering Problem in One Dimension : Reflection and Transmission by a Finite Potential Step. Stationary Solutions, Attractive and Repulsive Potential Barriers, Scattering Cross-section. Reaction Rate. Q-value of Reaction. Fission and Fusion.

### Unit III: Nuclear Models and Accelerators

Liquid Drop Model. Mass formula. Shell Model. Meson Theory of Nuclear Forces and Discovery of Pion. Van de Graaff Generator, Linear Accelerator, Cyclotron, Betatron,

### Unit IV: Detectors of Nuclear Radiations

Interaction of Energetic particles with matter. Ionization chamber. GM Counter. Cloud Chambers. Wilson Cloud Chamber. Bubble Chamber. Scintillation Detectors. Semiconductor Detectors (Qualitative Discussion Only).

## Unit V: Elementary Particles

Cosmic Rays :- Nature and Properties, Fundamental Interactions, Classification of Elementary Particles. Particles and Antiparticles. Baryons, Hyperons, Leptons, and Mesons. Elementary Particle Quantum Numbers : Baryon Number,

Lepton Number, Strangeness, Electric Charge, Hypercharge and Isospin<sup>0</sup>. Conservation Laws and Symmetry. Different Types of Quarks and Quark Contents of Spin  $\frac{1}{2}$  Baryons. Photons,

### Reference Books:

1. Concepts of Modern Physics by Arthur Beiser (McGraw-Hill Book Company, 1987)
2. Concepts of nuclear physics by Bernard L.Cohen.(New Delhi: Tata Mcgraw Hill, 1998).
3. Introduction to the physics of nuclei and particles by R.A. Dunlap.(Singapore: Thomson Asia, 2004).
4. Nuclear physics by Irving Kaplan. (Oxford & IBH, 1962).
5. Introductory nuclear physics by Kenneth S. Krane.( John Wiley & Sons, 1988)

## Semester VI

SUBJECT NAME: ELECTROMAGNETIC THEORY

SUBJECT CODE: BPH-324

### Unit-I: Maxwell Equations

Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge

Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum

Density. (12 Lectures)

Density and Angular Momentum Density. Unit-II: EM Wave Propagation in Unbounded Media

Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. (10 Lectures)

Unit-III: EM Wave in Bounded Media

Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves.

Metallic reflection (normal Incidence) (10 Lectures)

Unit-IV: Polarization of Electromagnetic Waves

Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by

Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. (12 Lectures)

Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter.

(5 Lectures)

#### Unit-V: Wave Guides & Optical Fibres

Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. (8 Lectures)

Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). (3 Lectures)

#### Reference Books:

- Introduction to Electrodynamics, D.J. Griffiths, 3rd Ed., 1998, Benjamin Cummings.
- Elements of Electromagnetics, M.N.O. Sadiku, 2001, Oxford University Press.
- Introduction to Electromagnetic Theory, T.L. Chow, 2006, Jones & Bartlett Learning.
- Fundamentals of Electromagnetics, M.A.W. Miah, 1982, Tata McGraw Hill.
- Electromagnetic field Theory, R.S. Kshetrimayun, 2012, Cengage Learning.

- Engineering Electromagnetic, Willian H. Hayt, 8th Edition, 2012, McGraw Hill.
- Electromagnetic Field Theory for Engineers & Physicists, G. Lehner, 2010, Springer.

Additional Books for Reference:

- Electromagnetic Fields & Waves, P. Lorrain & D. Corson, 1970, W. H. Freeman & Co.
- Electromagnetics, J.A. Edminster, Schaum Series, 2006, Tata McGraw Hill.
- Electromagnetic field theory fundamentals, B. Guru and H. Hiziroglu, 2004, Cambridge University Press.

SUBJECT NAME: ELECTROMAGNETIC THEORY

SUBJECT CODE: BPH-374

13. To verify the law of Malus for plane polarized light.
14. To determine the specific rotation of sugar solution using Polarimeter.
15. To analyze elliptically polarized Light by using a Babinet's compensator.
16. To study dependence of radiation on angle for a simple Dipole antenna.
17. To determine the wavelength and velocity of ultrasonic waves in a liquid (Kerosene Oil, Xylene, etc.) by studying the diffraction through ultrasonic grating.
18. To study the reflection, refraction of microwaves
19. To study Polarization and double slit interference in microwaves.



20. To determine the refractive index of liquid by total internal reflection using Wollaston's air-film.
21. To determine the refractive Index of (1) glass and (2) a liquid by total internal reflection using a Gaussian eyepiece.
22. To study the polarization of light by reflection and determine the polarizing angle for air-glass interface.
23. To verify the Stefan's law of radiation and to determine Stefan's constant.
24. To determine the Boltzmann constant using V-I characteristics of PN junction diode.

Note: Each student is required to perform at least seven experiments.

Referred Books:

- ☐ Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia, Publishing House.
- ☐ Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
- ☐ A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal.
- ☐ Electromagnetic Field Theory for Engineers & Physicists, G. Lehner, 2010, Springer

SUBJECT NAME: STATISTICAL MECHANICS

SUBJECT CODE: BPH-325

Unit-I: Classical Statistics

Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) – Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature.

(18 Lectures)

#### Unit-II: Classical Theory of Radiation

Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoff's law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wien's Displacement law. Wien's Distribution Law. Saha's Ionization Formula. Rayleigh-Jean's Law. Ultraviolet Catastrophe.

(9 Lectures)

#### Unit-III: Quantum Theory of Radiation

Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law.

(5 Lectures)

#### Unit-IV: Bose-Einstein Statistics

B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and Thermodynamic functions of photon gas. Bose derivation of Planck's law.

(13 Lectures)

#### Unit-V: Fermi-Dirac Statistics

Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas,

White Dwarf Stars, Chandrasekhar Mass Limit. (15 Lectures)

#### Reference Books:

- Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford University Press.
- Statistical Physics, Berkeley Physics Course, F. Reif, 2008, Tata McGraw-Hill.
- Statistical and Thermal Physics, S. Lokanathan and R.S. Gambhir. 1991, Prentice Hall.
- Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W. Sears and Gerhard L. Salinger, 1986, Narosa.
- Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer
- An Introduction to Statistical Mechanics & Thermodynamics, R.H. Swendsen, 2012, Oxford

Univ. Press

SUBJECT NAME: STATISTICAL MECHANICS

SUBJECT CODE: BPH-375

Use C/C++/Scilab/other numerical simulations for solving the problems based on Statistical Mechanics like

18. Computational analysis of the behavior of a collection of particles in a box that satisfy Newtonian mechanics and interact via the Lennard-Jones potential, varying the total number of particles  $N$  and the initial conditions:

- g) Study of local number density in the equilibrium state (i) average; (ii) fluctuations
- h) Study of transient behavior of the system (approach to equilibrium)
- i) Relationship of large  $N$  and the arrow of time
- j) Computation of the velocity distribution of particles for the system and comparison with the Maxwell velocity distribution.
- k) Computation and study of mean molecular speed and its dependence on particle mass.
- l) Computation of fraction of molecules in an ideal gas having speed near the most probable speed

19. Computation of the partition function  $Z(\beta)$  for examples of systems with a finite number of single particle levels (e.g., 2 level, 3 level, etc.) and a finite number of non-interacting particles  $N$  under Maxwell-Boltzmann, Fermi-Dirac and Bose- Einstein statistics:

- d) Study of how  $Z(\beta)$ , average energy  $\langle E \rangle$ , energy fluctuation  $\langle E^2 \rangle - \langle E \rangle^2$ , specific heat at constant volume  $C_V$ , depend upon the temperature, total number of particles  $N$  and the spectrum of single particle states.

- e) Ratios of occupation numbers of various states for the systems considered above.
  - f) Computation of physical quantities at large and small temperature  $T$  and comparison of various statistics at large and small temperature  $T$ .
20. Plot Planck's law for Black Body radiation and compare it with Raleigh –Jeans Law at high temperature and low temperature.
21. Plot Specific Heat of Solids (a) Dulong-Petit law, (b) Einstein distribution function, (c) Debye distribution function for high temperature and low temperature and compare them for these two cases.
22. Plot the following functions with energy at different temperatures
- d) Maxwell-Boltzmann distribution
  - e) Fermi-Dirac distribution
  - f) Bose-Einstein distribution

Note: Each student is required to perform at least ..... experiments.

#### Reference Books:

- ☐ Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn. 2007, Wiley India Edition.
- ☐ Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford University Press.

- Introduction to Modern Statistical Mechanics, D. Chandler, Oxford University Press, 1987.
- Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W. Sears and Gerhard L. Salinger, 1986, Narosa.
- Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer.
- Statistical and Thermal Physics with computer applications, Harvey Gould and Jan Tobochnik, Princeton University Press, 2010.
- Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández. 2014 Springer ISBN: 978-3319067896
- Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
- Scilab Image Processing: L.M.Surhone. 2010, Betascript Pub., ISBN: 978-6133459274

SUBJECT NAME: NANO-MATERIALS & APPLICATION

SUBJECT CODE: BPH-326

Unit I: Nanomaterials and Nanotechnology

Basic concepts of Nano science and technology – Quantum wire – Quantum well – Quantum dot – Properties and technological advantages of Nanomaterials– Carbon Nanotubes and applications – Material processing by Sol – Gel method, Chemical Vapour deposition and

Physical Vapour deposition – Microwave Synthesis of materials – Principles of SEM, TEM and AFM.

## Unit II: Nanostructures

Electronic Structure of Nanoparticles- Kinetics in Nanostructured Materials- Zero dimensional, one-dimensional and two dimensional nanostructures- clusters of metals and semiconductors, nanowires, nanostructured beams, and nanocomposites-artificial atomic clusters-Size dependent properties-size dependent absorption spectra-phonons in nanostructures.

## Unit III: Physical Properties of Nanomaterials

Melting point and phase transition processes- quantum-size-effect (QSE). Size-induced metal-insulator-transition (SIMIT)- nano-scale magnets, transparent magnetic materials, and ultrahigh-density magnetic recording materials chemical physics of atomic and molecular clusters.

## Unit IV: Surface and Micro-structural Properties of Nanomaterials

Surface energy – chemical potential as a function of surface curvature-Electrostatic stabilization-surface charge density-electric potential at the proximity of solid surface-Van der Waals attraction potential. Micro-structural Properties: Properties slightly dependent on temperature and grain size; properties strongly dependent on temperature and grain size; strengthening mechanisms; enhancement of available plasticity; grain size evolution and grain size control; HallPetch relation, microstructure – dislocation interactions at low and high temperatures; effects of diffusion on strength and flow of materials.

## Unit V: Applications of Nanomaterials

Solar energy conversion and catalysis, Molecular electronics and printed electronics  
Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems, Linear and  
nonlinear optical and electrooptical properties, Applications in displays and other devices,  
Advanced organic materials for data storage, Photonics, Plasmonics, Chemical and  
biosensors, Nanomedicine and Nanobiotechnology.

#### Referred Books:

1. Joel I. Gersten, "The Physics and Chemistry of Materials", Wiley, 2001. 2. A. S. Edelstein and R. C. Cammarata, "Nanomaterials: Synthesis, Properties and Applications", Institute of Physics Pub., 1998.
3. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2002. 4. S. Yang and P. Shen: "Physics and Chemistry of Nanostructured Materials", Taylor & Francis, 2000.

#### Dissertation/Project

SUBJECT NAME: DISSERTATION

SUBJECT CODE: BPH-377

4. Identification of a research Topic, reading of relevant literature, Summary of National and International Scenario of course taught.
5. Understanding of the unsolved and unresolved problems in the literature, framing of objectives for dissertation.
6. Assessment about the feasibility of identified objectives within available resources, and fine tuning of objectives for future work.



7. Experimental / computational analysis, data analysis and writing of report.
8. Writing of manuscript and Poster making for presentation in scientific conferences or publication in Journal based on above work.

**SCHEME FOR B. SC CHEMISTRY**

B. SC. (Hons.) CHEMISTRY			Semester	I
SN	Course Code	Course Name	Periods	Credits

			<b>L</b>	<b>T</b>	<b>P</b>	
1	BCH-110	Inorganic Chemistry – I	3	1	0	4
2	BCH-114	Organic Chemistry – I	4	0	0	4
3	BCH-120	Physical Chemistry – I	4	0	0	4
4	BMA-111	Calculus	5	1	0	6
5	BEN-101	Communication Skill (English)	2	0	0	2
6	BCH-160	Inorganic Chemistry – I Lab	0	0	4	2
7	BCH-170	Physical Chemistry – I Lab	0	0	4	2
8	BCH-164	Organic Chemistry – I Lab	0	0	4	2
		<b>Total</b>	<b>18</b>	<b>2</b>	<b>12</b>	<b>26</b>

<b>B. SC. (Hons.) CHEMISTRY</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BCH-115	Physical Chemistry – II	3	1	0	4
2	BCH-121	Inorganic Chemistry –II	3	1	0	4
3	BCH-122	Organic Chemistry –II	3	1	0	4
4	BPH-122	Electricity and Magnetism	3	1	0	4
5	CEA-101A	Environmental Science and Ecology	2	0	0	2
6	BCH-165	Physical Chemistry – II Lab	0	0	4	2
7	BPH-172	Electricity and Magnetism Lab	0	0	4	2
8	BCH-171	Inorganic Chemistry –II Lab	0	0	4	2
9	BCH-172	Organic Chemistry –II Lab	0	0	4	2
10	HD-101	Hobby Club	0	1	0	1
		<b>Total</b>	<b>14</b>	<b>5</b>	<b>16</b>	<b>27</b>

### SCHEME FOR B. SC CHEMISTRY

B. SC. (Hons.) CHEMISTRY			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-219	Physical Chemistry-III	3	1	0	4
2	BCH-221	Inorganic Chemistry –III	3	1	0	4
3	BCH-222	Organic Chemistry –III	3	1	0	4
4	BMA-230	Differential Equation-I	5	1	0	6
5	BCS-201	Computer for Chemists/Skill Based Subject –I	3	0	0	3
6	BA-272-A	Entrepreneurship	3	0	0	3
7	BCH-271	Inorganic Chemistry –III Lab	0	0	4	2
8	BCH-272	Organic Chemistry –III Lab	0	0	4	2
9	BCH-269	Physical Chemistry-III Lab	0	0	4	2
		Total	20	4	12	28

B. SC. (Hons.) CHEMISTRY			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-225	Organic Chemistry –IV	3	1	0	4
2	BCH-223	Physical Chemistry-IV	3	1	0	4
3	BCH-226	Analytical Chemistry / Discipline Specific Elective-I	3	1	0	4
4	BA-264A	Managerial Skill/ Skill Enhancement Subject –II	3	0	0	3
5	BPH-224/ BMA- 241	Element of Modern Physics/ Elementary Mathematics-II	3	1	0	4
6	BPH-274	General Elective Lab – IV / Element of Modern Physics Lab	0	0	4	2
7	BCH-275	Organic Chemistry –IV Lab	0	0	4	2
8	BCH-273	Physical Chemistry-IV Lab	0	0	4	2
9	BCH-276	Analytical Chemistry lab/ Discipline Specific Elective-I- lab	0	0	4	2
		Total	15	4	16	27

### SCHEME FOR B. SC CHEMISTRY

B. SC. (Hons.) CHEMISTRY			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-324	Inorganic Chemistry –IV	3	1	0	4
2	BCH-325	Organic Chemistry-V	3	1	0	4
3	BCH-321	Physical Chemistry-V	3	1	0	4
4	BCH-322	Spectroscopy & and Some Important Compounds/ Discipline Specific Elective-II	3	1	0	4
5	BCH-371	Physical Chemistry-V Lab	0	0	4	2
6	PD-392	PDP/Interpersonal Skills	2	0	0	2
7	BCH-374	Inorganic Chemistry –IV Lab	0	0	4	2
8	BCH-375	Organic Chemistry -V Lab	0	0	4	2
9	BCH-378	Workshop on Chemistry	0	0	4	2
Total			14	4	16	26

B. SC. (Hons.) CHEMISTRY			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-326	Discipline Specific Elective /Polymer Chemistry	3	1	0	4
2	BCH-327	Discipline Specific Elective-IV/ Fuel Chemistry	3	1	0	4
3	BCH-377	Project/ Dissertation/ Industrial	0	0	20	10
Total			6	2	20	18

# SYLLABUS FOR B. SC. (Hons.) CHEMISTRY

## Semester I

SUBJECT NAME: INORGANIC CHEMISTRY-I SUBJECT CODE: BCH-110

### UNIT-1: S & P BLOCK ELEMENT

Comparative study of the elements includes diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their function.

Emphasis on comparative study of periodic properties of p-block elements (including diagonal relationship and excluding methods of preparation). Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca, Preparation, properties, structures and uses of dioxygen and ozone; Allotropic forms of sulphur; Preparation, properties, structures and uses of sulphur dioxide, sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur, Allotropic forms of phosphorus;

### UNIT-2: CHEMISTRY OF NOBLE GASES

Chemical properties of noble gases with emphasis on their low chemical reactivity, chemistry of xenon, structure and bonding of fluorides, oxides and oxyfluorides of xenon.

### UNIT-3: BORON FAMILY

Oxide of boron ( $B_2O_3$ ), Oxyacid of boron ( $H_3BO_3$ )-preparation, properties and uses.

Preparation, properties and structure of diborane and borazine. Trihalides of boron-preparation, properties and relative strengths of trihalides of boron as Lewis acid. Preparation, properties and uses of boron and aluminium; Structure, properties and uses of borax, boric acid, diborane, boron trifluoride, aluminium chloride and alums.

### UNIT-4: CARBON FAMILY

Catenation, carbides, fullerenes, fluorocarbons, silicates (structural aspects), silicones- general methods of preparations, properties and uses.

### UNIT-5: NITROGEN & OXYGEN FAMILY

Oxides: structures of oxides of N, P. Oxyacids: structure and relative acid strengths of oxyacids of nitrogen and phosphorus. Structure of white, yellow and red phosphorus. Oxyacids of sulphur- structures and acidic strength of  $H_2O_2$ - structure, properties and uses. Preparation,

properties, structure and uses of ammonia, nitric acid, phosphine and phosphorus halides, ( $\text{PCl}_3$ ,  $\text{PCl}_5$ ); Structures of oxides and oxoacids of nitrogen.

#### Reference Books:

- Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991.
- Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford, 1970
- Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2006.
- Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.

SUBJECT NAME: INORGANIC CHEMISTRY LAB -I SUBJECT CODE: BCH-160

(A) Titrimetric Analysis

- (i) Calibration and use of apparatus
- (ii) Preparation of solutions of different Molarity/Normality of titrants

(B) Acid-Base Titrations

- (i) Estimation of carbonate and hydroxide present together in mixture.
- (ii) Estimation of carbonate and bicarbonate present together in a mixture.
- (iii) Estimation of free alkali present in different soaps/detergents

(C) Oxidation-Reduction Titrimetry

- (i) Estimation of Fe(II) and oxalic acid using standardized  $\text{KMnO}_4$  solution.
- (ii) Estimation of oxalic acid and sodium oxalate in a given mixture.
- (iii) Estimation of Fe(II) with  $\text{K}_2\text{Cr}_2\text{O}_7$  using internal (diphenylamine, anthranilic acid) and external indicator.

#### Reference text:

1. Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS.

SUBJECT NAME: PHYSICAL CHEMISTRY- I SUBJECT CODE: BCH-120

## UNIT-1: CHEMICAL KINETICS

Rate of reaction, Rate equation, Factors influencing the rate of reaction- concentration, temperature, pressure, catalyst. Order of reaction, integrated rate expression for zero order, first order, second order reaction. Half life period of a reaction, methods for determination of order of reaction.

Effect of temperature on the rate of reaction, Arrhenius equation, Theories of reaction rate- simple collision theory for unimolecular and bimolecular collision.

## UNIT-2: PHASE EQUILIBRIUM

Statement and meaning of the terms: phase component and degree of freedom thermodynamic derivation of Gibbs phase rule, phase rule, phase equilibria of one component system- example water and sulphur systems. Phase equilibrium of two components system solid liquid equilibria: simple eutectic example Pb -Ag system, desilverization of lead, congruent system (Zn-Mg system), incongruent system (Na-K system).

## UNIT-3 ELECTROCHEMISTRY-I

Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance, equivalent conductance and relation among them, Arrhenius theory of ionization, Ostwald's dilution law, Debye-Huckel equation, Transport number, definition and determination of Hittorf's methods.

## UNIT-4 SOLID STATE

Classification of solids, laws of crystallography- (i) Law of constancy of interfacial angles (ii) Laws of rationality of indices (iii) Law of symmetry

Definition of unit cell and space lattice, Bravais lattices, crystal system. X-ray diffraction by crystals, derivation of Bragg equation. packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, imperfection in solids; Electrical, magnetic and dielectric properties.

## UNIT-5 LIQUID STATE

Structure of liquids, properties of liquids- surface tension, viscosity, vapor pressure, Refractive Index and Types of Crystals.

Reference Books:

- Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry Ed., Oxford University Press

Ball, D. W. Physical Chemistry Thomson Press, India (2007).

Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).

Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).

SUBJECT NAME: PHYSICAL CHEMISTRY LAB-I SUBJECT CODE: BCH-170

1. Surface tension measurements.
  - a. Determine the surface tension by (i) drop number (ii) drop weight method.
  - b. Study the variation of surface tension of detergent solutions with concentration.
2. Viscosity measurement using Ostwald's viscometer.
  - a. Determination of viscosity of aqueous solutions of (i) polymer (ii) ethanol and (iii) sugar at room temperature.
  - b. Study the variation of viscosity of sucrose solution with the concentration of solute.
3. Indexing of a given powder diffraction pattern of a cubic crystalline system.
4. pH metry
  - a. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
  - b. Preparation of buffer solutions of different pH
    - i. Sodium acetate-acetic acid
    - ii. Ammonium chloride-ammonium hydroxide
  - c. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
  - d. Determination of dissociation constant of a weak acid.

#### Reference Books

- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).



- Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

SUBJECT NAME: ORGANIC CHEMISTRY – I SUBJECT CODE: BCH-114

#### UNIT-1 BASICS OF ORGANIC CHEMISTRY-I

Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties.

Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength.

#### UNIT-2 BASICS OF ORGANIC CHEMISTRY-II

Homolytic and Heterolytic fission with suitable examples. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes.

Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

#### UNIT-3 STEREOCHEMISTRY:

Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions; Geometrical isomerism: cis–trans and, syn-anti isomerism E/Z notations with C.I.P rules.

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Distereoisomers, meso structures, Racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations.

#### UNIT-4 CHEMISTRY OF ALIPHATIC HYDROCARBONS

##### (i) A. Carbon-Carbon sigma bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity.

##### (ii) Carbon-Carbon pi bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.

Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

#### UNIT-5 CYCLOALKANES AND CONFORMATIONAL ANALYSIS

Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes: Relative stability: Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.

#### Reference Books:

- Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.
- Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

SUBJECT NAME: ORGANIC CHEMISTRY LAB- II SUBJECT CODE: BCH-164

1. Checking the calibration of the thermometer
2. Purification of organic compounds by crystallization using the following solvents:
  - a. Water
  - b. Alcohol
  - c. Alcohol-Water
3. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)

5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds, Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method)

6. Chromatography

- a. Separation of a mixture of two amino acids by ascending and horizontal paper chromatography
- b. Separation of a mixture of two sugars by ascending paper chromatography
- c. Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC)

#### Reference Books

- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
- Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

SUBJECT NAME: CALCULUS ( GENERAL ELECTIVE)

SUBJECT CODE: BMA-111

UNIT-1: LIMIT & CONTINUITY : The real line and its geometrical representation;  $\epsilon$ - $\delta$  treatment of limit and continuity; Properties of limit and classification of discontinuities; Properties of continuous functions.

UNIT-2: DIFFERENTIABILITY: Successive differentiation; Leibnitz Theorem; Statement of Rolle's Theorem; Mean Value Theorem; Taylor and Maclaurin's Theorems; Indeterminate forms.

UNIT 3: APPLICATIONS OF DIFFERENTIATION : Asymptotes; Concavity, convexity and points of inflection; Curvature; Extrema; elementary curves, tangent and normal in parametric form; Polar Coordinates.

UNIT-4: PARTIAL DIFFERENTIATION: Limits and continuity of functions of two variables; Partial derivatives; Taylor's theorem and Maclaurin's Theorem for function of two variable; Maxima and minima for function of two variable.

UNIT-5: DOUBLE AND TRIPLE INTEGRALS; Change of order in double integrals. Application of Integration : length of a curve; Arc length as a parameter; Evolute & Envelope; Volumes and surface areas of solids of revolution.

### Reference Books:

1. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.
2. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.
3. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar Inc. New York 1975.
4. Shanti Narayan, Elements of Real Analysis, S. Chand & Company, New Delhi. 5Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Company, New Delhi.
6. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
7. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
8. H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P. Ltd.,Singapore, 2002.

**SUBJECT : COMMUNICATION SKILL SUBJECT CODE: BEN-101**

**UNIT 1: COMMUNICATION AND ITS ELEMENTS:** An introduction to the need of communication competency; Role of vocabulary in effective communication; Word formation; A set of selected 50 synonyms, antonyms, homonyms & homophones; suffixes & prefixes

**UNIT 2: LISTENING AND READING SKILLS:** Listening comprehension & reading comprehension; Listening to recorded speeches, TV News and other audio materials to test listening comprehension with given exercises

**UNIT 3: WRITING SKILLS:** Ad Creation; Slogan making; Picture composition; Expanding hints, proverbs; Movie review.

**UNIT 4: LETTER WRITING:** Types of letter writing; Structure & Lay out; Leave application; Letter of enquiry & response with respect to educational & official matters; Informal letter expressing or discussing social or educational issues.

**UNIT5: SPOKEN SKILLS:** Introduction to oral communication; Importance of Pronunciation; Importance of phonetics; Usage of Phonetics; Types of Conversation; Strategies for effective conversation for social and official interaction; Developing conversation on topics of current importance. Soft Skills Non-verbal Importance of Body Language and its usage to communicate better.

**Semester II**

**SUBJECT NAME: PHYSICAL CHEMISTRY II SUBJECT CODE: BCH-115**

## Unit-I THERMOCHEMISTRY-I:

Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics.

First law: Concept of heat,  $q$ , work,  $w$ , internal energy,  $U$ , and statement of first law; enthalpy,  $H$ , relation between heat capacities, calculations of  $q$ ,  $w$ ,  $U$  and  $H$  for reversible.

## Unit-2 THERMOCHEMISTRY-II

Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data,.

Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes.

Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.

Free Energy Functions: Gibbs and Helmholtz energy; variation of  $S$ ,  $G$ ,  $A$  with  $T$ ,  $V$ ,  $P$ ; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state. Free Energy Functions: Gibbs and Helmholtz energy; variation of  $S$ ,  $G$ ,  $A$  with  $T$ ,  $V$ ,  $P$ ; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.

## Unit-3 SYSTEMS OF VARIABLE COMPOSITION:

Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs-Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

## Unit-4 CHEMICAL EQUILIBRIUM:

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in

ideal gases, Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation

of relations between the various equilibrium constants  $K_p$ ,  $K_c$  and  $K_x$ . LeChatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase.

#### Unit-5 SOLUTIONS AND COLLIGATIVE PROPERTIES:

Different methods for expressing concentration of solution - molality, molarity, mole fraction, percentage (by volume and mass both), vapour pressure of solutions and Raoult's Law Ideal and non-ideal solutions. Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure] and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution.

#### Reference Books

- Peter, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxford University Press (2011).
- Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
- Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S.

Commonly Asked Questions in Thermodynamics. CRC Press: NY (2011).

- Levine, I. N. Physical Chemistry 6th Ed., Tata Mc Graw Hill (2010).
- Metz, C.R. 2000 solved problems in chemistry, Schaum Series (2006)

SUBJECT NAME: PHYSICAL CHEMISTRY LAB- II SUBJECT CODE: BCH-165

#### Thermochemistry

- (a) Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).
- (b) Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
- (c) Calculation of the enthalpy of ionization of ethanoic acid.

- (d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.
- (e) Determination of basicity/proticity of a polyprotic acid by the thermochemical method in terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step.
- (f) Determination of enthalpy of hydration of copper sulphate.
- (g) Study of the solubility  $\Delta$  of benzoic acid in water and determination of  $H$ .

SUBJECT NAME: INORGANIC CHEMISTRY-II SUBJECT CODE: BCH-121

#### UNIT-1 ACID AND BASE:

Brönsted-Lowry concept of acid-base reactions, solvated proton, relative strength of acids, types of acid-base reactions, levelling solvents, Lewis acid-base concept, Classification of Lewis acids, Hard and Soft Acids and Bases (HSAB) Application of HSAB principle

#### UNIT-2: GENERAL PRINCIPLES OF METALLURGY

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agent. Electrolytic Reduction, Hydrometallurgy. Methods of purification of metals: Electrolytic Kroll process, Parting process, van Arkel-de Boer process and Mond's process, Zone refining.

#### UNIT- 3 CORROSION AND ITS CONTROL

Types of Corrosion: Wet corrosion, dry corrosion, galvanic corrosion, water-line corrosion, differential aeration corrosion & stress corrosion, Factors effecting corrosion, Protection from corrosion: Barrier, sacrificial, cathodic and anodic protection.

#### UNIT-4 OXIDATION AND REDUCTION

Use of redox potential data - analysis of redox cycle, redox stability in water - Frost, Latimer and Pourbaix diagrams, Principles involved in the extraction of elements. UNIT-5

#### INORGANIC POLYMER

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes, and polysulphates

SUBJECT NAME: ORGANIC CHEMISTRY-II SUBJECT CODE: BCH-122

#### UNIT-1: ALKENES & DIENES

Nomenclature of alkenes, mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halides. Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes – mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration- oxidation, reduction, ozonolysis, hydration, hydroxylation and oxidation with  $\text{KMnO}_4$ , polymerization of alkenes, substitution at allylic and vinylic positions of alkenes.

#### UNIT-2: ALKYNES

Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration – oxidation of alkynes, metal –ammonia reductions, oxidation and polymerization.

#### UNIT-3: ALKYL & ARYL HALIDES

Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanisms and stereochemistry of nucleophilic substitution reactions of alkyl halides,  $\text{S}_\text{N}2$  and  $\text{S}_\text{N}1$  reactions with energy profile diagrams.

#### UNIT-4: ARENES AND AROMATICITY

Nomenclature of benzene derivatives: Aromatic nucleus and side chain, Structure of benzene: Molecular formula and Kekule structure Aromaticity: Huckel rule, aromatic ions, anti-aromatic, non - aromatic compounds. Aromatic electrophilic substitution – general pattern of the mechanism, mechanism of nitration, halogenations, sulphonation, and Friedel – Crafts reaction. Energy profile diagrams. Activating deactivating substituent, orientation and ortho/para ratio.

#### UNIT-5: POLY NUCLEAR HYDROCARBONS

Haworth synthesis of naphthalene and phenanthrene, Pschorr synthesis of phenanthrene, synthesis of anthracene involving Friedel craft acylation of benzene with phthalic anhydride and Diels-Alder reaction between 1,3-butadiene and 1,4- naphthoquinone, reaction of naphthalene, anthracene and phenanthrene, relative reactivities at different positions and mechanism of electrophilic substitution reactions in naphthalene, anthracene and phenanthracene.



#### Reference Books:

Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

SUBJECT NAME: ORGANIC CHEMISTRY LAB-II SUBJECT CODE: BCH-172

1. Preparation and purification through crystallization or distillation and ascertaining their purity through melting or boiling point:
  - (i) Phenyl benzoate from phenol and benzoyl chloride
  - (ii) M-dinitrobenzene from nitrobenzene(use 1:2 conc.  $\text{HNO}_3$  -  $\text{H}_2\text{SO}_4$  mixture if fuming  $\text{HNO}_3$  is not available).
  - (iii) Picric acid
  - (iv) Aspirin from salicylic acid
2. To study the differential extraction of compounds.
3. Crystallization and decolourization of impure naphthalene from ethanol.
4. Mixed M.P determination of urea & Cinnamic acid mixture of various composition(1:4, 1:1 & 4:1)

#### Reference Books

- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)

- Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
- Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).

SUBJECT NAME: ELECTRICITY AND MAGNETISM (GENERAL ELECTIVE)  
SUBJECT CODE: BPH-122

#### UNIT-1 ELECTRIC FIELD AND ELECTRIC POTENTIAL

Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry.

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole. Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere.

#### UNIT-2 DIELECTRIC PROPERTIES OF MATTER:

Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector

D. Relations between E, P and D. Gauss' Law in dielectrics.

#### UNIT-3 MAGNETIC FIELD:

Magnetic force between current elements and definition of Magnetic Field. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its

application to (1) Solenoid and (2) Toroid. Properties of  $B$ : curl and divergence. Vector Potential. Magnetic Force on

(1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field.

#### UNIT-4 ELECTROMAGNETIC INDUCTION & BALLISTIC GALVANOMETER:

Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell's Equations. Charge Conservation and Displacement current.

Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping.

#### UNIT-5 ELECTRICAL CIRCUITS & NETWORK THEOREMS:

AC Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit.

Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem,, Maximum Power Transfer theorem.

#### Reference Books:

- Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, Tata McGraw
- Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education
- Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.
- Feynman Lectures Vol.2, R.P.Feynman, R.B.Leighton, M. Sands, 2008, Pearson Education
- Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press.
- Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press.

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. To determine an unknown Low Resistance using Potentiometer.
4. To determine an unknown Low Resistance using Carey Foster's Bridge.
5. To compare capacitances using De'Sauty's bridge.
6. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
7. To verify the Thevenin and Norton theorems.
8. To verify the Superposition, and Maximum power transfer theorems.
9. To determine self inductance of a coil by Anderson's bridge.
10. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
11. To study the response curve of a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q.
12. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer
13. Determine a high resistance by leakage method using Ballistic Galvanometer.
14. To determine self-inductance of a coil by Rayleigh's method.
15. To determine the mutual inductance of two coils by Absolute method.

NOTE: Each student is required to perform at least seven experiments.

#### Reference Books

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
- A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition,

reprinted 1985, Heinemann Educational Publishers A Laboratory Manual of Physics for undergraduate

SUBJECT NAME: ENVIRONMENTAL SCIENCE AND ECOLOGY SUBJECT CODE: CEA-101-A

#### UNIT\_1.THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:

Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

#### UNIT-2 NATURAL RESOURCES:

Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non- renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

#### UNIT-3 ECOSYSTEMS:

Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

#### UNIT-4 BIODIVERSITY AND ITS CONSERVATION:

Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in- situ and ex-situ conservation of biodiversity.

## UNIT-5 ENVIRONMENTAL POLLUTION AND SOCIAL ISSUES:

Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster

management –floods, earthquake, cyclone and landslides. Water conservation, rain water harvesting, watershed management; climate change, global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

### Reference Book:

1. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
2. Bharucha Erach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
3. Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition,
4. New Age International Publishers, 2004
5. Brunner R. C., “Hazardous Waste Incineration”, 1st Edition McGraw Hill Inc., 1989.
6. Clark R.S., “Marine Pollution”, 1st Edition Clanderson Press Oxford, 1989
7. .Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., Environmental Encyclopedia”, 2nd Edition, Jaico Publ. House, 2001.
8. De, A. K., “Environmental Chemistry”, 2nd Edition, Wiley Eastern, 1989
9. Jadhav, H. and Bhosale, V.M ., “Environmental Protection and Laws”, 1st Edition, Himalaya Pub. House, Delhi, 1995.
10. Mckinney, M.L. and Schoel. R.M., “Environmental Science Systems & Solutions”, 2nd Edition, Web enhanced edition, 1996.

Semester III

## UNIT-1: THERMODYNAMICS

Definition of thermodynamics terms: system, surrounding, types of systems, intensive and extensive properties. State and path functions, Thermodynamic processes. Concept of heat and work. Zeroth Law of thermodynamics, first law of thermodynamics: statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law – joule – Thomson coefficient for ideal gas and real gas: and inversion temperature. Calculation of work done, heat, internal energy, enthalpy for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

## UNIT-2: SURFACE CHEMISTRY

Adsorption by solids, Application of adsorption, Adsorption of gases by solids, Factors influencing the adsorption, Langmuir theory of adsorption, Adsorption from solution, Gibbs adsorption isotherm. UNIT-3: DISTRIBUTION LAW

Nernst distribution law, conditions for the validity of Nernst distribution law, Derivation of molecular complexity from distribution law. Application of distribution law i.e. calculation of solubility of solute in solvent, determination of equilibrium constant from distribution law, distribution indicator, process of extraction and determination of degree of hydrolysis and study of complex ion formation, limitation of distribution law.

## UNIT-4: ELECTROCHEMISTRY – II

Kohlrausch's Law, calculation of molar ionic conductance and effect of viscosity, temperature & pressure on it. Application of Kohlrausch's law in calculation of conductance of weak electrolytes at infinite dilution.

Definition of pH and pKa, Buffer action, Buffer mechanism of buffer action.

## UNIT-5 GASEOUS STATE

Maxwell's distribution of velocities and energies( derivation excluded), average velocity and most probable velocity, collision diameter, collision number, collision frequency, deviation of real gases from ideal behavior, derivation of vander Waal's equation of state.

Reference Books:

Peter Atkins & Julio De Paula, Physical Chemistry 9th Ed., Oxford University Press (2010).

- Castellan, G. W. Physical Chemistry, 4th Ed., Narosa (2004).
- McQuarrie, D. A. & Simon, J. D., Molecular Thermodynamics, Viva Books Pvt. Ltd.: New Delhi (2004).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S.

#### SUBJECT -PHYSICAL CHEMISTRY PRACTICALS -III SUBJECT CODE- BCH-269

1. To determine the melting point and eutectic point of given mixture
2. To determine the partition coefficient of benzoic acid between water and benzene at room temperature.
3. Buffer Solution:

Preparation of buffer solution.

$\text{NH}_4\text{Cl}$  -  $\text{NH}_4\text{OH}$  and determination of pH of buffer solution

$\text{CH}_3\text{COOH}$  and  $\text{CH}_3\text{COONa}$  and determination of pH of buffer solution.

4. Surface Tension measurement (Use of organic solvent excluded)
  - (a) Determination of surface tension by drop number method & drop weight method
  - (b) Variation of surface tension of detergent solution with concentration.
5. Phase equilibria: Construction of phase diagram of
  - (a) Simple eutectic system
  - (b) Congruent melting point using cooling curve.

#### Reference Books:

- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).



- Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

SUBJECT NAME: INORGANIC CHEMISTRY-III SUBJECT CODE: BCH-221

#### UNIT-1: CHEMISTRY OF ELEMENTS OF 1ST TRANSITION SERIES:

Definition of transition elements, position in the periodic table, General characteristics & properties of 1st transition elements, Structures & properties of some compounds of transition elements–  $\text{TiO}_2$ ,  $\text{VOCl}_2$ ,  $\text{FeCl}_3$ ,  $\text{CuCl}_2$  and  $\text{Ni}(\text{CO})_4$

#### UNIT-2: CHEMISTRY OF ELEMENTS OF 2ND & 3RD TRANSITION SERIES:

General characteristics and properties of the 2nd and 3rd transition elements Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, oxidation state, magnetic and Spectral properties and stereochemistry.

#### UNIT-3: LANTHANIDES:

Comparative study of lanthanide elements with respect to electronic configuration atomic and ionic radii, oxidation state and complex formation, lanthanide contraction. Separation of lanthanides. Application of lanthanide complexes.

#### UNIT-4: COORDINATION COMPOUNDS

Werner's coordination theory, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

#### UNIT-5: HALOGEN FAMILY

Basic properties of halogen, interhalogens types properties, hydro and oxyacids of chlorine – structure and comparison of acid strength.

Reference Books:

- Purcell, K.F & Kotz, J.C. Inorganic Chemistry W.B. Saunders Co, 1977.
- Huheey, J.E., Inorganic Chemistry, Prentice Hall, 1993.
- Lippard, S.J. & Berg, J.M. Principles of Bioinorganic Chemistry Panima Publishing

Company 1994.

- Cotton, F.A. & Wilkinson, G, Advanced Inorganic Chemistry. Wiley-VCH, 1999.
- Basolo, F, and Pearson, R.C., Mechanisms of Inorganic Chemistry, John Wiley & Sons, NY, 1967.
- Greenwood, N.N. & Earnshaw A., Chemistry of the Elements, Butterworth-Heinemann, 1997.

SUBJECT NAME: INORGANIC CHEMISTRY LAB-III SUBJECT CODE: BCH-271

1. Semi micro qualitative analysis of mixture containing not more than four radicals (including interfering and excluding insoluble):

Pb<sup>2+</sup>, Hg<sup>2+</sup>, Ag<sup>+</sup>, Bi<sup>3+</sup>, Cu<sup>2+</sup>, Cd<sup>2+</sup>, As<sup>3+</sup>, Sb<sup>3+</sup>, Sn<sup>2+</sup>, Fe<sup>3+</sup>, Cr<sup>3+</sup>, Al<sup>3+</sup>, Co<sup>2+</sup>, Ni<sup>2+</sup>, Mn<sup>2+</sup>, Zn<sup>2+</sup>, Ba<sup>2+</sup>, Sr<sup>2+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, NH<sub>4</sub><sup>+</sup>, CO<sub>3</sub><sup>2-</sup>, S<sup>2-</sup>, SO<sub>3</sub><sup>2-</sup>, S<sub>2</sub>O<sub>3</sub><sup>2-</sup>, NO<sub>2</sub><sup>-</sup>, CH<sub>3</sub>COO<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, I<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>

,C<sub>2</sub>O<sub>4</sub><sup>2-</sup>, PO<sub>4</sub><sup>3-</sup>.

2. Inorganic preparations:

- (a) Cuprous chloride
- (b) Manganese (II) phosphate

Reference Book:

1. Vogel, A.I. A text book of Quantitative Analysis, ELBS 1986.

SUBJECT NAME: ORGANIC CHEMISTRY-III SUBJECT CODE: BCH-222

#### UNIT-1: ALCOHOLS

Monohydric alcohols—nomenclature, methods of formation by reduction of aldehydes, ketones, Carboxylic acids and esters. Hydrogen bonding. Acidic nature, Reactions of alcohols. Dihydric alcohols- nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [ $\text{Pb}(\text{OAc})_4$  and  $\text{HIO}_4$  ] and pinacol-pinacolone rearrangement.

#### UNIT-2:EPOXIDES

Synthesis of epoxides, acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

#### UNIT-3: PHENOLS

Nomenclature, structure and bonding, preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols — electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe's reaction and Schotten and Baumann reactions.

#### UNIT-4: CARBOXYLIC ACIDS

Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength, Preparation of carboxylic acids. Reactions of carboxylic acids. Hell- Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides, reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of halo acids. Hydroxy acids: malic, tartaric and citric acids. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Industrial manufacture of acetic acid and benzoic acid (flow sheet diagram). Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents.

#### UNIT-5: CARBOXYLIC ACID DERIVATIVES

Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides, relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution, Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and hydrolysis (acidic and basic).

#### Reference Books:

- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Acheson, R.M. Introduction to the Chemistry of Heterocyclic compounds, John Welly & Sons (1976).
- Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.
- Kalsi, P. S. Textbook of Organic Chemistry 1st Ed., New Age International (P)

SUBJECT NAME: ORGANIC CHEMISTRY LAB-III SUBJECT CODE: BCH-272

1. Systematic identification (detection of extra elements, functional groups, determination of melting point or boiling point and preparation of at least one pure solid derivative) of the following simple Compound: Naphthalene, anthracene, acenaphthene, benzyl chloride, p-dichlorobenzene, m- dinitrobenzene, p-nitrotoluene, resorcinol, hydroquinone,  $\alpha$ -naphthol,  $\beta$ -naphthol, benzophenone, ethyl-methyl ketone, benzaldehyde, vanillin.
2. To find out equivalent weight of acid (neutralization and silver salt method).

#### Reference Books

- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
- Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry,

5th Ed., Pearson (2012)

- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
- Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).

SUBJECT NAME: DIFFERENTIAL EQUATIONS-I ( GENERAL ELECTIVE) SUBJECT CODE: BMA-230

UNIT 1: Geometrical meaning of a differential equation. Exact differential equations, integrating factors. First order higher degree equations solvable for x, y, p Lagrange's equations, Clairaut's equations. Equation reducible to Clairaut's form.

UNIT-2: Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Equations reducible to homogeneous equation.

UNIT -3: Method of variations of parameters. Method of undetermined coefficients. Reduction of order of a differential equation. Linear differential equations of second order: Reduction to normal form.

UNIT-4: Transformation of the equation by changing the dependent variable/ the independent variable. Solution by operators of non-homogeneous linear differential equations.

UNIT-5: Ordinary simultaneous differential equations. Solution of simultaneous differential equations involving operators  $x (d/dx)$  or  $t (d/dt)$  etc. Simultaneous equation of the form  $dx/P = dy/Q$

$= dz/R$ . Total differential equations. Condition for  $Pdx + Qdy + Rdz = 0$  to be exact. General method of solving  $Pdx + Qdy + Rdz = 0$  by taking one variable constant.

Reference Books:

1. B.Rai & D.P. Chaudhary : Ordinary Differential Equations; Narosa, Publishing House Pvt. Ltd.
2. D.A. Murray : Introductory Course in Differential Equations. Orient Longman (India)

SUBJECT NAME: ENTREPRENEURSHIP DEVELOPMENT SUBJECT CODE: BA-272-A

## OBJECTIVES

1. It provides exposure to the students to the entrepreneurial cultural and industrial growth so as to prepare them to set up and manage their own small units.
2. Creates a pre-understanding and a foundation for which the students can be tested in theoretical insight, understanding and critical thinking.
3. The students solve a specific innovation challenge and apply their knowledge into actual action that creates value for others.

UNIT I INTRODUCTION: The Entrepreneur: Definition, Emergence of Entrepreneurial Class; Theories of Entrepreneurship.

### UNIT 2 PROMOTION OF A VENTURE:

Opportunity Analysis; External Environmental Analysis Economic, Social and Technological; Competitive factors; Legal requirements of establishment of a new unit and Raising of Funds; Venture Capital Sources and Documentation Required.

### UNIT 3 ENTREPRENEURIAL BEHAVIOUR:

Innovation and Entrepreneur; Entrepreneurial Behaviour and Psycho-theories, Social responsibility. Entrepreneurial Development Programmes (EDP): EDP, Their Role, Relevance and Achievements; Role of Government in Organizing EDP's Critical Evaluation.

### UNIT 4 ROLE OF ENTREPRENEUR:

Role of an Entrepreneur in Economic Growth as an Innovator, Generation of Employment Opportunities, Complimenting and Supplementing Economic Growth, Bringing about Social Stability and Balanced Regional Development of Industries: Role in Export Promotion and Import Substitution, Forex Earnings.

### Text Books:

1. Hisrich, Robert and Peters, Michael, (2002), Entrepreneurship, 5th Edition, McGrawHill Education.
2. Charantimani, (2006), Entrepreneurship Development and Small Business Enterprise, 1st edition, Pearson Education.

### Reference Books:

1. Chandra, Ravi, (2003), Entrepreneurial Success: A Psychological Study, Sterling Publication Pvt. Ltd., New Delhi.
2. Balaraju, Theduri, (2004), Entrepreneurship Development: An Analytical Study, Akansha Publishing House, New Delhi.
3. David, Otes, (2004), A Guide to Entrepreneurship, Jaico Books Publishing House, Delhi.
4. Kaulgud, Aruna, (2003), Entrepreneurship Management, Vikas Publishing House, Delhi.

SUBJECT NAME- ELEMENTARY MATHEMATICS-I

COURSE CODE- BMA-231

### UNIT-1: SEQUENCE AND SERIES:

Arithmetic Progression (A.P.), Arithmetic Mean (A.M.), Geometric Progression (G.P.), general term of a G.P., sum of n terms of a G.P. Arithmetic and geometric series, infinite G.P. and its sum, geometric mean (G.M.). Relation between A.M. and G.M. Sum to n terms of the special series :  $\sum n$ ,

$\sum n^2$  and  $\sum n^3$ .

### UNIT-2: MATRICES

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). (Here all matrices will have real entries).

### UNIT-3: DETERMINANTS

Determinant of a square matrix (up to  $3 \times 3$  matrices), properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse

of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

#### UNIT-4: DIFFERENTIATION

Differentiability, derivative of composite functions, chain rule, , derivative of implicit function. Concepts of exponential, logarithmic functions. Derivatives of  $\log_e X$  and  $e^X$ . Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.

Rate of change, maxima and minima. Simple problems

#### UNIT-5: INTEGRALS

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts. Definite integrals as a limit of a sum. Fundamental Theorem of

Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals. Applications in finding the area under simple curves

#### TEXT BOOKS/REFERENCE BOOKS:

1. R.D SHARMA FOR CLASS 11th AND 12TH MATHEMATICS
2. R.S . AGRAWAL FOR CLASS 12TH MATHEMATICS
3. PRADEEP'S REFERENCE BOOK FOR CLASS 11TH

SUBJECT NAME: COMPUTER FOR CHEMISTS

SUBJECT CODE: BCS-201



## UNIT – 1: INTRODUCTION TO INTERNET

World Wide Web and concepts of website, web pages etc. Client – Server Architecture, The idea of hypertext and hyper media: how the web works: HTTP, HTML and URLs; how the browser works: MIME types, plug-ins and helper applications, standards, Introduction to HTML, XML, XHTML and the W3C.

## UNIT –2 : HYPERTEXT MARKUP LANGUAGE

HTMLS: The anatomy of an HTML document; marking up for structure and style: basic page markup, ordered and unordered list, Structuring content with HTML using natural divisions, Marquee text with or without background with attributes, Working with Links Internal Links: Anchor Link, Email Link; embedding images, table creation: Table attributes Colspan, Rowspan, Table Border, Align, Valign, Table background image, Nesting tables, Frames and Nesting, iframes, forms, Semantic elements of HTMLS, Media tags in HTMLS.

## UNIT – 3 : CASCADING STYLE SHEET

Introduction to Cascading Style Sheet: Selector, Declaration and declaration block. Types of CSS – Inline and Internal style specifications within HTML; external linked style specification using CSS, page and site design considerations. Types of Selector: Universal, Class and ID Selector, Building & Applying Class Selectors, ID Selector using Div Tags and span tag.

## UNIT – 4 : CLIENT SIDE PROGRAMMING:

Introduction to JavaScript syntax: output, Comments, variables, functions, operators, conditions, switch, loop. JavaScript object model: Window, Location and History object model; HTML DOM: Introduction to DOM: methods, event handling, navigation, Forms validation.

## UNIT – 5 : TESTING WEB APPLICATION

Introduction, Fundamentals, Terminology, Quality characteristics, test objectives, test levels, Test Methods and Techniques, Link Testing, Browser Testing, Usability Testing Load, stress and continuous testing; Testing Security; Test automation; Benefits and drawbacks of automation testing.

Semester IV

SUBJECT NAME: PHYSICAL CHEMISTRY-IV SUBJECT CODE: BCH-223

### UNIT-1 THERMODYNAMICS

Second law of thermodynamics. Need of the law, Concept of entropy, entropy as a state function of V and T, entropy as a function of P and T. Entropy change in physical processes. Entropy as criteria of Spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases, work function, Gibb's free energy function. Gibbs function (G) and Helmholtz function (A) as thermodynamic function. Criteria of spontaneity of reversible processes in terms of enthalpy change, entropy change, work function and free energy function.

### UNIT-2 COLLOIDAL STATES

Colloids, classification of colloids, solids in liquids (sols) properties: Kinetic, optical and Electrical, stability of colloids, protective colloids, Hardy-schulze Rule, gold number, Emulsion types of emulsion and their preparation, Emulsifier. Gels (liquid in solids): Classification and properties, General application of colloids.

### UNIT-3 CRITICAL PHENOMENON

Critical temperature, critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Vander Waal's equation, relationship between critical constants and Vander Waal's constants. Critical compressibility factor, the law of corresponding states. Liquefaction of gases.

### UNIT-4 NUCLEAR CHEMISTRY:

Radioactivity, Properties of radiation, detection & measurement of radioactivity, types of radioactive decay, Group displacement law, rate of radioactive decay, half life, calculation of half life, radioactive dating, nuclear reactions: nuclear fission and nuclear fusion reaction. Nuclear binding energy.

## UNIT-5 CHEMICAL BONDING:

Covalent bonding, valence bond and molecular orbital approaches, LCAO-MO treatment of  $H_2$ . Bonding and antibonding orbitals. Qualitative extension to  $H_2$ . Comparison of LCAO-MO and VB

treatments of  $H_2$  (only wavefunctions, detailed solution not required) and their limitations. Refinements of the two approaches (Configuration Interaction for MO, ionic terms in VB). Qualitative description of LCAO-MO treatment of homonuclear and heteronuclear diatomic molecules ( $HF$ ,  $LiH$ ).

### Reference Books:

- Atkins, P.W & Paula, J.D. Physical Chemistry, 9th Ed., Oxford University Press (2011).
- Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
- Mortimer, R. G. Physical Chemistry 3rd Ed., Elsevier: NOIDA, UP (2009).
- Barrow, G. M., Physical Chemistry 5th Ed., Tata McGraw Hill: New Delhi (2006).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- Rogers, D. W. Concise Physical Chemistry Wiley (2010).
- Silbey, R. J.; Alberty, R. A. & Bawendi, M. G. Physical Chemistry 4th Ed., John Wiley & Sons, Inc. (2005).

SUBJECT NAME: PHYSICAL CHEMISTRY LAB- IV SUBJECT CODE: BCH-273

1. To determine the enthalpy of neutralization of strong acid/ strong base.
2. To determine the enthalpy of ionization of ethanoic acid.
3. To determine the solubility of benzoic acid in water at room temperature.
4. Determination of enthalpy of hydration of  $CuSO_4$ .

5. Determination of basicity of polyprotic acid by thermochemical methods in terms of change of temperature observed in the graph.
6. Determination of heat capacity of calorimeter and integral enthalpy (Endothermic & Exothermic).
7. To determine parachor value of  $-\text{CH}_2$  group.
8. To determine the viscosity index of given oil by Redwood viscometer-I

Reference Books:

- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

SUBJECT NAME: ORGANIC CHEMISTRY-IV SUBJECT CODE: BCH-225

UNIT-1: ORGANOMETALLIC COMPOUNDS

Reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions. Organo lead compounds: formation and chemical reactions. Organo cadmium compounds: formation and chemical reactions. Organo copper compounds: formation and chemical reactions

UNIT-2: ORGANOSULPHUR COMPOUNDS

Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. Synthetic detergents alkyl and aryl sulphonates. UNIT-3: ORGANO PHOSPHORUS COMPOUNDS

Nomenclature, Trivalent phosphorus compounds - trialkyl and triaryl phosphine (method of formation and reactions), Pentavalent phosphorus compounds, organic phosphoranes, phosphorus ylides, wittig reaction. Biological role of phosphorus.

UNIT-4: HETEROCYCLIC COMPOUNDS

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives.

Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed five and six- membered heterocycles.

#### UNIT-5: ORGANIC SYNTHESIS VIA ENOLATES

Acidity of hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3-dithianes. Alkylation and acylation of enamines.

SUBJECT NAME: ORGANIC CHEM LAB-IV SUBJECT CODE: BCH-275

1. Systematic identification (detection of extra elements, functional groups, determination of melting point or boiling point and preparation of at least one pure solid derivative ) of the following simple mono and bifunctional organic compounds. oxalic acid, succinic acid, benzoic acid, salicylic acid, aspirin, phthalic acid, cinnamic acid, benzamide, urea, acetanilide, benzamide, aniline hydrochloride, p-toluidine, phenyl salicylate(salol), glucose, fructose, sucrose, o-,m-, p-nitroanilines, thiourea.
2. Estimation of phenol (bromide- bromate method) and aniline (bromide-bromate and acetylation method).

Reference Books:

- Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.
- Arthur, I. V. Quantitative Organic Analysis, Pearson.

SUBJECT NAME: ANALYTICAL CHEMISTRY SUBJECT CODE: BCH-226

UNIT-I INTRODUCTION:

Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements. Presentation of experimental data and results, from the point of view of significant figures.

#### UNIT-II ANALYSIS OF SOIL & WATER:

Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators a. Determination of pH of soil samples. b. Estimation of Calcium

and Magnesium ions as Calcium carbonate by complexometric titration. Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods..

#### UNIT-III ANALYSIS OF FOOD PRODUCTS:

Nutritional value of foods, idea about food processing and food preservations and adulteration. a. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc.

#### UNIT-IV CHROMATOGRAPHY:

Definition, general introduction on principles of chromatography, paper chromatography, TLC etc. a. Paper chromatographic separation of mixture of metal ion ( $\text{Fe}^{3+}$  and  $\text{Al}^{3+}$ ). b. To compare paint samples by TLC method. Ion-exchange: Column, ion-exchange chromatography etc.

#### UNIT-V ANALYSIS OF COSMETICS:

Major and minor constituents and their function a. Analysis of deodorants and antiperspirants, Al, Zn, boric acid, chloride, sulphate. b. Determination of constituents of talcum powder: Magnesium oxide, Calcium oxide by complexometric titration.

SUBJECT NAME: MANAGERIAL SKILLS COURSE CODE: BA- 264A

UNIT-1 SKILL DEVELOPMENT

Writing Business Letter, Official letters, 7C's & 4'S in Communication , Report writing , Skills, Presentation Skills , Communication : Concept, Types , process, barriers, making Communication effective.

MANAGERIAL CREATIVITY- Business Process Re-engineering - Concept , Process, Redesign, BPR, experiences in Indian Industry , Total Quality Management(TQM) - Concept , Systems model of Quality, Deming's approach, TQM as a business Strategy .

## UNIT-2 TECHNOLOGY LED DEVELOPMENT

Knowledge Management (KM)- What , why, how, of Knowledge Management , KM process , approach, strategies, tools. E-commerce- Ideology, methodology, classification by application /nature of transactions , Driving Forces of EC, Impact of EC, Scope

## UNIT-3 LEADERSHIP FOR MANAGERS

Concept, Traits, Styles, Types of leadership, Leadership for managers-varied case studies for identifying and imbibing leadership attributes.

Selling & Negotiation Skills-Types of Negotiation , Negotiation Strategies ,Selling skills – Selling to customers , Selling skills – Body language, Conceptual selling, Strategic selling

## UNIT-4 CONFLICT MANAGEMENT

Conflict Management - Types of conflicts and Conflict Management, Coping strategies and Conflict Management, Conflict Management Styles

## UNIT-5 POSITIVE THINKING

Attitudes, Beliefs, Positive thinking – Martin Seligman's theory of Learned Helplessness , Learned Optimism, Case Studies and Presentations.

## References

1.Stoner, Freeman , Gilbert Jr. : Management (Pearson education) 2.Kootz,O'Donnell , Weighrich : Essentials of Management

3. Michael , J. Stahl : Management -Total Quality in a global environment ( Blackwell Business) 4.Newman , Warren and Summer : The Process of Management , Concept, Behaviour & Practice.

SUBJECT NAME: ELEMENTARY MATHEMATICS-II ( GENERAL ELECTIVE)

SUBJECT CODE: BMA-241

#### UNIT-1: PRINCIPLE OF MATHEMATICAL INDUCTION & BINOMIAL THEOREM

Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, General and middle term in binomial expansion, simple applications

#### UNIT-2: MATHEMATICAL REASONING

Mathematically acceptable statements. Connecting words/ phrases - consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words difference between contradiction, converse and contrapositive.

#### UNIT-3: STATISTICS & PROBABILITY

Measures of dispersion; Range, mean deviation, variance and standard deviation of ungrouped/grouped data. Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive



events. Conditional probability, multiplication theorem on probability. independent events, total probability, Baye's theorem, Random variable and its probability distribution, mean and variance of random variable.

#### UNIT-4: VECTORS:

Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Definition, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors.

#### UNIT-5: LINEAR PROGRAMMING:

Introduction, related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible regions (bounded and unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

#### TEXT BOOKS/REFERENCE BOOKS:

1. 12th NCERT Text Book
2. R.D SHARMA FOR CLASS 11th AND 12TH MATHEMATICS
3. R.S . AGRAWAL FOR CLASS 12TH MATHEMATICS
4. PRADEEP'S REFERENCE BOOK FOR CLASS 11TH

SUB: ELEMENT OF MODERN PHYSICS SUBJECT CODE: BPH-224

#### UNIT 1

Planck's quantum, Planck's constant and light as a collection of photons; Blackbody

Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions.

## UNIT 2

Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction. Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude.

## UNIT 3

Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension- across a step potential & rectangular potential barrier.

## UNIT 4

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers

Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.

## UNIT 5

Mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions).

Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. Basic lasing.

#### TEXT BOOKS/REFERENCE BOOKS:

- Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
- Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
- Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education.
- Modern Physics, G.Kaur and G.R. Pickrell, 2014, McGraw Hill
- Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan

#### Additional Books for Reference

- Modern Physics, J.R. Taylor, C.D. Zafiratos, M.A. Dubson, 2004, PHI Learning.
- Theory and Problems of Modern Physics, Schaum's outline, R. Gautreau and W. Savin, 2nd Edn, Tata McGraw-Hill Publishing Co. Ltd.

#### ELEMENTS OF MODERN PHYSICS LAB

Subject Code: BPH-274

1. Measurement of Planck's constant using black body radiation and photo-detector
2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine work function of material of filament of directly heated vacuum diode.
4. To determine the Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the ionization potential of mercury.
7. To determine the absorption lines in the rotational spectrum of Iodine vapour.
8. To determine the value of  $e/m$  by (a) Magnetic focusing or (b) Bar magnet.

Semester V

SUBJECT NAME: PHYSICAL CHEMISTRY-V SUBJECT CODE: BCH-321

### UNIT-I QUANTUM CHEMISTRY-I

Postulates of quantum mechanics, quantum mechanical operators, Schrödinger equation and its application to free particle and “particle-in-a-box” (rigorous treatment), quantization of energy levels, zero-point energy and Heisenberg Uncertainty principle; wave functions, probability distribution functions, nodal properties, Extension to two and three dimensional boxes, separation of variables, degeneracy. Qualitative treatment of simple harmonic oscillator model of vibrational motion: Setting up of Schrödinger equation and discussion of solution and wave functions.

### UNIT-2 QUANTUM CHEMISTRY –II:

Vibrational energy of diatomic molecules and zero-point energy. Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component. Rigid rotator model of rotation of diatomic molecule. Schrödinger equation, transformation to spherical polar coordinates. Separation of variables. Spherical harmonics. Discussion of solution. Qualitative treatment of hydrogen atom and hydrogen-like ions: setting up of Schrödinger equation in spherical polar coordinates, radial part, quantization of energy (only final energy expression). Average and most probable distances of electron from nucleus. Setting up of Schrödinger equation for many-electron atoms (He, Li). Need for approximation methods. Statement of variation theorem and application to simple systems (particle-in-a-box, harmonic oscillator, hydrogen atom).

### UNIT-3 PHOTOCHEMISTRY

Characteristics of electromagnetic radiation, Lambert-Beer's law and its limitations, physical significance of absorption coefficients. Laws, of photochemistry, quantum yield, actinometry, examples of low and high quantum yields, photochemical equilibrium and the differential rate of photochemical reactions, photosensitised reactions, quenching. Role of photochemical reactions in biochemical processes, photostationary states, chemiluminescence

### UNIT-4 MOLECULAR SPECTROSCOPY:

Interaction of electromagnetic radiation with molecules and various types of spectra; Born-Oppenheimer approximation. Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution. Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration, concept of group frequencies. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion.

#### UNIT-5 ELECTRONIC SPECTROSCOPY:

Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation, calculation of electronic transitions of polyenes using free electron model.

Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of NMR spectroscopy, Larmor precession, chemical shift and low resolution spectra, different scales, spin-spin coupling and high resolution spectra, interpretation of PMR spectra of organic molecules.

Electron Spin Resonance (ESR) spectroscopy: Its principle, hyperfine structure, ESR of simple radicals.

#### Reference Books:

- Banwell, C. N. & McCash, E. M. Fundamentals of Molecular Spectroscopy 4th Ed. Tata McGraw-Hill: New Delhi (2006).
- Chandra, A. K. Introductory Quantum Chemistry Tata McGraw-Hill (2001).
- House, J. E. Fundamentals of Quantum Chemistry 2nd Ed. Elsevier: USA (2004).
- Lowe, J. P. & Peterson, K. Quantum Chemistry, Academic Press (2005).
- Kakkar, R. Atomic & Molecular Spectroscopy, Cambridge University Press (2015).

1. To determine the refractive index of given liquid and calculation of specific and molar refractivity.
  2. Determination of concentration of binary mixture by measurement of refractive index.
  3. Setting of a Galvanic Cell and determination of cell voltage.
  4. To verify Lambert-beer Law for  $\text{KMnO}_4$  solution & determine the conc. of given unknown solution
  5. To verify Lambert-beer Law for  $\text{CuSO}_4$  solution & determine the conc. Of given unknown solution of  $\text{CuSO}_4$ .
1. To prepare the following colloidal sol: Arsenious sulphide, Ferric hydroxide sol, Aluminum hydroxide sol.

#### Reference Books

- Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
  - Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

SUBJECT NAME: SPECTROSCOPY AND IMPORTANT ORGANIC COMPOUNDS (DEPARTMENT ELECTIVE)

SUBJECT CODE: BCH-322

UNIT-1:NMR SPECTROSCOPY: Principle of nuclear magnetic resonance,the PMR spectrum,number of signals, peak areas, equivalent and nonequivalent protons positions of signals and chemical shift, shielding and deshielding of protons, proton counting,splitting of signals and coupling constants, magnetic equivalence of protons. Discussion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1, 1-dibromoethane, 1, 1, 2-tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde,

acetophenone, p-anisidine and p-nitrotoluene. Simple problems on PMR spectroscopy for structure determination of organic compounds.

UNIT-2: MASS SPECTROSCOPY: Introduction, instrumentation, mass spectrum, determination of molecular formula, parent peak and base peak, recognition of molecular ion peak, fragmentation pattern of alkanes, alkenes and benzene.

UNIT-3: CARBOHYDRATES: CLASSIFICATION AND NOMENCLATURE-  
Monosaccharides,

mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D (+)-glucose & D (-) fructose. Mechanism of mutarotation.

UNIT-4: CARBOHYDRATES : STRUCTURES OF RIBOSE AND DEOXYRIBOSE.: An

introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) involving structure determination.

UNIT-4 FABRICS: Fabrics – natural and synthetic (acrylic, polyamido, polyester), Rubbers – Fabrics – natural and synthetic (acrylic, polyamido, polyester); Rubbers- natural and synthetic: Buna-

S, Chloroprene and Neoprene; Vulcanization; Polymer additives; Introduction to liquid crystal polymers; Biodegradable and conducting polymers with examples.

Reference Books:

Berg, J.M., Tymoczko, J.L. and Stryer, L. (2006) Biochemistry. VIth Edition. W.H. Freeman and Co. Nelson, D.L., Cox, M.M. and Lehninger, A.L. (2009) Principles of Biochemistry.

IV Edition. W.H. Freeman and Co.

SUBJECT NAME: INORGANIC CHEMISTRY-IV

SUBJECT CODE: BCH-324

UNIT-1: THEORETICAL PRINCIPLES IN QUALITATIVE ANALYSIS:

Basic principles involved in analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II

## UNIT-2: REACTION KINETICS AND MECHANISM

Introduction to inorganic reaction mechanisms. Substitution reactions in square planar complexes, Trans- effect, theories of trans effect, Mechanism of nucleophilic substitution in square planar complexes, Thermodynamic and Kinetic stability, Kinetics of octahedral substitution, Ligand field effects and reaction rates, Mechanism of substitution in octahedral complexes.

## UNIT-3: BIOINORGANIC CHEMISTRY

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals. Sodium / K-pump, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine.

## UNIT-4: ORGANOMETALLIC CHEMISTRY

Definition, Nature of Metal Carbon bond, classification of organometallic compounds by bond types viz. i) covalent ii) Ionic iii) Electron deficient, cluster compounds bond compounds including sandwich derivatives. Structure and bonding in Metal carbonyls, cyclopentadienyl derivative, metal-

ethylenic, metal-acetylenic complexes, Applications of organometallic compounds as homogeneous catalysts in hydrogenation, hydroformylation, polymerization, oligomerization and metathesis reactions of alkenes

and alkynes (Ziegler - Natta polymerization of ethylene and propylene).

## UNIT-5 ORGANOMETALLIC COMPOUNDS



VBT. $\pi$ -acceptorbehaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding. Zeise's salt: Preparation and structure, evidences of synergic effect and comparison of synergic effect with that in carbonyls.

Metal Alkyls: Important structural features of methyl lithium (tetramer) and trialkylaluminium (dimer), concept of multicentre bonding in these compounds. Role of triethylaluminium in polymerisation of ethene (Ziegler – Natta Catalyst). Species present in ether solution of Grignard reagent and their structures, Schlenk equilibrium. Wacker Process, Synthetic gasoline (Fischer Tropsch reaction) Synthesis gas by metal carbonyl complexes.

SUBJECT NAME: INORGANIC CHEM LAB-IV SUBJECT CODE: BCH-374

1. Determination of acetic acid in commercial vinegar using NaOH
2. Determination of alkali content - antacid tablet using HCl
3. Estimation of calcium content in chalk as calcium oxalate by permanganometry.
4. Gravimetric Analysis
  - (i) Aluminium as oxinate
  - (ii) Mg as  $\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$
  - (iii) Ba as  $\text{BaSO}_4$
4. Synthesis of
  - (a) Sodium hexa nitritocobaltate (III) (b) Sodium ammonium hydrogen phosphate

SUBJECT NAME: ORGANIC CHEMISTRY-V SUBJECT CODE: BCH-325

#### UNIT-1:FATS, OIL AND DETERGENTS:

Occurrence, chemical composition and importance, hydrogenated oils, Rancidity, acid value, saponification and iodine numbers, difference between toilet and washing soaps, comparison of soap and detergents, classification and principle of cleansing action of detergents.

#### UNIT-2:POLYMERS:

Polymers, Classification on the basis of source, repeating units, sequences, method of polymerization, intermolecular interactions, atoms present. Mechanism of polymersisation. Synthesis of polymers: Nylon-6,6.; Perlon, Dacron, PAN, PVC. Natural rubber, synthetic rubber, vulcanization; Plastics; resins

### UNIT-3: ALKALOIDS

Natural occurrence, General structural features, Isolation and their physiological action

Hoffmann's exhaustive methylation, Emde's modification, Structure, Medicinal importance elucidation and synthesis of Nicotine, cocaine, atropine.

### UNIT-4: DRUGS

Introduction, structure and use of methylene blue, Prontosil, use of pronyosil in synthesis of other sulpha drugs. Synthesis, structure and uses of sulphadiazine, mode of action of p-aminobenzenesulphonamide on bacteria.

### UNIT-5: SYNTHETIC DYES

Color and constitution (electronic concept). Classification of dyes. Chemistry and synthesis of Methyl orange, Congo red, and Malachite green, Crystal violet, Phenolphthalein, Fluorescein, Alizarin and Indigo.

#### Reference Books:

- Kalsi, P. S. Textbook of Organic Chemistry 1st Ed., New Age International (P) Ltd. Pub.
- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Billmeyer, F. W. Textbook of Polymer Science, John Wiley & Sons, Inc.
- Gowariker, V. R.; Viswanathan, N. V. & Sreedhar, J. Polymer Science, New Age International (P) Ltd. Pub.

- Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.
- Clayden, J.; Greeves, N.; Warren, S.; Wothers, P.; Organic Chemistry, Oxford University Press.

SUBJECT NAME: ORGANIC CHEMISTRY LAB-V SUBJECT CODE: BCH-375

Determination of :

- (a) Acid value: Resin, Plasticizers
- (b) Iodine number : Linseed oil, Castrol oil
- (c) Saponification value: coconut oil, polyester.

Synthesis of the following organic compounds:

- (a) p-Nitroacetanilide from acetanilide and its hydrolysis to p-nitroaniline.
- (b) Phthalimide from phthalic anhydride and its rearrangement to anthranilic acid.
- (c) Benzanilide from benzophenone.

Synthesis of urea-formaldehyde and phenol-formaldehyde resin. Paper Chromatography

Determination of R<sub>f</sub> values and identification of organic compounds

- (a) Separation of a mixture of phenylalanine and glycine. Alanine and aspartic acid. Leucine and glutamic acid . Spray reagent-ninhydrin.
- (b) Separation of mixture of D,L-alanine, glycine and L-leucine using n-butanol : acetic acid water (4:1:5 ). Spray reagent-ninhydrin.

Reference Books:

- Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).
- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
- Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).

## Semester VI

### POLYMER CHEMISTRY : DEPARTMENTAL ELECTIVE

SUBJECT CODE: BCH-326

#### UNIT 1: INTRODUCTION AND HISTORY OF POLYMERIC MATERIALS

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers. Functionality and its importance: Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bifunctional systems, Poly-functional systems.

#### UNIT 2: KINETICS OF POLYMERIZATION

Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

Crystallization and crystallinity: Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

#### UNIT 3: NATURE AND STRUCTURE OF POLYMERS

Structure Property relationships. Determination of molecular weight of polymers ( $M_n$ ,  $M_w$ , etc) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index. Glass transition temperature ( $T_g$ ) and determination of  $T_g$ , Free volume theory, WLF equation, Factors affecting glass transition temperature ( $T_g$ ).

#### UNIT 4: POLYMER SOLUTION

Criteria for polymer solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and free energy change of mixing of polymers solutions, Flory- Huggins theory, Lower and Upper critical solution temperatures.

#### UNIT 5: PROPERTIES OF POLYMERS

Physical, thermal, Flow & Mechanical Properties. Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene and styrene copolymers, poly(vinyl chloride), poly(vinyl acetate), acrylic polymers, fluoro polymers, polyamides. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [polyacetylene, polyaniline].

#### List of Text Books:

- Seymour's Polymer Chemistry, Marcel Dekker, Inc.
- G. Odian: Principles of Polymerization, John Wiley.
- F.W. Billmeyer: Text Book of Polymer Science, John Wiley.

#### List of Reference Books

- P. Ghosh: Polymer Science & Technology, Tata Mcgraw-Hill.
- R.W. Lenz: Organic Chemistry of Synthetic High Polymers.

FUEL CHEMISTRY (DEPARTMENTAL ELECTIVE) SUBJECT CODE: BCH-327

#### UNIT-1: LUBRICANTS & LUBRICANTS

Introduction, Mechanism of lubrication: fluid film, boundary lubrication and extreme pressure lubricants, Classification of lubricants: Solid, semi-solid, liquid and emulsion, synthetic lubricants and additives for lubricants.

#### UNIT-2 PROPERTIES OF LUBRICANTS

Properties of lubricants: Flash & Fire point, Saponification number, Iodine value, Acid value , Viscosity and Viscosity index, Aniline point, Cloud point and pour point, Corrosive Tendency, Specific gravity, Volatility, oiliness, Emulsification, decomposition stability and carbon residue of lubricants

### UNIT-3: COAL AS ENERGY RESOURCES

Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value, Characteristics of good fuel, Comparison between solid, liquid and gaseous fuel, BOMB calorimeter, Coal, Classification of coal, Uses of coal in various industries, Selection of coal, analysis of coal, carbonization of coal. Pulverized coal and Metallurgical coal.

### UNIT- 4 PETROLEUM

Petroleum, Cracking, Fractionation Distillation, Cracking: Thermal & Catalytic Cracking, Refining of gasoline, Synthetic petrol and methods of polymerization for synthetic petrol, Reforming: Thermal and Catalytic reforming, Knocking, Improvement in anti knocking properties.

### UNIT-5: FUELS

Diesel Engine fuel, Kerosene & LPG as fuel, Non petroleum fuels, Natural gas, Coal gas, Oil gas Water gas/ Blue gas, Non- conventional source of energy, Biomass, Biogas, Combustion, Analysis of fuel gas.

#### Reference Books:

- Fuels and fuel-additives. S.P. Srivastava & Jeno Hancsok. Willey.
- The chemistry of Hydrocarbon fuels. Harold H. Schobert. Science Direct.
- The chemistry and technology of petroleum. J.G. Speight.
- The chemistry and technology of coal. James Speight.

### SYLLABUS FOR M.SC. (CHEMISTRY) SEMESTER I

#### INORGANIC CHEMISTRY-I:

## Unit-I Organometallic Chemistry:

Basic concept of organometallic chemistry, Metal carbonyl, Phosphine's, alkenes, alkynes & allyl complexes. Hydride, carbenes, carbynes, metallocene, metal arenes complexes.

Fluxionality in Organometallic compound.

## Unit-II Organometallic Chemistry:

Homogeneous & Heterogeneous catalysis: Oxidative addition & reductive elimination, Insertion reaction, Agostic Interaction, Hydroformylation, Zeigler Natta catalyst, Wilkinson catalyst, Syntheses gas. Monsanto process & Wacker process, catalytic.

## Unit- III Inorganic Reaction mechanism:

Mechanism of substitution reaction of tetrahedral, trigonal bipyramidal, square planar & octahedral complexes. Potential energy diagram. Factors affecting reactivity of square planar complex. Trans effect & its application to synthesis of complexes.

## Unit-IV Molecular rearrangement Process:

Electron transfer reaction: outer & inner sphere complexes formation & rearrangement, Nature of bridging ligands, fission of successor complex, two electron transfers, syntheses of coordination compounds using electron transfer reaction.

## Unit-V Bioinorganic Chemistry:

Basic Introduction (Porphyrin Ring, metallo porphyrin ring), oxygen transport & oxygen storage system (Hemoglobin, myoglobin, hemocyanin, Hemerythrin), Metalloenzyme- CAE, CP, LADH, Xanthine

Oxidase, Tyrosine, Cytochrome -C, Cyt-P-450, Vitamin B-12, Coenzyme-12. Electron transfer protein, Fe-Sulphur protein, cytochrome. Metal storage & metal transfer system ferritin, transferrin.

#### Reference Books:

1. Principle of Bioinorganic chemistry – Lippard and Berg, Univ. Science Books, 1994.
2. Bio-coordination chemistry – Fenton, Oxford chemistry primer, 1995.
3. Bioinorganic chemistry: Inorganic perspective in the chemistry of Life, Kaim and Schwederski, 1994.
4. Inorganic chemistry – Shriver, Atkins, and Langford, 1994.
5. Bioinorganic Chemistry – Bertini, Gray, Lippard and Valentine Viva books Pvt. Ltd. 1998.

#### PRACTICAL INORGANIC CHEMISTRY-I:

1. Preparation of Hexaamminecobalt(III) chloride
2. Synthesis of CHLOROPENTAAMMINECOBALT(III) CHLORIDE
3. Preparation of Chloropentaamminecobalt (III) chloride
4. To determine the molar conductance of  $[\text{Co}(\text{NH}_3)_5]\text{Cl}_3$ , and  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$  by measuring conductivity of these compounds.
5. To determine the number of chloride ions in the  $[\text{Co}(\text{NH}_3)_5]\text{Cl}_3$  and  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ .
6. Synthesis of trans-dichlorobis (ethylenediamine) cobalt (III) Chloride
7. Synthesis of cis-Dichlorobis(ethylenediamine)cobalt (III) Chloride

#### ORGANIC CHEMISTRY-I:

##### Unit-1: Stereochemistry-I:

Molecular Symmetry and Chirality: Symmetry operations and elements, point groups and symmetry number

Stereoisomerism: classification, racemisation, molecules with one, two or more chiral centres, DL, RS and EZ nomenclature. Planar and axial chirality. Stereochemistry of allenes, spiranes,



alkylidene cycloalkanes, adamantanes, catenanes, biphenyls(atropisomerism), bridged biphenyls and cyclophanes.

#### Unit-1 Stereochemistry-II:

Topicity and prostereoisomerism: topicity of ligands and faces and their nomenclature, stereogenicity, pseudoasymmetry, stereogenic and prochiral centres.

Simple chemical correlation of configurations with examples, quasiracemates  
Cyclostereoisomerism: configuration, conformation, stability of cyclohexanes(mono, di and tri-substituted), cyclohexenes, cyclohexanones, halocyclohexanones.

Asymmetry induction: Cram's, prelog's and Horeau's rules; Dynamic stereochemistry (acyclic and cyclic) Curtin-Hammett Principle, circular dichromism and cotton effect.

#### Unit-3 Study of reactive intermediates-I:

Linear free energy relationships and their applications (Hammett equation and modifications)  
Carbocations: Classical and non-classical, NGP (Neighbouring group participation), ion- pairs, molecular rearrangements in acyclic, monocyclic and bicyclic systems, stability and reactivity of bridged-head carbocations.

#### Unit-4 Carbanions:

Generation, structure and stability, ambident ions and their general reactions; HSAB principle and its application

Radicals: Generation, structure and stability and reactions, radical cations and anions.

#### Unit-5 Carbenes:

Formation and structure, reactions involving carbenes and carbenoids. Nitrenes: Formation, structure, reactions of nitrenes

Nucleophilic aromatic substitution: Benzyne. S<sub>N</sub>Ar and S<sub>RN</sub>1 mechanisms; Ipso effect.

#### Reference Books:

1. F. A. Carey and R. A. Sundberg, Advanced Organic Chemistry, Part B: Reactions and Synthesis, 5th edition, Springer, New York, 2007.
2. W. Carruthers and I. Coldham, Modern methods of Organic Synthesis, First South Asian Edition 2005, Cambridge University Press.
3. J. March and M. B. Smith, March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, 6th Edition, Wiley, 2007.
4. I. Fleming, Frontier Orbitals and Organic Chemical Reactions, Wiley, London, 1976.
5. S. Sankararaman, Pericyclic Reactions- A text Book, Wiley VCH, 2005.

#### PRACTICAL ORGANIC CHEMISTRY-I:

- I) Qualitative analysis of mono and bifunctional compounds.
- II) Small Scale organic synthesis using one of the following reactions:
  - i) Acylation reaction
  - ii) Bromination and bromine addition
  - iii) Diazotization reactions
  - iv) Coupling reactions.

#### PHYSICAL CHEMISTRY-I:

and uncertainty principles. Differential equations, partial differential equations, series solutions and special functions, linear vector spaces, transformations of coordinate matrix, representation of operators, eigenvalue problem, orthonormal sets Fourier and Laplace transforms.

#### Unit-II Some exactly soluble problems:

Particle in a box and ring. Concept of degeneracy and Jahn-Teller distortion. Simple harmonic oscillator problem and its solution using series solutions or factorization method. Calculation of various average values using ladder operators and recursion relations of Hermite polynomials.

Angular momentum operators. Eigenvalues and eigenfunctions. Ladder operators. Rigid rotator and hydrogen atom: Complete solution. Radial distributions. Virial theorem.

Unit-III HMO method and its applications:

$\pi$ -Electron approximation, Huckel molecular orbital theory of conjugated systems, calculation of properties- delocalization energy, electron density, bond order, alternant and nonalternant hydrocarbons, pairing theorem.

Unit-IV Approximate methods-I:

First order time-independent perturbation theory for non degenerate states. Variation theorem and variational methods. Use of these methods illustrated with some examples (particle in a box with a finite barrier, anharmonic oscillator, approximate functions for particle in a box and hydrogen atom).

Unit-V Approximate methods-II:

Ground and excited state of helium atom. Pauli's exclusion principle. Many-electron atoms. Concept of spin and determinantal wave functions.

Reference Books:

1. P. W. Atkins and R. S. Friedman, Molecular Quantum Mechanics, Oxford University Press, Oxford, 2004. (Must for Quantum Chemistry basics)
2. Quantum Chemistry by RK Prasad
3. Quantum Chemistry by Era Levine (For Advance Quantum Chemistry)
4. Introduction to Quantum Chemistry by Clifford Dykstra
5. Elementary Quantum Chemistry by Frank Pilar, Mineola, N.Y. Dover, 2001
6. Quantum chemistry and spectroscopy by Thomas Engel, Pearson/Benjamin Cummings, c 2006
7. Quantum chemistry : fundamentals to applications by Tamás Veszprémi , Kluwer Academic/Plenum, 1999.
8. J. P. Lowe and K. Petersen, Quantum Chemistry, Elsevier Academic Press, MA, USA, 2006

PRACTICAL PHYSICAL CHEMISTRY-I:

### Chemical kinetics:

1. Determine the specific rate constant for the acid catalysed hydrolysis of methyl acetate by the initial rate method. Study the reaction at two different temperatures and calculate the thermodynamic parameters.
  2. Study the saponification of ethyl acetate with sodium hydroxide volumetrically.
- Conductometry:

1. Determine the cell constant of the given conductivity cell at room temperature and study the equivalent conductance versus square root of concentration relationship of a strong electrolyte (KCl or NaCl) and weak electrolyte (acetic acid).
  2. Determine the equivalent conductance at infinite dilution for acetic acid by applying Kohlrausch's law of independent migration of ions.
  3. Determine the equivalent conductance, degree of dissociation and dissociation constant ( $K_a$ ) of acetic acid.
  4. Study the conductometric titration of acetic acid vs. sodium hydroxide Potentiometry:
1. Prepare and test Calomel electrode.
  2. Titrate hydrochloric acid and sodium hydroxide potentiometrically.
  3. Determine the dissociation constant of acetic acid potentiometrically.
  4. Titrate oxalic acid and sodium hydroxide potentiometrically.

### SEMESTER II

#### INORGANIC CHEMISTRY-II:

##### Course A: Group Theory and its Applications:

Symmetry elements and symmetry operations, Groups, subgroups, classes and its characteristics, products, classes and application of symmetry operations

Equivalent atoms, equivalent symmetry elements, relation between symmetry elements and operations

Point group classification along with the Optical activity and Dipole moment based applications.

Reducible and irreducible representations, position vector, base vector for representation, character table, Wave functions for irreducible representations (p- and d- block only), Correlation diagram, Russell-Saunders coupling, vibronic coupling, non-centrosymmetric complexes.

Infrared and Raman spectroscopy, SALCs, Hybridization and its applications, LCAO.

Course B: d- and f- block elements:

Russel Saunders state, Term and symbols, CFT and splitting in Td, D4h, C4v systems, Determination of Dq and Racah parameters, Orgel and Tanabe sugano diagrams, electronic absorption spectra ( complex ions), Magnetic properties (Transition metal complexes) Structure and bonding in complexes containing  $\pi$ -acceptor ligands. Spectrochemical and nephelauxetic series.

Reference Books:

1. D. M. P. Mingos and D. J. Wales; Introduction to Cluster Chemistry, Prentice Hall, 1990.
2. N. N. Greenwood and E. A. Earnshaw; Chemistry of elements, Second Edition, Butterworth- Heinemann, 1997.
3. T. P. Fehlner, J. F. Halet and J-Y. Saillard; Molecular Clusters: A Bridge to solid-state Chemistry, Cambridge University press, 2007.
4. B. D. Gupta and A. J. Elias; Basic Organometallic Chemistry: Concepts, Synthesis, and Applications, Universities Press (India), 2010.
5. D. M. P. Mingos, Essential Trends in Inorganic Chemistry, Oxford, University Press, 1998.
6. C. E. Housecroft, Metal-Metal Bonded Carbonyl Dimers and Clusters, Oxford Chemistry Primers (44), Oxford, University Press, 1996.

#### PRACTICAL INORGANIC CHEMISTRY-II:

1. Qualitative analysis of mixtures of inorganic salts including rare earth salts.
2. Quantitative analysis of mixtures of metal ions by complexometric titrations using masking and de masking agents.

#### ORGANIC CHEMISTRY-II:

## Course A: Organic Synthetic methodology:

Reduction Chemistry: Stereochemistry and selectivity of catalytic hydrogenation along with the mechanism, Applications of Lithium aluminium hydride, Sodium borohydride, sodium cyanohydride, alkoxy substituted LAH, DIBAL, diborane, diisooamylborane, thexyborane, 9-BBN as reducing agents, Homogeneous hydrogenation mechanism using Ru and Rh metal complexes along with its applications.

Oxidation Chemistry: Sharpless epoxidation, Applications of DDQ, SeO<sub>2</sub>, Tl(NO<sub>3</sub>)<sub>3</sub>.  
Coupling Reactions with Pd(0) and Pd(II): Stille, Suzuki and Sonogashira coupling, Heck reaction and Negishi coupling.

Reductions: stereochemistry, stereoselection and mechanism of catalytic hydrogenation and metal-liquid ammonia reactions.

## Course B: Spectroscopy:

PMR: Effect of external magnetic field on the spinning nucleus, precessional motion and frequency. Energy transitions, Chemical shift and its measurements. Factors influencing chemical shift, anisotropic effects. Integrals of protons, spin-spin coupling, magnitude of coupling constant. Chemical and magnetic equivalence, proton exchange, factors affecting the coupling-first and non-first order spectra. Simplification of complex spectra and NOE experiments. Applications of PMR in structural elucidation of simple and complex compounds.

CMR: Resolution and multiplicity of <sup>13</sup>C NMR. <sup>1</sup>H-decoupling, noise decoupling, broad band decoupling, deuterium, fluorine and phosphorus coupling. NOE signal enhancement, off-resonance, proton decoupling, structure applications of CMR, DEPT and INEPT experiments. Introduction to 2D-NMR, COSY, HMQC and HETCOR spectra.

ESR: Hyperfine splitting, g-values, ESR spectra of molecules.

MASS: Unit mass and molecular ions, Singly, doubly/multiple charged ions, metastable peak, base peak, isotopic mass peaks, Recognition of M<sup>+</sup> ion peak, Ionization methods (CI, EI and FAB), general fragmentation rules, fragmentation of various classes of organic molecules, McLafferty rearrangement, ESI, APCI and MALDI etc.

#### Reference Books:

1. P. W. Atkins, Molecular Quantum Mechanics, 2nd edition, Oxford University Press, 1983.
2. P. F. Bernath, Spectra of Atoms and Molecules, 2nd Edition, Oxford University Press, 2005.
3. E. B. Wilson, Jr., J. C. Decius and P. C. Cross, Molecular Vibrations: The Theory of Infrared and Raman Spectra, Dover Publications, 1980.
4. W. Demtroder, Molecular Physics, Wiley-VCH, 2005.
5. J. A. Weil and J. R. Bolton, (Eds), Electron Paramagnetic Resonance: Elementary Theory and Practical Applications, Second Edition, Wiley Interscience, John Wiley & Sons, Inc., 2007.
6. A. E. Derome, Modern NMR Techniques for Chemistry Research, Pregamon, 1987.
7. C. P. Slichter, Principles of Magnetic Resonance, Third Edition, Springer-Verlag, 1990.
8. T. C. Farrar and E. D. Becker, Pulse and Fourier Transform NMR, Academic Press, New York, 1971.

#### PRACTICAL ORGANIC CHEMISTRY-II:

- I) Qualitative analysis of mono and bifunctional compounds.
- II) Small Scale organic synthesis using one of the following reactions:
  - i) Oxidation and reduction
  - ii) Condensations
  - iii) Diazotization reactions
  - iv) Acylation reaction

#### PHYSICAL CHEMISTRY-II:

Course A:

Statistical mechanics, thermodynamics, kinetics and macromolecules statistical mechanics and thermodynamics.

Fundamentals:

Concept of distribution. Thermodynamic probability and most probable distribution. Canonical and other ensembles. Statistical mechanics for systems of independent particles and its importance in Chemistry. Types of statistics: Maxwell-Boltzmann. Thermodynamic probability (W) for the three types of statistics. Derivation of distribution laws (most probable distribution) for the three types of statistics. Lagrange's undetermined multipliers. Stirling's approximation, molecular partition function and its importance. Assembly partition function.

Application to ideal gases:

The molecular partition function and its factorization. Evaluation of translational, rotational and vibrational partition function of monatomic, diatomic and polyatomic gases. The electronic and nuclear partition functions. Calculation of thermodynamic properties of ideal gases in terms of partition function. Statistical definition of entropy. Third law of Thermodynamics, Residual entropy.

Macromolecules:

Concepts of number average and mass molecular weights. Methods of determining molecular weights (osmometry, viscometry, sedimentation equilibrium methods). Distribution of chain lengths. Average end-to-end distance.

Course B: Kinetics:

Theories of reaction rates: Collision theory. Potential energy surfaces (basic idea). Transition state theory (both thermodynamic and statistical mechanics formulations). Theory of unimolecular reactions, Lindemann mechanism, Hinshelwood treatment, RRKM model (qualitative treatment).

Solution kinetics:

Factors affecting reaction rates in solution. Effect of solvent and ionic strength (primary salt effect) on the rate constant. Secondary salt effects.



### Electrochemistry:

Solutions: Activity coefficients and ion-ion interactions. Physical significance of activity coefficients, mean activity coefficient of an electrolyte and its determination. Derivation of

Debye-Huckel theory of activity coefficients (both point ion size and finite ion size models). Excess functions.

### Reference Books:

1. P. Atkins and J. Paula, Physical Chemistry, 10th Edition, Oxford University Press, Oxford 2014.
2. D. A. McQuarrie and J. D. Simon, Molecular Thermodynamics, University Science Books, California 2004
3. R. S. Berry, S. A. Rice and J. Ross, Physical Chemistry, 2nd Edition, Oxford University Press, Oxford, 2007
4. D. A. McQuarrie, Statistical Mechanics, University Science Books, California 2005
5. B. Widom, Statistical Mechanics - A Concise Introduction for Chemists, Cambridge, University Press, 2002

### PRACTICAL PHYSICAL CHEMISTRY-II:

#### Chemical kinetics:

1. Compare the strength of hydrochloric acid and sulphuric acid studying the rate of hydrolysis of methyl acetate.
2. Study the kinetics of iodination of acetone in the presence of acid by the initial rate method.

#### Conductometry:

1. Study the conductometric titration of hydrochloric acid with sodium carbonate and determine the concentration of sodium carbonate in commercial sample of soda ash.
2. Study the conductometric titration of acetic acid vs. ammonium hydroxide

3. Study the conductometric titration of sodium acetate vs. HCl

Potentiometry:

1. Prepare and test Calomel electrode.
2. Titrate a mixture of strong and weak acids (Hydrochloric and acetic acids)
3. Titrate a mixture of weak acid (acetic acid) and dibasic acid (oxalic acid)
4. Titrate a mixture of strong acid (hydrochloric acid) and dibasic acid (oxalic acid) versus sodium hydroxide.

## ANALYTICAL CHEMISTRY-I

Course A: Introduction to analytical chemistry:

Scope & objectives, Analytical chemistry and chemical analysis, Classification of analytical methods, Method selection, Sample processing, Steps in a quantitative analysis, Quantitative range (bipartite classification), Data organization, Analytical validations, Limit of detection and limit of quantitation, The tools of analytical chemistry and good lab practices.

Errors in Chemical Analysis and Statistical Evaluation of Data:

Systematic and random errors, Accuracy and precision, Ways of expressing accuracy and precision, Normal error curve and its equation, Propagation of error, Useful statistical test: test of significance, the F test, the student 't' test, the chi-test, the correlation coefficient, confidence limit of the mean, comparison of two standard values, comparison of standard deviation with average deviation, comparison of mean with true values, significant figures, regression analysis (least-square method for linear plots), statistics of sampling and detection limit evaluation.

Course B: Separation Methods:

(a) Multiple liquid-liquid extraction:

Countercurrent extraction, Craig's tube and Craig's apparatus, distribution of single solute, Gaussian treatment in describing distribution pattern of solute fraction in  $r$ th tube after  $n$ -transfers.

(b) Fractional Distillation:

Temperature composition diagram of a binary system, concept of theoretical plates, HETP, Bubble-cap distillation column and derivation of Fenske equation.

(c) Chromatography:

General description of Chromatography, Principle of chromatography, Classifications of chromatography, Techniques of planar and column chromatography, Gas chromatography, High-performance liquid chromatography.

Gas Chromatography:

Introduction, principle of gas chromatography, instruments for gas-liquid chromatography, detectors:- thermal conductivity detector, flame ionization detector, electron capture detector and others, gas chromatographic columns and stationary phases, factors affecting the efficiency of the column, Van-Deemter equation, resolution, retention time and other basic parameters. Interpretation of gas chromatograms. Qualitative analysis, Kovats retention index ( $I$ ), Quantitative analysis, measurement of peak area, response factor; Temperature programming in gas chromatography, Applications of gas chromatography.

High Performance Liquid Chromatography (HPLC):

Basic difference between HPLC and conventional liquid chromatography with respect to sample applications, packing materials and equipments, detectors. Advantages and applications.

Reference Books:

1. Wilson, Ian D.; Adlard, Edward R.; Cooke, Michael; et al., eds. (2000). Encyclopedia of separation science. San Diego: Academic Press. ISBN 978-0-12-226770-3
2. D. A. Skoog, F. J. Holler and S. R. Crouch, Principles of Instrumental Analysis, 6th Edition, Brooks/Cole Cengage Learning, Belmont, CA, 2007
3. H. H. Willard, L. L. Merrin, Jr., J. A. Dean, and F. A. Senle, Jr., Instrumental Methods of Analysis: Wadsworth, 7th Edition, Belmont., 1989

4. F. Rousseac and A. Roessac, Chemical Analysis: Modern Instrumentation Methods and Analysis, 4th Edition, John Wiley & Sons, Ltd., 2000
5. J. Wang, Analytical Electrochemistry, 3rd Edition, Wiley – VCH, 2006
6. P.T. Kissinger and W. R. Heineman, Laboratory Techniques in Electroanalytical Chemistry, 2nd Edition, Marcel Dekker Inc., 1996
7. B. Voigtlaender, Scanning Probe Microscopy: Atomic Force Microscopy and Scanning

## PRACTICAL ANALYTICAL CHEMISTRY-I

1. Determination of accuracy, precision, mean deviation, standard deviation, coefficient of variation, normal error curve and least square fitting of certain set of experimental data in an analysis.
2. Composition of two sets of results in terms of significance (Precision and accuracy) by (I) student's t-test, (ii) F-test.
3. Determination of Fe (III) by chloride extraction in ether.
4. Determination of Fe (III) as the 8-hydroxy quinolate (oxinate) by extraction in chloroform.
5. Separation of  $\text{Cd}^{+2}$  and  $\text{Zn}^{+2}$  quantitatively through an anion exchanger.
6. Separation of nickel, manganese, cobalt and zinc and determination of  $R_f$  values by thin layer or paper strip techniques.
7. Determination of ferrous ammonium sulfate potentiometrically with standard ceric sulfate solution (Direct and back titration).

## M.SC. CHEMISTRY THIRD SEMESTER

### HETEROCYCLIC COMPOUNDS

Unit-I Introduction to heterocycles:

Nomenclature, spectral characteristics, reactivity and aromaticity

Unit-II Synthesis and reactions of three and four membered heterocycles: Aziridine, azirine, azetidine, oxiranes, thiarines, oxetanes and thietanes.

Unit-III Five-membered rings with two heteroatoms:

pyrazole, imidazole, oxazole, thiazole, isothiazole, benzofused analogs.

Unit-IV Chemistry of bicyclic compounds containing one or more heteroatoms.

Benzofused six membered rings with one, two and three heteroatoms: benzopyrans, quinolones, isoquinolines, quinoxalines, acridines, phenoxazines, phenothiazines, benzotriazines, pteridines.

Unit-V Seven and large membered heterocycles:

azepines, oxepines, thiepinines.

Chemistry of porphyrins and spiro heterocycles.

Recommended Texts:

1. "Heterocyclic Chemistry" by J A Joule and K Mills
2. "Name Reactions in Heterocyclic Chemistry" by Jie Jack Li
3. "Advances in Heterocyclic Chemistry" by Alan R Katritzky
4. "Synthesis of some heterocyclic compounds by advanced techniques" by Sandip Sadaphal and Murlidhar Shingare
5. "Heterocyclic Chemistry" by Raj K Bansal
6. "Heterocyclic Chemistry" by GILCHRIST
7. "HETEROCYCLIC CHEMISTRY" by Ahluwalia V K
8. "Heterocyclic Chemistry" by John A Joule and Keith Mills
9. "3000 Solved Problems in Organic Chemistry (Schaum's Solved Problems Series)" by Herbert Meislich and Estelle K Meislich
10. "Heterocyclic Chemistry" by SAINSURY M

Organic Chemistry –III Practical:

1. Qualitative Analysis:

- a) Less common metal ions- Tl, Se, Te, Mo, W, Ti, Zr, U&V
- b) Insolubles- Oxides( $\text{WO}_3$ , Silica, Alumina); Sulphates( Lead Sulphate, Barium Sulphate Strontium Sulphate and Calcium Sulphate);

Halides(Calcium fluoride and silver halides)

(2 less common metal ions and 1 insoluble to be given)

2. Quantitative Analysis:

a) Separation and determination of two metal ions such as Ag- Cu, Cu- Ni, Cu- Zn, Ni- Zn, Cu-Fe etc. involving volumetric and gravimetric methods.

PHYSICAL CHEMISTRY-III

Unit I-Rotational spectroscopy:

Introduction to molecular spectroscopy, Rotational spectroscopy of diatomic molecules based on rigid rotator approximation, Determination of bond lengths and/ or atomic masses from microwave data, effect of isotopic substitution, non-rigid rotator, classification of polyatomic molecules, energy levels and spectra of symmetric top molecules and asymmetric top molecules, First order Stark effect.

Unit II-Vibrational spectroscopy:

Normal coordinate analysis of mononuclear and heteronuclear diatomic molecules, Extension to polyatomic linear molecules, Derivation of selection rules for diatomic molecules based on Harmonic oscillator approximation, Force constants and amplitudes, Anharmonic oscillator, Overtones and combination bands, Dissociation energies from vibrational data, Vibration-rotation spectra, P, Q and R branches, Breakdown of the Born-Oppenheimer approximation, Nuclear spin effect.

Unit III-Raman Spectroscopy:

Stokes and anti-stokes lines, Polarizability ellipsoids, Rotational and Vibrational Raman spectroscopy. Selection rules, Polarization of Raman lines.

Unit IV-Atomic Spectra:

(i) Characterization of atomic states, Microstate and spin factoring methods, Hund's rules, Derivation of spin and orbital selection rules ( based on recursion relations of Legendre polynomials), spectra of complex atoms. Zeeman and Stark effect, Atomic photoelectron spectroscopy.

(ii) Electronic spectroscopy: Diatomic molecules, Selection rules. Breakdown of selection rules, Franck-Condon factors, Dissociation energies, Photoelectron spectroscopy of diatomic (N<sub>2</sub>) and simple polyatomic molecules (H<sub>2</sub>O, formaldehyde), Adiabatic and vertical ionization energies, Koopmans' theorem.

## Unit V-NMR spectroscopy:

Larmor precession. Mechanism of spin-spin and spin-lattice relaxation and quantitative treatment of relaxation, Quantum mechanical treatment of the AB system, Selection rules and relative intensities of lines.

### Recommended Texts books:

1. Hollas. J.M Modern Spectroscopy 4th Ed. Wiley & Sons(2004)
2. Barrow. G. M. introduction to Molecular Spectroscopy Mc Graw-Hill (1962)
3. Brand. J.C.D. & Speakman. J.C. Molecular Structure the Physical Approach 2nd Ed. Edward Arnold London (1975)
4. Chang. R. Basic Principles of Spectroscopy McGraw- Hall. New York, N.Y. (1970)
5. Moore, W.J. Physical Chemistry 4th Ed. Prentice-Hall (1972)
6. Warren, B.E. X-Ray Diffraction Dover Publications (1990)
7. Bacon, G.E. Fifty Years of Neutron Diffraction Hilger (1987)

1. Titrate a moderately strong acid (salicylic/mandelic acid) by the
  - (a) Salt-line method
  - (b) Double alkali method
2. Titrate a mixture of copper sulphate, acetic acid and sulphuric acid with sodium hydroxide.
3. Titrate a tribasic acid (phosphoric acid) against NaOH and Ba(OH)<sub>2</sub> conductometrically.
4. Titrate
  - (i) Magnesium sulphate against BaCl<sub>2</sub> and its reverse titration
  - (ii) HCl Vs NH<sub>4</sub>OH
  - (iii) Sodium oxalate Vs HCl

5. Estimate the concentration of each component of a mixture of  $\text{AgNO}_3$  and  $\text{HNO}_3$  by conductometric titration against  $\text{NaOH}$ .
6. Determine the degree of hydrolysis of aniline hydrochloride.
7. Determine the critical micelle concentration of a surfactant (sodium lauryl sulphate) by the conductivity method.
8. Study the effect of dielectric constant on the nature of the conductometric titration between maleic acid and sodium methoxide using different mixtures of benzene and methanol as solvents.
9. Determine the velocity constant for the saponification of ethyl acetate conductometrically.

#### Inorganic Chemistry Specialization Papers

##### Nuclear & Radio Chemistry:

###### Section-A:

###### Nuclear Binding Energy:

Justifications and applications; nuclear stability rules and decay of unstable nuclei. Nuclear Structure: Nuclear force, Liquid drop model, shell model and collective mode.

###### Section-B:

###### Interaction of Radiation with matter:

Physical and chemical effects of radiation on matter (photoelectric effect, Compton effect and pair production).

###### Radiochemical Techniques:

##### NAA: Principle, Application and Limitation

##### IDA: Principle, Application and Limitation, Radiometric titrations.

###### Section-C:

###### Detection of Nuclear Radiation:

Various methods of detecting nuclear radiations, Gas-filled counters – Ionization chamber; Proportional counter and G.M. counters. Scintillation detectors; Solid state detectors.



## Section-D:

### Nuclear Reactions:

Energetics of nuclear reactions; various types of nuclear reactions including photonuclear, thermonuclear and spallation reactions; mechanism of nuclear reaction by compound nucleus model.

### Nuclear fission:

Fission probability; energy release; theories of fission.

### Nuclear Fusion:

Brief idea about breeder reactors,; accelerators and cyclotron.

## Section-A:

### Metal Ions in Biological Systems:

General survey of essential and trace metals, Disturbing factors in metabolic process and causes of diseases, different classes of drugs.

### Alkali and alkaline earth metals in biological systems:

Ionophores, active transport of cations across membranes, sodium pump, Calcium pump, Calcium carriers, role of carriers in muscle contraction, blood clotting and hormones.

### Interaction of metal ions with Nucleotides:

metal ions in nucleotide systems, effect of metal ions on nucleic acids.

## Section-B:

Oxygen carriers: Porphyrins, metalloporphyrins, Hemoproteins, structure and functions of hemoglobin and myoglobin, synthetic oxygen carrier model systems

### Nitrogen fixation:

Biological nitrogen fixation, Nitrogenase, model for nitrogenase, metal-N<sub>2</sub> complexes, photosynthesis and chlorophyll.

### Metal transport and storage:

Transferrin, Ferritin, Siderophores

## Section-C:

## Environmental Chemistry:

Atmosphere: Chemical composition of atmosphere, atmospheric structure, Earth's radiation balance; oxides of N,C,S and their effects, Green house effect, acid rain, photochemical smog , air quality standards, depletion of ozone, particulate matter in atmosphere , mechanism of aerosol formation in air, Noise pollution and their health hazards.

## Reference Books:

1. "Advances in Inorganic Biochemistry: Metal Ions in Genetic Information Transfer v. 3" by Luigi G Marzilli and Gunther L Eichhorn.
2. "Mechanisms of Metallocenter Assembly (Advances in inorganic biochemistry)" by Luigi G Marzilli and Gunther L Eichhorn.
3. "Molecular Design in Inorganic Biochemistry (Structure and Bonding)" by Daniel Rabinovich.
4. "Fundamental Concepts of Environmental Chemistry" by G S Sodhi, Narosa Book Distributors Pvt Limited.
5. "Environmental Chemistry" by Anil Kumar De, NEW AGE; 7 Edition.

## Inorganic Chemistry –V Practical:

Preparation of selected Inorganic compounds/complexes and their characterization using techniques/methods such as elemental analysis, conductance measurement, molecular weight determination, magnetic susceptibility measurements, infrared, UV, visible, Mossbauer and ESR spectra etc. Handling of air and moisture sensitive compounds.

- i) Chromous Acetate
- ii)  $\text{Hg}[\text{Co}(\text{SCN})_4]$
- iii)  $\text{Ni}(\text{dmg})_2$
- iv)  $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4 \cdot \text{H}_2\text{O}$
- v)  $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$
  
- vi)  $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$
- vii)  $\text{VO}(\text{acac})_2$
- viii)  $\text{Mn}(\text{acac})_3$

- ix) Prussian blue
- x)  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ ;  $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{Cl}_2$  ;  $[\text{Co}(\text{NH}_3)_5\text{ONO}]\text{Cl}_2$
- xi)  $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$
- xii)  $[\text{Ni}(\text{en})_3]\text{S}_2\text{O}_3$  etc.

#### Semester-IV

### ORGANO-TRANSITION METAL CHEMISTRY:

#### Section-A:

Organo metallic Compounds: Introduction and Classification of organometallic compounds by bond types viz. covalent, ionic, electron deficient and cluster compounds.

Alkyls and Aryls of Transition Metals:

Types, routes of synthesis, stability and decomposition pathways, organo copper in organic synthesis.

#### Section-B:

Transition Metal –Complexes:

Transition metal –complexes with unsaturated molecules- alkenes, alkynes, allyl, & diene(metallocene) complexes, preparation, properties and nature of bonding and structural features, important reactions related to nucleophilic and electrophilic attack on ligands and to organic synthesis.

#### Section-C:

Compounds of Transition Metal-Carbon Multiple Bonds:

Transition metal-carbene complexes: Fischer type and Schrock type carbene complexes, their synthesis, reactions and structures & bonding; Transition metal-carbyne complexes: their synthesis, reactions and structural features.

#### Section-D:

Fluxional Organometallic Compounds:

Fluxionality & dynamic equilibria in compounds such as acyclic alkenes,  $\eta^5$ -bonded and  $\eta^6$ -bonded cyclic alkenes, rotation of ligands on metals, ligand scrambling on metals.

Applications of Transition metal Organometallics as Catalysts:

Zeigler-Natta polymerization ; homogeneous catalytic hydrogenation; alkene hydrogenation-Wilkinson Catalyst; Oxidation of olefins-Wacker's process; hydroformylation of olefins – the oxo process.

#### Reference Books:

1. Principles and Applications of Organotransition Metal Chemistry by James, P. Collman , University Science Book, First Edition.
2. Transition Metals in the Synthesis of Complex Organic Molecules 2nd Edition by Louis , S. Hegedus, Hegedus, Bjorn C. G. Soderberg, University Science Book, Third Edition.
3. Organo-transition metal chemistry: from bonding to catalysis by John Hartwig , University Science Books; 2010 edition.

### ELECTRO ANALYTICAL CHEMISTRY

#### SECTION –A:

Electrons at and across interfaces, Electro-chemical and chemical reactions, Basic principles, residual current, migration current, diffusion current and limiting current, saturated calomel electrode(SCE) and dropping mercury electrode(DME). Ilkovic equation, Koutecky equation for diffusion current, Polarographic waves (anodic and cathodic), Half wave potentials.

Oxygen interference, maxima function of supporting electrolytes.

#### SECTION-B:

Determination of stability constant complex by D.C.Polarography, Catalytic hydrogen wave. Principles of Amperometric titrations, types of titration curves, apparatus and techniques. Hanging mercury drop electrode, rotating dropping mercury electrode, platinum electrodes(RPE), Gold electrode, carbon paste electrode, glassy carbon electrode and graphite electrode.

#### Section-C:

Super imposed a.c. Polarography, voltametry in quiet and stirred solution with electrode other than mercury, square-wave polarography, normal and differential pulse polarography, chronopotentiometry, chronoamperometry and coulometry.

#### Section-D:

Theory of anodic stripping voltametry, concentration process, rest period, stripping process, Cathodic stripping voltametry, Anodic deposition, Cathodic redissolution, Experimental and applications of above system to Inorganic systems. Theory of ion selective electrodes, Experimental and applications of ISE to Inorganic systems.

#### Reference Books:

1. “Electrochemical Methods: Fundamentals and Applications” by A J Bard
2. “Fundamentals of Electroanalytical Chemistry” by P S Monk
3. “Electrochemical Reactions: The Electrochemical Methods of Analysis” by Gaston Charlot
4. “Modern Modified Electrochemical Methods for Pharmaceutical Analysis” by Dar Riyaz Ahmad and Brahman Pradeep Kumar
5. “Electrochemical Methods of Process Analysis” by D E Smith
6. “Electrochemically Engineered Nanoporous Materials (Springer Series in Materials Science)” by Dusan Losic and Abel Santos
7. “Electroanalytical Methods: Guide to Experiments and Applications” by Fritz Scholz

## MEDICINAL ASPECTS OF INORGANIC CHEMISTRY

### Section-A:

#### Metals in Medicine:

Biochemical bases of essential metal deficient diseases; Iron, copper and zinc deficiencies and their therapies, carcinogens and carcinostatic agents, zinc in tumour growth and inhibition, anticancer activity and mechanism of platinum complexes, anticancer activity of Rhodium, copper and Gold complexes, anti cancer activity of Selenium, antibacterial and antiviral properties of metal complexes, polyamino carboxylic acids and polyethylene amines as chelating drugs.

### Section-B:

Miscellaneous applications of Inorganic compounds as medicines:

Drugs in hypo and hyper activity of thyroids, Inorganic drugs in dental carries, clinical disorders of alkali and alkaline earth metals and their remedies, lithium drugs in psychiatry.

#### Heavy metals in Biological systems:

Toxicity of heavy metals – and their detoxification, role of Selenium in Biological systems with reference to its essentiality and toxicity, mechanism of metal ion induced toxicity, interaction between orally administered drugs & metal ions in guts.

### Section-C:

#### Ligand Therapy:

Ligand induced toxicity, interference with haemoglobin in oxygen transport system, interference with metallo-enzymes, beneficial effects of ligand chelation; carcinogenic ligands, carcinostatic ligands, alkylating agents as anticancer drugs, Thiosemicarbazones as anticancer drugs, macrocyclic antibiotic ligands and probable mechanism of the drug, antiviral activity of chelating agents, aspirin chelation, drugs where chelation and therapeutic activity are unrelated.

#### Section-D:

##### Hydrosphere:

Chemical composition of water bodies-lakes, streams & rivers; water quality parameters- dissolved oxygen, BOD, water quality standards; Purification and treatment of water. Radio pharmacology, nuclear medicines, radioiodine-131, technetium-99m, gallium and indium scan.

##### Reference Books:

1. Helmut Sigel (1973): Metal ions in biological system, Vol.9, Marcel Dekker INC, New York and Basel.
2. Helmut Sigel (1973): Metal ions in biological system (Concepts on metal ion toxicity), Vol.7 Marcel Dekker INC, New York and Basel.
3. Kaim, Wand Schewederski, B (1994): Bioinorganic Chemistry : Inorganic Elements in the Chemistry of Life, John Wiley & Sons, New York, USA.
4. Guy Berthon (1995): Handbook of Metal-Ligand interactions in Biological fluid, Bioinorganic medicine, Vol.2, Marcel Dekker INC, New York and Basel.
5. Rosette M. Roat- Malone (2007): Bioinorganic Chemistry: A Short Course, Wiley.
6. Ivano Bertini (1994): Bioinorganic Chemistry, Mill Valley, CA: University Science Books.

##### Inorganic Chemistry IV-Practical:

1. Estimation of metal ions by atomic absorption spectrophotometry and Flame Photometry.
2. Spectrophotometric determination of Fe, Ni, Mn, Cr, V, Ti and fluoride, Nitrate and phosphate etc.
3. Determination of pK value of an indicator Spectrophotometrically.
4. Study of Complexation ( Stoichiometry and stability constant) between Fe- thiocyanate, Fe-Phenanthroline and Cu- ethylenediamine by Job's method/ slope ratio method.

5. Polarographic determination of metal ions such as Zn, Cd,
6. Mg, Tl etc.(including mixtures). Amperometric titrations.

Industrial Chemistry:

UNIT I Raw Materials for Chemical Industry:

Raw materials – Characteristics of raw materials and their resources – methods of raw material concentrations–integral utilization of raw materials. Energy for chemical industry–Fuels–classification of fuels–coal–fuel gases and liquid fuels–petroleum– cracking–Octane number–cetane number–composition and uses of coal gas, water gas, producer gas, oil gas and gobar gas.

UNIT II Explosive and Pesticides:

Explosives:

Classification, characteristics, preparation of nitrocellulose-T.N.T, Picric acid, Dynamite-cordite and Gunpowder, Dynamite, HMX, PETN, Cyclonite, plastic explosives, gelatin, RDX, cordite and seismic explosives, propellants-manufacture of liquid and solid propellants-hydrazine, incendiaries and smoke screens. Industrial applications.

Pesticides:

Introduction, classification, synthesis of few common pesticides of chlorinated (DDT, BHC, Chlordane, Aldrin), organophosphorus and carbamate (parathion, malathion, carbaryl) compounds family, Plant pesticides, Pesticide formulations.

UNIT III Cement, Ceramics, Polymeric Materials, Glass, Paints and Fertilizers

Cement:

Manufacture – Wet Process and Dry process. Types, Analysis of major constituents, setting of cement, reinforced concrete. Cement industries in India.

Ceramics:

Important clays and feldspar, glazing and verification.

Polymeric Materials:

Industrial polymers (Thermoplastics polymers and thermosetting Polymers) and composite materials–their constitutions, chemical and physical properties, Industrial applications. Glass:

Types, Composition, manufacture of Optical glass, colored glasses, lead glass and neutron absorbing glass.

#### UNIT IV Industrial Chemical Analysis:

Sampling procedures, sampling of bulk materials, techniques of sampling—solids, Liquids and gases. Collection and processing of data. Chromatography: Principles, working and applications of paper chromatography, TLC, GLC, HPLC.

Particle size determination, rheological properties of liquids, plastics and their analysis. Modern Instrumental Methods of analysis—UV-visible spectroscopy-IR spectroscopy and non-dispersive IR- Raman spectroscopy-NMR Spectroscopy-Electron spin resonance spectroscopy-Atomic absorption spectroscopy-Flame photometry-Neutron diffraction-X-ray fluorescence-Ion chromatography

#### UNIT V Industrial Hygiene and Chemical Safety:

Classification of hazardous chemicals, storage, transportation, handling, risk assessments, challenges/solutions (d) Eco-friendly effluents disposal: Water pollutants, health hazards, sampling and analysis of water, water treatment, different industrial and domestic effluents and their treatment and

disposal, advanced waste water treatment, effluent quality standards and laws, chemical industries, tannery, dairy, textile effluents, common treatment.

#### Text Books:

1. Mukhlyonov (ed.) (1979): Chemical Technology, Vol.1, 3rd Edition, Mir publication, Moscow.
2. De.,A.K. (1989): Environmental Chemistry, WileyEasternLtd., 11th edn., Meerut.
3. Sharma, B.K (1997): Industrial Chemistry, Goel publishing house.

#### References:

1. Norris Shreve, R. and J.A. Brink (1977): Jr. Chemical Process Industries. 4th edn. McGrawHill, Tokyo.
2. Chakrabarty, B.N (1981): Industrial Chemistry, Oxford & IBH Publishing Co., New Delhi.

#### Inorganic Chemistry V-Practical:



1. Quantitative estimation of aniline,phenol,ethyl methyleketone and glucose (by both Betrane's

and Lane and Bynon methods).

2. Semi-micro Qualitative Analysis Analysis of mixtures containing two familar and two less familiar cations from among the following:

Ti, W, Se, Te, Mo, Ce,Th,Ti,Zr,V,B 0 e,U and Li.

### SCHEME FOR B. A. (HONORS) ENGLISH

B.A. (HONORS)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BEN-101	English Communication Skills-1	2	0	0	2
2	BEN-151	English Communication Lab-1	0	0	1	1
3	BEN-102	History of English Literature	5	0	0	5
4	BEN-103	British Poetry and Drama:14 <sup>th</sup> to 17 <sup>th</sup> Century	5	0	0	5
5	BEN-104	Modern Indian Writings in English Translation	5	0	0	5

6	PD-191A	Hobby Club	2	0	0	2
7	CEA-101	Environmental Science & Ecology	2	0	0	2
		<b>Total</b>	<b>21</b>	<b>0</b>	<b>1</b>	<b>22</b>

<b>B.A. (HONORS)</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BEN-111	Indian Writing in English- An Overview	4	0	0	4
2	BEN-112	Popular Literature	4	0	0	4
3	BEN-113	Media & Communication Skills	3	0	0	3
4	BEN-114	English Communication	2	0	0	2
5	BEN-111B	Seminar Indian Writing	0	0	2	1
6	BEN-112B	Seminar Popular Literature	0	0	2	1
7	BEN-113A	Media & Communication Skills Lab	0	0	2	1
8	BA 258	Fundamentals of Economics	2	0	0	2
9	PD192A	Hobby Club	0	1	0	1
		<b>Total</b>	<b>15</b>	<b>1</b>	<b>6</b>	<b>19</b>

### SCHEME FOR B. A. (HONORS) ENGLISH

<b>B.A. (HONORS)</b>			<b>Semester</b>			<b>III</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BEN-201	Soft Skills	4	0	0	4
2	BEN- 202	American Literature	4	1	0	5
3	BEN- 205	Academic Writing and Composition	4	1	0	5

4	BEN- 206	British Poetry and Drama: 17 <sup>th</sup> to 18 <sup>th</sup> Century	4	1	0	5
5	BEN-202B	Seminar on American Literature	0	0	2	2
6	BEN-251	Soft Skills Lab	0	0	2	1
7	PD-193	PDP	2	0	2	2
		<b>Total</b>	<b>18</b>	<b>3</b>	<b>6</b>	<b>24</b>

<b>B.A. (HONORS)</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BEN-211	Presentation Skills	4	1	0	5
2	BEN- 252	Presentation Skills Lab	0	0	2	1
3	BEN- 212	European Classical Literature – An Overview	4	1	0	5
4	BEN- 213	British Literature 19 <sup>th</sup> Century & Early 20 <sup>th</sup> Century	4	1	0	5
5	BEN-214	Literary criticism – An Introduction	4	1	0	5
6	BEN-215	Science Fiction and Detective Literature	4	1	0	5
7	PD-293A	Interpersonal Skills	2	0	1	2
		<b>Total</b>	<b>22</b>	<b>5</b>	<b>1</b>	<b>28</b>

### SCHEME FOR B. A. (HONORS) ENGLISH

<b>B.A. (HONORS)</b>			<b>Semester</b>			<b>V</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	

1	BEN-301	British Literature: The Early 20 <sup>th</sup> Century	5	1	0	6
2	BEN-302	European Classical Literature	5	1	0	6
3	BEN-303	Literary Theory	4	2	0	6
4	BEN-304	Research Methodology	5	1	0	6
5	BEN-305	Translation Studies	4	1	0	5
		<b>Total</b>	<b>23</b>	<b>6</b>	<b>0</b>	<b>29</b>

<b>B.A. (HONORS)</b>			<b>Semester</b>			<b>VI</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BEN-307	Literature of the Indian Diaspora	4	1	0	5
2	BEN-308	Modern European Drama	4	1	0	5
3	BEN-309	British Literature Post World War II	4	1	0	5
4	BEN-310	Women Writings	4	1	0	5
5	BEN-311	Research Methodology	4	1	0	5
6	BEN-312	Technical Writing	4	1	0	5
7	PD 392 A	Problem Solving Skills	0	0	2	2
		<b>Total</b>	<b>24</b>	<b>6</b>	<b>2</b>	<b>32</b>

## SYLLABUS FOR B. A. (HONORS) ENGLISH

**Course Objective:** The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills that should be integral to personal, social and professional interactions.

**Learning Outcomes:** By the end of the semester, students should have gained some degree of confidence to face an adult audience. They would have imbibed the vital importance of eye contact, positive and confident body language and the importance of interpersonal sensitivity and proxemics.

**Unit-1:** Remedial English- Parts of Speech; Tenses and their application; Verbs and their various forms.

**Unit-2:** Oral Communication- Developing meaningful conversation; extempore speech; welcome speech etc.

**Unit-3:** Writing Skills- Introduction to various types of writings including general writing, technical writing, creative writing, picture composition etc.

**Unit-4:** Introduction to various literary devices; different forms of prose writing; different poetic forms, figures of speech, how to appreciate a poem? Etc.

**Unit-5:** Professional Skills- Basic ethics in communication, body language in communication, News Paper reading etc.

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
2	BEN-151	English Communication Lab-1	0-0-1	1

**Course Objective:** To empower the language proficiency; to learn to refer and gather information; to enhance the speaking skills,

To listen to, understand and convey information

To listen to and respond appropriately to the contributions of others

To understand, order and present facts, ideas and opinions

To articulate experience and express what is thought, felt and imagined

To communicate clearly and fluently

To use grammatically correct language

To use register appropriate to audience and context.

**Learning Outcomes:** By the end of the term, the student should be able to:

- Describe a visual or an object
- Explain and give cause and effect
- Narrate an experience with descriptive detail
- Provide relevant information
- Use alternatives to slang
- Take an active part in group discussion
- Elicit and show respect for the views of others
- Disagree, argue and use persuasive speech in appropriate language

1. Self-introduction

2. Exercises on speaking: JAM

3. Exercises on speaking: Extempore
4. Newspaper reading and preparing write-up
5. Debate
6. Reading Comprehension
7. Speech on current affairs
8. Group Discussion
9. Listening Comprehension
10. Slogan Making

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
3	BEN-102	History of English Literature	5-0-0	5

### Course Objective:

- To acquaint the learners with the history of English literature and how historical and sociocultural events influence English literature.
- To provide learners with essential knowledge of the various trends in literature and enable them to interpret various literary terms.
- To enable the learners to recognize distinguished features of various literary genre

### Learning Outcome

- The students will be familiar with how historical and socio-cultural events influence English literature through representative literary and cultural texts.
- The learners will acquire essential knowledge of the various trends in literature to enable them to interpret various literary terms.
- The learners will be able to recognize distinguished features of various literary genres and critically analyse major literary and cultural texts in multiple genres

**Unit-1:** Old English to Middle English Period

**Unit-2:** Elizabethan & Jacobean Period

**Unit-3:** Restoration & Augustan Period

**Unit-4:** Pre-Romantics & Romantics

**Unit-5:** Victorian Period

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
4	BEN-103	British Poetry and Drama:14 <sup>th</sup> to 17 <sup>th</sup> Century	5-0-0	5

**Course Objectives:** To introduce students to the tenets of Renaissance Humanism, To acquaint students with aspects of the Elizabethan stage, Court and City, To come to an understanding of how Religious and Political Thought of the period affected its literary output, Ideas of Love and Marriage and their impact on the writer in Society – and the milieu.

**Learning Outcomes:** By the end of the semester, students should be thoroughly acquainted with this fertile and vital period of literary history.

**Unit-I: Introduction-** Students are required to study the social, political, religious and economic conditions of the respective ages in England, significant movements, influences and literary schools.

**Unit-II:**

1. Chaucer- Nun's Priest's Tale
2. Edmund Spenser- The Faerie Queen, Book-1
3. Milton- How Soon Hath Time
4. Donne- A Hymn to God the Father
5. Andrew Marvell- To His Coy Mistress

**Unit-III:** Shakespeare- Macbeth

**Unit-IV:** John Bunyan- The Holy War

**Unit-V:** An Essay of Dramatic Poesy- John Dryden

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
5	BEN-104	Modern Indian Writings in English Translation	5-0-0	5

**Course Objectives**

This Course introduces nineteenth Century Reform Movements in India; the Indian National Movement; Rise of the Indian Novel; Caste-Class; The New Indian Woman. It also offers a detail study of History of Indian English Literature, and the Themes and Techniques of the Indian Novel in English, and the reflections of Realism and Reality: The Novel and Society in India.

**Learning Outcomes**

It make the students aware of social, political, and cultural issues reflected in Indian writing in English, with reference to Indian social reformations, freedom struggle, women education and empowerment in nineteenth century. Student would appreciate the artistic and innovative use of language employed by the writers to instil the values and develop human concern in students through exposure to literary texts.

**Unit-1:** Introduction to Indian literature and its various phases; importance of translated works in contemporary literary world etc.

**Unit-2:** Short Stories-Premchand: 'The Shroud', Ismat Chughtai: 'The Quilt', Gurdial Singh: 'A Season of No Return'.

**Unit-3:** Poetry-Rabindra Nath Tagore-'Light, Oh Where is the Light?' and 'Where the Head is Held High', from Gitanjali.

G.M. Muktibodh- 'The Void' and 'So Very Far', (tr. Tr. Vishnu Khare and Adil Jussawala), in The Oxford Anthology of Modern Indian Poetry, ed. Vinay Dharwadker and A.K. Ramanujam.

Amrita Pritam- 'I Say unto Waris Shah', (tr. N.S. Tasneem) in Modern Indian Literature: An Anthology, Plays and Prose, Surveys and Poems, ed. K.M. George, vol. 3.

**Unit-4:** Novel- Dharamveer Bharati-AndhaYug, tr. AlokBhalla.

**Unit-5:** Drama- G. KalyanRao Untouchable Spring, tr. Alladi Uma and M. Sridhar.

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
6	PD-191A	Hobby Club	2-0-0	2

## OBJECTIVE

To empower the students with entrepreneurial skills, behaviour, grooming and effective interaction at the work place.

1. **GOAL SETTING:** Types of Goals, Setting Smart Goals, Personal Goal Setting, Business Goal Setting, Goal Setting Techniques.
2. **ENTREPRENEURIAL SKILLS:** Meaning, Entrepreneurial Competencies, Advantages, Risks involved, Avenues & Opportunities, Support from Govt., Basic and Significant Personality Traits, Venture Project Planning and Entrepreneurship Cycles, Planning the Project, Entrepreneurship in daily life, Case studies in Entrepreneurship, Exercises.
3. **CORPORATE DRESSING:** The Corporate Fit, Corporate Culture, Dress Codes, Dressing for Interviews, Clothing do's and don'ts.
4. **CORPORATE GROOMING:** Making a Good Impression at Work, Grooming Check List, Accessories, Do's and Don'ts for Men and Women, Hygiene and Skin Care, Hands and Feet, Makeup and Hair Accessories.
5. **ETIQUETTE & MANNERS:** Social Etiquette, Dining Etiquette, Party & Wedding Etiquette, Sensitivity towards Diverse Cultures, Respecting Religions and Traditions.
6. **BUSINESS ETIQUETTE:** Dealing with People at Work Place (Peers, Subordinates and Superiors), International Business, Etiquette at Meetings and Conferences.
7. **COMMUNICATION MEDIA ETIQUETTE:** Telephone Etiquette, Email Etiquette, Media Etiquette.

## REFERENCE BOOKS

1. Miner, B. John, "The 4 Routes to Entrepreneurial Success", Berrett-Koehler, 1996



2. Ellis, Keith, "The Magic Lamp", Three Rivers Press, 1998
3. Blair, Gary Ryan, "The Ten Commandments of Goal Setting", Goalsguy Learning Skills Inc., 2005

4. Gupta, Seema, "Correct Manners and Etiquette", Pustak Mahal, 1992
5. Soundararaj, Francis, "Speaking and Writing for Effective Business Communication", MacMillan, 1995

**Note:** One trainer per lecture and two trainers per practical session. Classroom with board/projector for PPT and video clips will be required.

## **SCHOOL OF HUMANITIES AND SOCIAL SCIENCE**

### **SCHEME OF STUDIES**

#### **B.A. (HONORS) ENGLISH**

#### **SEMESTER-III**

**2017-18**

<b>SN</b>	<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>L-T-P</b>	<b>Cr.</b>
1	BEN-201	Soft Skills	4-0-0	4
2	BEN- 202	American Literature	4-1-0	5
3	BEN- 205	Academic Writing and Composition	4-1-0	5
4	BEN- 206	British Poetry and Drama: 17 <sup>th</sup> to 18 <sup>th</sup> Century	4-1-0	5
5	BEN-202B	Seminar on American Literature	0-0-2	2
6	BEN-251	Soft Skills Lab	0-0-2	1
7	PD-193	PDP	2-0-0	2

<b>SN</b>	<b>Course No.</b>	<b>Course Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>1</b>	<b>BEN-201</b>	<b>AECC-3 Soft Skills</b>	<b>3-2-0</b>	<b>4</b>

#### **Course Objectives**

- To encourage the all-round development of students by focusing on soft skills.
- To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice
- To develop and nurture the soft skills of the students through individual and group activities.

- To expose students to right attitudinal and behavioural aspects and to build the same through activities

**Learning Outcomes:** On completion of the course, student will be able to–

- Effectively communicate through verbal/oral communication and improve the listening skills
- Write precise briefs or reports and technical documents
- Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
- Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
- Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of teamwork, Inter-personal relationships, conflict management and leadership quality

**Unit-1:** Teamwork

**Unit-2:** Emotional Intelligence

**Unit-3:** Adaptability

**Unit-4:** Leadership

**Unit-5:** Problem solving

### **Suggested Readings**

1. English and Soft Skills. S.P. Dhanavel. Orient Black Swan 2013
2. English for Students of Commerce: Precis, Composition, Essays, Poems eds. Kaushik, et al.

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
2	BEN- 202	American Literature	4-1-0	5

**Course Objectives:** Upon completion of this course, the student will be able to:

1. Identify key ideas, representative authors and works, significant historical or cultural events, and characteristic perspectives or attitudes expressed in the literature of different periods or regions.
2. Analyze literary works as expressions of individual or communal values within the social, political, cultural, or religious contexts of different literary periods.
3. Demonstrate knowledge of the development of characteristic forms or styles of expression during different historical periods in different regions.
4. Articulate the aesthetic principles that guide the scope and variety of works in the arts and humanities.

5. Write research-based critical papers about the assigned readings in clear and grammatically correct prose, using various critical approaches to literature.

**Learning Outcomes:**

A. Critical Thinking: To include creative thinking, innovation, inquiry and analysis, evaluation, and synthesis of information.

B. Communication: To include the effective development, interpretation, and expression of ideas through written and visual communication.

C. Social Responsibility: To include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities.

D. Personal Responsibility: To include the ability to connect choices, actions, and consequences to ethical decision-making.

**Unit-I:** Introduction- Students are required to study the social, political, religious, and economic conditions of the respective periods in American writings in English, significant literary movements, influences and literary schools.

**Unit-II:** Walt Whitman-: Song of Myself

Robert Frost: The Road Not Taken, Stopping By Woods in a Snowy Evening.

Sylvia Plath: Tulip, Mirror

**Unit-III:** Ernest Hemingway: The Old man and The Sea

**Unit-IV:** Arthur Miller: Death of a Salesman

**Unit-V:** Emerson: Self Reliance

SN	Course No.	Course Name	L-T-P	Cr.
3	BEN-205	GE-1 Academic Writing and Composition	4-1-0	5

**Course Objectives:** The course challenges students to...

- Understand and analyse conventions for purpose, audience, and genre, understanding that genres evolve in response to changes in material conditions and composing technologies.
- Create rhetorically appropriate work that demonstrates an understanding of purpose, audience, context, and genre conventions.
- Practice varying strategies for composition, using self-evaluation to recognize that writing processes are recursive and flexible.
- Analyse, synthesize, and evaluate information from various non-scholarly texts, attending especially to relationships between assertion and evidence and to patterns of organization.

•  
**Learning Outcomes:** By the end of the course, students will have...Used varying strategies of writing processes in composing course projects, including working effectively in peer groups to give and receive substantive feedback on emerging drafts.

1. Practiced rhetorical analysis of genre conventions of multiple types of work that demonstrates an understanding of purpose, audience, and context of the genre convention.
2. Composed a finished project that substantially and effectively analyses, incorporates, and attributes credible texts produced by others.
3. Reflected on and described students' individual writing processes and how they contribute to students' continued literacy development.

**Unit-1:** Introduction to the Writing Process

**Unit-2:** Introduction to the Conventions of Academic Writing

**Unit-3:** Writing in one's own words: Summarizing and Paraphrasing

**Unit-4:** Critical Thinking: Syntheses, Analyses, and Evaluation

**Unit-5:** Structuring an Argument: Introduction, Interjection, and Conclusion, Citing Resources; Editing, Book and Media Review.

**Suggested Readings:** 1. Liz Hamp-Lyons and Ben Heasley, Study writing: A Course in Writing Skills for Academic Purposes (Cambridge: CUP, 2006).

2. Renu Gupta, A Course in Academic Writing (New Delhi: Orient Black Swan, 2010).

3. IlonaLeki, Academic Writing: Exploring Processes and Strategies (New York: CUP, 2nd edn, 1998).

4. Gerald Graff and Cathy Birkenstein, They Say/I Say: The Moves That Matter in Academic Writing (New York: Norton, 2009).

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
4	BEN-206	British Poetry and Drama:17 <sup>th</sup> to 18 <sup>th</sup> Century	5-1-0	6

**Course Objectives:**

- To introduce students to the Religious and Secular Thought of the 17th Century
- To learn the main features of the 17th C Stage, State and Market
  - The learn the elements of The Mock-epic and Satire
- To understand the place and position of Women in the 17th Century
- To learn and appreciate The Comedy of Manners

**Learning Outcomes:** By the end of the semester, students will be acquainted with very important terms and literary forms like the Comedy of Manners, Mock-epic (V/s Epic), Satire and the Age of Reason that swept over Europe during the period.

**UNIT: 1** Introduction & Background Study

**Unit 2:** John Milton *Paradise Lost Book 1*

**UNIT: 3** John Webster *The Duchess of Malfi*

**UNIT: 4** Aphra Behn *The Rover*

**UNIT: 5** Alexander Pope *The Rape of the Lock*

### **Suggested Topics and Background Prose Readings for Class Presentations Topics**

Religious and Secular Thought in the 17th Century

The Stage, the State and the Market

The Mock-epic and Satire

Women in the 17th Century

The Comedy of Manners

#### **Readings**

1. The Holy Bible, *Genesis*, chaps. 1–4, *The Gospel according to St. Luke*, chaps. 1–7 and 22–4.
2. Niccolo Machiavelli, *The Prince*, ed. and tr. Robert M. Adams (New York: Norton, 1992) chaps. 15, 16, 18, and 25.
3. Thomas Hobbes, selections from *The Leviathan*, pt. I (New York: Norton, 2006) chaps. 8, 11, and 13.
4. John Dryden, ‘A Discourse Concerning the Origin and Progress of Satire’, in *The Norton Anthology of English Literature*, vol. 1, 9th edn, ed. Stephen Greenblatt (New York: Norton 2012) pp. 1767–8.

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
5	BEN-202B	Seminar on American Literature	0-0-2	2

#### **Course content**

This course introduces American literature, where the focus is on the nineteenth and the twentieth century. Attention will be paid to the ways in which literary texts speak to the reader, and the syllabus texts will be studied in terms of developments in literary history and the history of ideas.

Wherever relevant, the teaching will draw on the wider historical, social and cultural context from which the texts spring.

#### **Learning outcome**

After completing this course, you:

- have an overview of American literature, its central themes, literary periods, and key artistic features
- can analyse literary texts in a variety of genres
- can write an essay that makes literary-critical arguments
- can express yourself in appropriate academic English

**Instructions:**

- Students should be assigned with topics regularly related to the syllabus and of current importance
  - They must be encouraged to do sincere library reading of related books with the help of the teacher.
  - Every week, the students should be given chance to prepare & present a topic. The presentation should be evaluated and the record of the content and evaluation should be kept with the faculty member's signature.
  - Each student should have a Seminar file which keeps the records of all their presentations with the evaluation
  - One student should complete 8 EFFECTIVE & SUCCESSFUL presentations in a semester to secure the 2 credits
- 
- In case of PPt. presentation, the faculty should collect the PPt. Presentation and the full paper prepared on that.
  - Topics should be different for each student in each presentation. The faculty should prepare meaningful topics well in advance.
  - Faculty members should have a clear idea about the reference books available on the Courses they are dealing with.
  - Along with oral presentation, assess the handwriting of the students also.

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
6	BEN-251	Soft Skills Lab	0-0-2	1

**Course Objectives:** The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks

**Learning Outcomes:** To help students to develop formal communication skills in a work place. To make them acquire team skill by working in-group activities. To equip them with suitable language and speech patterns in a workplace. To enhance the ability of critical & lateral thinking while addressing the issues at any situation. To enable them to present themselves confidently in job interviews.

1. Newspaper reading and making write up on news events; presenting the write up
2. Listening Comprehension:
  - a. Video Tapes b. Dialogue
3. Preparing speech on given topic with the help of Internet
4. Creative Writing
5. Role Play
6. Turn Coat
7. Group Discussion
8. Reading Comprehension
9. Picture/Cartoon Interpretation
10. Telephone Conversation

## **SCHOOL OF HUMANITIES AND SOCIAL SCIENCE**

### **SCHEME OF STUDIES**

#### **B.A. (HONORS) ENGLISH**

#### **SEMESTER-V**

**2017-18**

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
1	BEN-301	British Literature: The Early 20 <sup>th</sup> Century	5-1-0	6
2	BEN-302	European Classical Literature	5-1-0	6
4	BEN-303	Literary Theory	4-2-0	6
5	BEN-304	Research Methodology	5-1-0	6
6	BEN-305	Translation Studies	4-1-0	5

SN	Course No.	Course Name	L-T-P	Cr.
1	BEN-301	British Literature: The Early 20 <sup>th</sup> Century	5-1-0	6

**Course Outcomes:**

- To enable students to appreciate representative British literary works of the 19th century.
- To enable students to review the impact of the socio-political and cultural milieu on the literature of the period.
- To acquaint students with the various prose and poetic styles of 19th century British literature.
- To encourage the independent reading of matter related to the various critical schools of thought prevailing during the period.

**Learning Outcomes:**

At the end of the course, students should be familiar with the pattern of development and change in the themes and literary techniques used by the nineteenth-century British novelists and poets.

**Unit I:** Joseph Conrad Heart of Darkness

**Unit II:** D.H. Lawrence Sons and Lovers

**Unit III:** Virginia Woolf Mrs Dalloway Poetry

**Unit IV:** i. W. B. Yeats a) Leda and the Swan b) The Second Coming c) No Second Troy d) Sailing to Byzantium

**Unit V:** T.S. Eliot a) The Love Song of J. Alfred Prufrock b) Sweeney among the Nightingales c) The Hollow Men

SN	Course No.	Course Name	L-T-P	Cr.
2	BEN-302	European Classical Literature	5-1-0	6

**Course Objective:**

- Classical Studies focus primarily on the literature and art of the ancient world to provide the students a cultural understanding of the ancient civilizations.
- A learner will embrace the diversity of Greek and Roman culture, drawing upon literature, drama, myth, religion, history, philosophy and art.

**Learning Outcome**

1. The students will demonstrate an ability to read and understand a variety of classical literary texts (i.e., Ancient Greek or classical Latin) in the target language.
2. Demonstrate an understanding of the classics in a historical context and an understanding of cultural information about the Greeks and Romans



3. Demonstrate a familiarity with the styles of authors in the major genres of prose and poetry (e.g., History, philosophy, novel, epic, lyric, drama).

**UNIT 1: Post Colonialism** – Introduction to Post Colonialism, Feminism-Humanism- Magic realism- Characteristics of Postcolonial world & Literature

**UNIT 2:** Chinua Achebe: Things Fall Apart- Gabriel Garcia Marquez: Chronicle of a Death Foretold

**UNIT 3:** Bessie Head: The Collector of Treasures- Ama Ata Aidoo: The Girl who can

**UNIT 4:** Mamang Dai: Small Towns and the River, The Voice of the Mountain- Grace Ogot: The Green Leaves

**UNIT 5:** Pablo Neruda: Tonight I can Write, The Way Spain Was- Derek Walcott: A Far Cry from Africa, Names

SN	Course No.	Course Name	L-T-P	Cr.
3	BEN-303	Literary Theory	4-2-0	6

**Course Objective:**

- To introduce students with the practical reading of literature, literary theories like Structuralism, PostStructuralism, and Marxism and so on (as prescribed in the syllabus).
- To analyze the relationship between author and work; also to familiarize the significance of race, class, gender, both from the stand point of the biography of the author.
- To identify and discuss the major theorists like Jacques Derrida, Karl Marx, Terry Eagleton, Antonio Gramsci and so on ( as prescribed in the syllabus).

**Learning Outcome:**

1. Students will learn to apply the concepts or arguments successfully in a close reading of a literary text.
2. Students will get to know about the contemporary cultural forces in influencing emerging trends in literary theory like Eco- Criticism, Trauma theory, Chaos theory.
3. Understanding the role of historical context in interpretation as well as the relevance of linguistic and unconscious elements of the text

**Unit 1:** Basic concepts of structuralism, Post structuralism, Saussurean linguistics, Dialogism, Deconstruction.

**Unit 2:** Introduction to different theories of Post colonialism, Orientalism, Psychopathology of Colonialism, Subaltern, Diaspora, Cosmopolitanism.

**Unit 3:** Marxist theory, class, Marxism, culture, Art, work, and production, Ideology, Hegemony.

**Unit 4:** Introduction to feminism, Difference between sex and gender, Social construction of gender, Materialistic view of feminism, A brief study of the works of Mary Wollstonecraft and Simone de Beauvoir.

**Unit 5:** Introduction to the basic concepts of Neo Historicism and Cultural Materialism, Culture as text and Cultural Text, the politics of interpretation.

SN	Course No.	Course Name	L-T-P	Cr.
4	BEN-304	Research Methodology	5-1-0	6

**Course Objective:**

- To understand the research process and the major research methods in literary research.
- Be able to assess and analyse a published journal article that uses one of the primary research methods in the field.
- To understand the importance of research ethics and integrate research ethics into the research process.

**Learning Outcome:**

1. The student will be able to propose a research study and justify the theory as well as the methodological decisions, including sampling and measurement.
2. The students will be able to understand and apply arrange of quantitative and / or qualitative research techniques to literary works /issues.

**UNIT I –RESEARCH FORMULATION AND DESIGN** Motivation and objectives – Research methods vs. Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

**UNIT II – DATA COLLECTION AND ANALYSIS** Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools,data analysis with statically package (Sigma STAT,SPSS for student t-test, ANOVA, etc.), hypothesis testing.

**UNIT III – SOFT COMPUTING** Computer and its role in research, Use of statistical software SPSS, GRETL etcin research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

**UNIT IV –RESEARCH ETHICS, IPR AND SCHOLARY PUBLISHING** Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

**UNIT V –INTERPRETATION AND REPORT WRITING** Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report

SN	Course No.	Course Name	L-T-P	Cr.
5	BEN-305	Translation Studies	4-1-0	5

#### Course objectives

- knowledge of the most important translation theories and areas of applied translation studies
- ability to critically reflect on different translation theories
- ability to apply the methods and strategies discussed in some of these theories
- To acquaint the students with the concept, scope and significance of translation. To understand the inter-cultural and linguistic thrust in translation.

#### Learning outcomes

After studying this course, you should be able to:

- understand the skills required to become a professional translator and what is meant by translation competence
  - have an awareness of what it means to be a professional translator
  - undertake an independent research activity
  - evaluate personal language skills
- undertake a translation activity.

**UNIT 1.** Introducing Translation: a brief history and significance of translation in a multi linguistic and multicultural society like India.

**UNIT 2.** Exercises in different Types / modes of translation, such as: a. Semantic / Literal translation b. Free / sense/ literary translation c. Functional / communicative translation d. Technical / Official e. Transcreation f. Audio-visual translation 22

**UNIT 3.** Introducing basic concepts and terms used in Translation Studies through relevant tasks; for example: Equivalence, Language variety, Dialect, Idiolect, Register, Style, Mode, Code mixing / Switching.

**UNIT 4.** Defining the process of translation (analysis, transference, restructuring) through critical examination of standard translated literary/non-literary texts and critiquing subtitles of English and Hindi films. Practice: Translation in Mass Communication / Advertising, subtitling, dubbing,

**UNIT 5.** Exercises to comprehend \_Equivalence in translation: Structures (equivalence between the source language and target language at the lexical (word) and syntactical (sentence) levels. This will be

done through tasks of retranslation and recreation, and making comparative study of cultures and languages. Practice: Tasks of Translation in Business: Advertising – Discussions on issues of Translation and Gender by attempting translation for media, films and advertisements from different languages. Developing skills for Interpreting: understanding its dynamics and

challenges. Interpreting: Simultaneous and Consecutive (practical application) Practice: Using tools of technology for translation: machine / mobile translation, software for

## **SEMESTER-I**

### **BEN-101 English Communication Skills-1**

**Unit-1:** Remedial English- Parts of Speech; Tenses and their application; Verbs and their various forms.

**Unit-2:** Oral Communication- Developing meaningful conversation; extempore speech; welcome speech etc.

**Unit-3:** Writing Skills- Introduction to various types of writings including general writing, technical writing, creative writing, picture composition etc.

**Unit-4:** Introduction to various literary devices; different forms of prose writing; different poetic forms, figures of speech, how to appreciate a poem? etc.

**Unit-5:** Professional Skills- Basic ethics in communication, body language in communication, News Paper reading etc.

### **BEN-151 English Communication Skills Lab-1**

**Objective:** To empower the language proficiency; to learn to refer and gather information; to enhance the speaking skills

11. Self-introduction
12. Exercises on speaking: JAM
13. Exercises on speaking: Extempore
14. News paper reading and preparing writeup
15. Debate
16. Reading Comprehension
17. Speech on current affairs
18. Group Discussion
19. Listening Comprehension
20. Slogan Making

## **BEN-102 History of English Literature: An overview**

**Unit-1:** Old English to Middle English Period

**Unit-2:** Elizabethan & Jacobean Period

**Unit-3:** Restoration & Augustan Period

**Unit-4:** Pre-Romantics & Romantics

**Unit-5:** Victorian Period

## **BEN-103 British Poetry & Drama: 14<sup>th</sup> to 17<sup>th</sup> Century**

**Unit-I: Introduction-** Students are required to study the social, political, religious and economic conditions of the respective ages in England, significant movements, influences and literary schools.

**Unit-II:**

6. Chaucer- Nun's Priest's Tale
7. Edmund Spenser- The Faerie Queen, Book-1
8. Milton- How Soon Hath Time
9. Donne- A Hymn to God the Father
10. Andrew Marvell- To His Coy Mistress

**Unit-III:** Shakespeare- Macbeth

**Unit-IV:** John Bunyan- The Holy War

**Unit-V:** An Essay of Dramatic Poesy- John Dryden

## **BEN-104 Modern Indian Writings in English Translations**

**Unit-1:** Introduction to Indian literature and its various phases; importance of translated works in contemporary literary world etc.

**Unit-2:** Short Stories-Premchand: 'The Shroud', Ismat Chughtai: 'The Quilt', Gurdial Singh : 'A Season of No Return'.

**Unit-3:** Poetry-Rabindra Nath Tagore-'Light, Oh Where is the Light?' and 'Where the Head is Held High', from Gitanjali.

G.M. Mukhibodh- 'The Void' and 'So Very Far', (tr. Tr. Vishnu Khare and Adil Jussawala), in The Oxford Anthology of Modern Indian Poetry, ed. Vinay Dharwadker and A.K. Ramanujam.

Amrita Pritam- 'I Say Unto Waris Shah', (tr. N.S. Tasneem) in Modern Indian Literature: An Anthology, Plays and Prose, Surveys and Poems, ed. K.M. George, vol. 3.

**Unit-4:** Novel- DharamveerBharati-AndhaYug, tr. AlokBhalla.

**Unit-5:** Drama- G. KalyanRao Untouchable Spring, tr. Alladi Uma and M. Sridhar.

### **PD-193 Entrepreneurship & Professional Skills**

**OBJECTIVE** To empower the students with entrepreneurial skills, behaviour, grooming and effective interaction at the work place.

8. **GOAL SETTING:** Types of Goals, Setting Smart Goals, Personal Goal Setting, Business Goal Setting, Goal Setting Techniques.
9. **ENTREPRENEURIAL SKILLS:** Meaning, Entrepreneurial Competencies, Advantages, Risks involved, Avenues & Opportunities, Support from Govt., Basic and Significant Personality Traits, Venture Project Planning and Entrepreneurship Cycles, Planning the Project, Entrepreneurship in daily life, Case studies in Entrepreneurship, Exercises.
10. **CORPORATE DRESSING:** The Corporate Fit, Corporate Culture, Dress Codes, Dressing for Interviews, Clothing do's and don'ts.
11. **CORPORATE GROOMING:** Making a Good Impression at Work, Grooming Check List, Accessories, Do's and Don'ts for Men and Women, Hygiene and Skin Care, Hands and Feet, Make up and Hair Accessories.
12. **ETIQUETTE & MANNERS:** Social Etiquette, Dining Etiquette, Party & Wedding Etiquette, Sensitivity towards Diverse Cultures, Respecting Religions and Traditions.
13. **BUSINESS ETIQUETTE:** Dealing with People at Work Place (Peers, Subordinates and Superiors), International Business, Etiquette at Meetings and Conferences.
14. **COMMUNICATION MEDIA ETIQUETTE:** Telephone Etiquette, Email Etiquette, Media Etiquette.

### **REFERENCE BOOKS**

1. Miner, B. John, "The 4 Routes to Entrepreneurial Success", Berrett-Koehler, 1996
2. Ellis, Keith, "The Magic Lamp", Three Rivers Press, 1998
3. Blair, Gary Ryan, "The Ten Commandments of Goal Setting", Goalsguy Learning Skills Inc., 2005
4. Gupta, Seema, "Correct Manners and Etiquette", Pustak Mahal, 1992
5. Soundararaj, Francis, "Speaking and Writing for Effective Business Communication", MacMillan, 1995

**Note:** One trainer per lecture and two trainers per practical session. Classroom with board/projector for PPT and video clips will be required.

<http://www.pasadenaisd.org/rayburn/Clubs/BPA/contest/managetime.html>

<http://www.citeman.com/7026-business-etiquette-2/>

## **B.A. (HONORS) ENGLISH**

### **SEMESTER-II**

#### **BEN-111 C3-Indian Writing in English**

**UNIT 1:** An Introduction to Indian Writing in English; Indian English Literature & its Readership; Themes & Contexts of Indian English Novels; The Aesthetics of Indian English Poetry; Modernism in Indian English Literature

**UNIT 2:** Anita Desai : Voices in the City

**UNIT 3:** Girish Karnard: Tughlaq

**UNIT 4:** H.L.V.Derozio : Freedom to the Slave, The Orphan Girl; Kamala Das: Introduction, My Grandmother's House; Nizzim Ezekiel: Enterprise, The Night of the Scorpion; Robin S.Ngangom: The Strange Affair of Robin S.Ngangom', A Poem for Mother

**UNIT 5:** Mulk Raj Anand :Two Lady Rams; Salman Rushdie: The Free Radio; RohintonMistry: Swimming Lesson; Shashi Deshpande: The Intrusion

#### **BEN-111B Seminar**

##### **Instructions:**

- Students should be assigned with topics regularly related to the syllabus and of current importance
- They must be encouraged to do sincere library reading of related books with the help of the teacher.
- Every week, the students should be given chance to prepare & present a topic. The presentation should be evaluated and the record of the content and evaluation should be kept with the faculty member's signature.
- Each student should have a Seminar file which keeps the records of all their presentations with the evaluation
- One student should complete 8 EFFECTIVE & SUCCESSFUL presentations in a semester to secure the 2 credits

- In case of PPT. presentation, the faculty should collect the PPT. Presentation and the full paper prepared on that.
- Topics should be different for each student in each presentation. The faculty should prepare meaningful topics well in advance.
- Faculty members should have a clear idea about the reference books available on the Courses they are dealing with.
- Along with oral presentation, assess the handwriting of the students also.

### **BEN-112 C4-Popular Literature**

**UNIT 1:** Coming of Age; Canonical & popular; Caste, gender & identity; Ethics & Education in Children's Literature; Sense & Nonsense; The Graphic Novel

**UNIT 2:** Lewis Carroll : Through the Looking Glass

**UNIT 3:** Agatha Christie :The Murder of Roger Akroyd

**UNIT 4:** Shyam Sevadurai :Funny Boy

**UNIT 5:** Durgabhai Vyam&SubhashVyam:Bhimyana: Experiences of Untouchability

### **BEN-112B Seminar**

#### **Instructions:**

- Students should be assigned with topics regularly related to the syllabus and of current importance
- They must be encouraged to do sincere library reading of related books with the help of the teacher.
- Every week, the students should be given chance to prepare & present a topic. The presentation should be evaluated and the record of the content and evaluation should be kept with the faculty member's signature.
- Each student should have a Seminar file which keeps the records of all their presentations with the evaluation
- One student should complete 8 EFFECTIVE & SUCCESSFUL presentations in a semester to secure the 2 credits
- In case of PPT.presentation, the faculty should collect the PPT. Presentation and the full paper prepared on that.
- Topics should be different for each student in each presentation. The faculty should prepare meaningful topics well in advance.



- Faculty members should have a clear idea about the reference books available on the Courses they are dealing with.
- Along with oral presentation, assess the handwriting of the students also.

### **BEN-113 GE-2 Media & Communication Skills**

**UNIT-1** Introduction to Mass Communication – Mass Communication & Globalization, Forms of Mass Communication (Topics for Student Presentation: Case studies of Current issues in Indian Journalism, Performing street plays, writing pamphlets & posters)

**UNIT 2:** Advertisements – Types of Advertisements, Advertising Ethics, How to create Advertisement / story boards ( Topics for student presentation – Creating advertisement / visualization, Enacting an advertisement in a group, Creating jingles & taglines)

**UNIT 3:** Media Writing: Script writing for TV / Radio, writing News reports & editorials, Editing for print & online media ( Topics for student presentation –Script writing for a TV / Panel Discussion / radio programme/ hosting Radio Programme, Editing articles, writing an Editorial for a topical subject)

**UNIT 4:** Introduction to Cyber and Social Media : Types of social media , impact of social media. Introduction to cyber media

**UNIT 5:** Digital Media- An Overview: Types of digital media: E-Book, E-Journal, E-Magazine, Internet, World wide web; Copyright, Plagiarism

#### **Further Reading:-**

1. Writing for the Mass Media James Glen Pearson Education, 2006 (Sixth edition).
2. Basic News Writing Melvin Menchar William. C.Brown Co., 1983
3. Writing and Reporting News: A Carole Rich Wadsworth/ Thomson Learning, Coaching Method 2003
4. News Writing & Reporting James A Neal & Surjeeth Publications, 2003 Suzane S Brown
5. Broadcast News Writing, Ted White Macmillan Reporting & Production
6. An Introduction to Digital Tony Feldman (Blueprint Series) 1996
7. Advertising Ahuja & Chhabra Sujeeth Publications, 1989
8. The Screenwriter's Workbook Syd Field Dell Publishing, 1984
9. E-Writing Dianna Boother Macmillan, 2008
10. Mass Communication Theory Denis Mcquail Vistaar Publications, 2007

### **BEN-113A Media & Communication Skills Lab**

**Activity 1-** Formal Self Introduction; write the content, get assessed by the faculty member & then present confidently

**Activity 2:** Preparing Pamphlets & Posters on various programmes and current issues

**Activity 3:** Panel Discussion - Choose topics of real life relevance and conduct a discussion

**Activity 4:** Case Studies - on topics & issues of current importance, topics of importance in the News paper& Journals

**Activity 5:** Advertisement – Prepare the ad with suitable jungles / tagline, enact the ad

**Activity 6:** Dialogue writing: Preparing script for a programme; Hosting a programme

**Activity 7:** Ppt. Presentation & Oral presentation: Prepare Ppt. Presentation on the assigned topic and get it evaluated by the teacher and then give a presentation of it.

**Activity 8:** Interpretation of visual images: Display some visual images and encourage the students to make some creative interpretation of that in written form. Then present it .

**Activity 9:** Collage making: Assign the students to prepare a collage on some social or educational issues.

**Activity 10:** Talk show: Invite some experts, conducted a talkshow on topics related to the syllabus like Cyber crime prevention, Plagiarism & copyright;

### **BEN-114 AECC-2 English Communication**

**UNIT 1:** Introduction: Theory of Communication, Types and Modes of communication

**UNIT 2:** Language of Communication: Verbal & Nonverbal; Personal, Social & Business; Barriers & Strategies; Intra-personal, Interpersonal & Group Communication

**UNIT 3:** Speaking Skills: Monologue, Discussion, Group Communication, Effective communication, Mis communication; Interview, Public speech

**UNIT 4:** Reading & Understanding: Close reading, comprehension, summary, paraphrasing, analysis ,&Interpretation, translation( from Indian Language to English & Vice versa) Literary / knowledge texts

**UNIT 5:** Writing Skill: Documenting, Report writing, Making Notes & Letter writing

## **B.A. (HONORS) ENGLISH**

### **SEMESTER-III**

## **BEN-201 AECC-3 Soft Skills**

**Unit-1:** Teamwork

**Unit-2: Emotional Intelligence**

**Unit-3:** Adaptability

**Unit-4:** Leadership

**Unit-5:** Problem solving

Suggested Readings

1. English and Soft Skills. S.P. Dhanavel. Orient BlackSwan 2013
2. English for Students of Commerce: Precis, Composition, Essays, Poems eds. Kaushik, et al.

## **BEN-202 C5- American Literature**

**Unit-I:** Introduction- Students are required to study the social, political, religious, and economic conditions of the respective periods in American writings in English, significant literary movements, influences and literary schools.

**Unit-II:** Walt Whitman-: Song of Myself

Robert Frost: The Road Not Taken, Stopping By Woods in a Snowy Evening.

Sylvia Plath: Tulip, Mirror

**Unit-III:** Ernest Hemingway: The Old man and The Sea

**Unit-IV:** Arthur Miller: Death of a Salesman

**Unit-V:** Emerson: Self Reliance

## **BEN-205 GE-1 Academic Writing and Composition**

**Unit-1:** Introduction to the Writing Process

**Unit-2:** Introduction to the Conventions of Academic Writing

**Unit-3:** Writing in one's own words: Summarizing and Paraphrasing

**Unit-4:** Critical Thinking: Syntheses, Analyses, and Evaluation

**Unit-5:** Structuring an Argument: Introduction, Interjection, and Conclusion, Citing Resources; Editing, Book and Media Review.

**Suggested Readings:**

1. Liz Hamp-Lyons and Ben Heasley, *Study writing: A Course in Writing Skills for Academic Purposes* (Cambridge: CUP, 2006).
2. Renu Gupta, *A Course in Academic Writing* (New Delhi: Orient BlackSwan, 2010).
3. IlonaLeki, *Academic Writing: Exploring Processes and Strategies* (New York: CUP, 2nd edn, 1998).
4. Gerald Graff and Cathy Birkenstein, *They Say/I Say: The Moves That Matter in Academic Writing* (New York: Norton, 2009).

### **BEN-206 British Poetry and Drama: 17th and 18th Centuries**

**UNIT:1** John Milton *Paradise Lost: Book 1*

**UNIT:2** John Webster *The Duchess of Malfi*

**UNIT:3** Aphra Behn *The Rover*

**UNIT:4** Alexander Pope *The Rape of the Lock*

### **Suggested Topics and Background Prose Readings for Class Presentations**

#### **Topics**

Religious and Secular Thought in the 17th Century

The Stage, the State and the Market

The Mock-epic and Satire

Women in the 17th Century

The Comedy of Manners

#### **Readings**

1. The Holy Bible, *Genesis*, chaps. 1–4, *The Gospel according to St. Luke*, chaps. 1–7 and 22–4.
2. Niccolo Machiavelli, *The Prince*, ed. and tr. Robert M. Adams (New York: Norton, 1992) chaps. 15, 16, 18, and 25.
3. Thomas Hobbes, selections from *The Leviathan*, pt. I (New York: Norton, 2006) chaps. 8, 11, and 13.
4. John Dryden, ‘A Discourse Concerning the Origin and Progress of Satire’, in *The Norton Anthology of English Literature*, vol. 1, 9th edn, ed. Stephen Greenblatt (New York: Norton 2012) pp. 1767–8.

### **BEN-202B C5-Seminar**

#### **Instructions:**

- Students should be assigned with topics regularly related to the syllabus and of current importance
- They must be encouraged to do sincere library reading of related books with the help of the teacher.
- Every week, the students should be given chance to prepare & present a topic. The presentation should be evaluated and the record of the content and evaluation should be kept with the faculty member’s signature.

- Each student should have a Seminar file which keeps the records of all their presentations with the evaluation
- One student should complete 8 EFFECTIVE & SUCCESSFUL presentations in a semester to secure the 2 credits
- In case of PPT. presentation, the faculty should collect the PPT. Presentation and the full paper prepared on that.
- Topics should be different for each student in each presentation. The faculty should prepare meaningful topics well in advance.
- Faculty members should have a clear idea about the reference books available on the Courses they are dealing with.
- Along with oral presentation, assess the handwriting of the students also.

### **BEN-251 Soft Skills Lab**

**Objective:** To empower the language proficiency; to learn to refer and gather information; to enhance the speaking skills

1. News paper reading and making write up on news events; presenting the write up
2. Listening Comprehension:
  - a. Video Tapes
  - b. Dialogue
3. Preparing speech on given topic with the help of Internet
4. Creative Writing
5. Role Play
6. Turn Coat
7. Group Discussion
8. Reading Comprehension
9. Picture/Cartoon Interpretation
10. Telephone Conversation

## **B.A. (HONORS) ENGLISH**

### **SEMESTER-IV**

### **BEN-211 Presentation Skills**

**UNIT 1:** Theories of Communication – Oral and Written Communication – Features of oral communication –word stress – intonation - falling and rising tones

**UNIT 2:** Conversations – Vocabulary – Introducing yourself – Body Language – Public speaking - Debates – Group Discussion – Discussion Skills – Interview skills and etiquettes – Meetings - Voice and delivery – Dress code – Class seminar presentation – Viva voce.

**UNIT 3:** Effective Presentation- Planning, Preparation, Delivery, Feed back, Tips to over come fear

**UNIT 4:** Telephone skills – Handling calls – Leaving messages – Making enquiries – Placing an order – Booking and arrangements – Change of plan – Handling complaints.

**UNIT 5** Computer aided presentations – Basic computer skills – OHP – Preparation of slides – Power point presentation – Visuals and sounds.

### **Reading List**

1. Ashok Thorat&MuniraLokhandwala: Enriching Oral & written Communication in English (Orient Black Swan)
2. Kenneth Anderson, Joan Maclean & Tony Lynch : Study Speaking – A Course in Spoken English for Academic Purposes – (CUP)
3. PriyadarshiPatnaik : Group Discussion and Interview Skills – Foundation Books)
4. B. Jean Naterop& Rod Revell : Telephoning in English (CUP)

### **BEN-252 Presentation Skill Lab**

1. **Listening Skills:** Make each student speak for one minute on any topic of choice, make another student repeat the content of the speech, assess the comprehension skill of the second student and the expression skill of the first student. Give healthy feed back.
2. **Reading Skill:** Make the students read the given text material with proper tone & clarity, Let the teacher ask questions based on the read matter, make students also frame questions and present them to the other students. Each student's participation is mandatory.
3. **News paper Head lines:** Give a demo of News reading, make the students read the news in proper tone and clarity; make them prepare news from the news paper and present it.
4. **Elocution:** Assign topics in advance and make them prepare well for 3 to 4 minutes speech and to give the presentation; focus on the body language , paralanguage & the delivery of content. This activity should enable students to get out of stage fear.
5. **Extempore:** Assign instant topics of great interest and and of current value, encourage them to express their views for 1 to 2 minutes, evaluate their performance with effective feedback

6. **Advertising:** Let the students go through variety of advertisements, make them imitate the ads of their interest in pairs or groups, assign them with products and encourage them to advertise that product. Let the student assess the quality of the presentation.
  
7. **Formal speech:-** Make the students understand the types of speeches like Welcome address, Introduction speech, Vote of thanks, Inaugural address, felicitation speech etc. Assign them with different types of speeches with a context and make them deliver the speech.
  
8. **Group Discussion:** Students are now familiar with GD. Assign them with topics of more importance and encourage to discuss in groups of 5 to 6 students. Give effective feed back about their various group behaviour.
  
9. **Power point Presentation:** Assign topics of academic importance and ask them to give presentation. Evaluate the preparation of the slide and also the delivery of the content.
  
10. **Interview:** Assign with different contexts / industry and conduct interview. Assess their presentation including their appearance, soft skills & the subject knowledge.

**Evaluation:** Practical classes carry 7 marks each for 10 Labs which goes to the internal marks under the label Lab activity for 70 Marks. Viva carries 30 Marks which includes a general evaluation of the students' language proficiency. Marks are given as per the grades.

## **BEN-212 European Classical Literature – An Overview**

**UNIT 1:** The Epic; Comedy & Tragedy in Classical drama; The Athenian City State; Catharsis & Mimesis; Satire; Literary culture in Augustan Rome

**UNIT 2:** Homer: The Iliad, tr. E.V. Rieu

**UNIT 3:** Sophocles: Oedipus the King, tr. Robert Fagles in Sophocles: The Three Theban Plays, Sophocles

**UNIT 4:** Plautus: Pot of Gold, tr. E.F. Watling

**UNIT 5:** Ovid: Selections from Metamorphoses, Bacchus' (Book III), 'Pyramus and Thisbe' (Book IV), 'Philomela' (Book VI) tr. Mary M. Innes Horace Satires 1:4 In Horace: Satires and Epistles and Persius: Satires, tr. Niall Rudd

Reading:

1. Aristotle : Poetics (tr.) Malcolm Heath, London, Penguin -1996, Chap. 6-17, 23, 24 & 26

2. Horace: Ars Poetica, tr. Rushton Fairclough, Horace Satires: Epistles and Ars Poetica (Harvard University Press 2005) PP-453-71
3. Plato : The Republic Book X, tr. Desmond Lee (London, Penguin -2007)

### **BEN-213 Literature of 19 Century & Early 20<sup>th</sup> Century**

**UNIT 1:** Postcolonialism – An Introduction: post-modernism, post-colonialism, feminism, humanism, realism, magic realism, naturalism, Characteristics of Postcolonial world & Literature

**UNIT 2:** Gayatri Spivak: Can the Subaltern Speak?

**UNIT 3:** Frantz Fanon, The Wretched of the Earth (Chapter-1)

**UNIT 4:** Chinua Achebe: Things Fall Apart ; Jean Rhys: Wide Sargasso Sea

**UNIT 5:** J.M. Coetzee: Disgrace; Salman Rushdie: Midnight's Children

#### **Reference Books:**

1. The Postcolonial Studies Reader ed. Bill Ashcroft, Gareth Griffiths, Helen Tiffin (London, Routledge, 1995)
2. Ania Loomba, Colonialism/Postcolonialism 2<sup>nd</sup> ed. ( London, Routledge, 2007)
3. Leela Gandhi, Postcolonial Theory: A Critical Introduction (New Delhi, Oxford Univ Press. 1998)
4. Rushdie's Midnight's Children: A Book of Readings ed. Meenakshi Mukherjee ( Delhi: Pencraft, 2003)

### **BEN-214 Literary criticism – An Introduction**

**UNIT 1 - CLASSICAL AGE** Aristotle: Concepts of tragedy, plot, Character; Plato: Concept of Art, criticism of poetry and drama (Contemporary relevance of the ideas in the above to be discussed)

**UNIT 2 – INDIAN AESTHETICS** Theory of Rasa, Vyanjana and Alankara. (The relationship between Module I & II to be discussed. For eg. The concept of Rasa and purgation, Alankara and figures of speech etc.

**UNIT 3 – MODERN CRITICISM** (This section is meant to make the students familiar with modern critical Movements and writing.) **MOVEMENTS IN CRITICISM:** Classicism, neo-classicism, romanticism, symbolism, Russian formalism, Marxist criticism, absurd literature, modernism, structuralism, post-structuralism, deconstruction, , psycho- analytic criticism

\* William Wordsworth: Preface to Lyrical Ballads- Paragraphs 5-12 \* Ferdinand de Saussure: Nature of the Linguistic Sign. \* Elaine Showalter- Towards a Feminist Poetics

**UNIT 4 : CRITICAL TERMS AND CONCEPTS** This is a section meant to familiarize students with the various tools, movements and concepts in criticism. This may include the following:- Figures of



Speech: Simile, metaphor, synecdoche, metonymy, symbol, irony, paradox. Movements: Concepts: Objective correlative, Ambiguity, intentional fallacy, affective fallacy, negative capability, myth, archetype. Literary Forms: Lyric, Ode, Elegy, epic, sonnet, ballad, dramatic monologue, melodrama, tragic- comedy, farce, and satire

**UNIT 5: CRITICAL APPRECIATION:** Critical analysis of short poems and short stories are to be done by students. The students may be asked to analyse pieces in terms of theme, diction, tone, figures of speech, imagery etc.

### **FURTHER READING**

1. Abrams, M.H. A Glossary of Literary Terms.VII edn. Thomson Heinle , India, 1999.
2. Peck, John and Martin Coyle. Literary Terms and Criticism. Macmillan, London,1993.
3. Sethuraman, V.S. et al. Practical Criticism . Macmillan, India,1990.
4. An Introduction to the Hudson, W.H. Study of literature 8 Literature Criticism and Croft, Steven et al. Oxford University press, Page 55 of 92 55 Style 1997
5. Literary Theory: The Bertens, Hans Routledge, 2001 Basics 10 Literary Theory for the Klages, Mary India: Viva Books, 2007 Perplexed
- 6.Aristotle. “Poetics” classical appendix in English Critical Texts , OUP, Madras, 1962.
7. Prasad, B. An Introduction to English Criticism. Macmillan, India, 1965. pp 1-28.
8. Das Guptha,S.N. “The Theory of Rasa”, (pp 191 -196) in Indian Aesthetics : An Introduction ed.. V.S.Sethuraman, Macmillan, India, 1992.
9. KuppaswamiSastri. “The Highways of Literary Criticism in Sanskrit” (pp 173 - 190), in Indian Aesthetics : An Introduction ed.. V.S. Sethuraman, Macmillan, India, 1992.
10. Raghavan, V. “Use and Abuse of Alankara”(pp 235 - 244) in Indian Aesthetics An Introduction. India , Macmillan, 1992.

5. WEB RESOURCES      [www.literatureclassics.com/ancientpaths/litcrit.html](http://www.literatureclassics.com/ancientpaths/litcrit.html)  
[www.textec.com/criticism.html](http://www.textec.com/criticism.html)      [www.ipl.org/div/litcrit](http://www.ipl.org/div/litcrit)      [www.assumption-edu/users/ady/HHGateway/Gateway/Approaches.html](http://www.assumption-edu/users/ady/HHGateway/Gateway/Approaches.html)  
[www.maiteospace.com/englishodyssey/Resources/litcrit.html](http://www.maiteospace.com/englishodyssey/Resources/litcrit.html)

### **BEN-215 Science Fiction & Detective Literature**

**UNIT 1:** Introduction to Detective Literature- Crime across the media; constructions of criminal identity; cultural stereotypes in crime fiction; Crime fiction & cultural nostalgia; Crime fiction & ethics; crime & censorship

**UNIT 2:** WilkieCollins :The Woman in White

**UNIT 3:** Arthur Conan Doyle :The Hound of the Baskervilles

**UNIT 4:** Raymond Chandler :The Big Sleep

**UNIT 5:** H.R.F.Keating :Inspector Ghote Goes by Train

**Books for Reading:**

1. J.Edmund Wilson : Who Care Who Killed Roger Ackroyd
  2. George Orwel: Raffles & Miss Blandish
  3. W.H.Auden : The Guilty Vicarage [harpers.org/archive/1948/05/the-guilty-vicarage/](http://harpers.org/archive/1948/05/the-guilty-vicarage/)
- Raymond Chandler :The Simple Art of Murder  
<http://www.en.utexas.edu/amlit/amlitprivate/scans/chandlerart.htm/>

PD-293A Inter-personal Skills

**OBJECTIVE**

To acquaint the students with the understanding of self development through good inter-personal skills for effective social communication in order to succeed in maintaining relationships in professional and social environments. This module will also help at learning group discussions and interview skills to enable better employability of the students.

1. **Goal setting** : Types of goals , Smart & precise goals , “personal , professional , life” goals setting techniques
2. **Assertiveness and Confidence:** Assertiveness; being confident; strategies to make assertive NO easier; dealing with emotions; difference between being aggressive and being aggressive.
3. **Entrepreneurial Skills** - Meaning , awareness , Entrepreneurial Competencies , advantages , risks involved , Avenues & Opportunities , support for govt. , awareness sessions , planning , project , case studies , sessions by experts.
4. **Corporate grooming** – culture, behavior, do’s & don’ts, hygiene, physical presentation for males & females.
5. **Being Professional** –Dining Etiquette, professional by being social, respecting cultural heritage, telephonic manners, email, writing, media awareness
6. **Interview Skills** & Group Discussion skills, Aptitude. Data Interpretation: Venn Diagram, Bar graph, Line Graph, Pie Charts, Tabular data, Net Diagrams.

**REFERENCE BOOKS**

1. Haddon, F. Peter, ”Mastering Personal and Interpersonal Skills”, Viva Books Pvt. Ltd., 2003
2. Schuller, Robert H., “Tough Times Never Last But Tough People Do”, Orient Paperbooks, 1988
3. Bolton, Robert, “People Skills”, Touchstone Books, 1986
4. Jansaz, De Suzanne, ” Interpersonal Skills in Organizations”, 3<sup>rd</sup> Edition, McGraw Hill Education (Asia), 2009
5. Fontana, David, “Social Skills at Work”, Universities Press, 2000
6. Burns, James Mac Gregor, “Leadership”, Harper Perennial, 1982
7. Harris, Godfrey, ”Art of Conversation”, Jaico Publishing House, 2002
8. Ganguly, Anand, ”Group Discussions and Interviews”, Ramesh Publishing House, 2008

## **B.A. (HONORS) ENGLISH**

### **SEMESTER-V**

#### **BEN-301 Applied Language Skills**

**UNIT 1: Communication** – Theories of communication- Oral and Written Communication – Features of oral communication – effective way of communication – barriers of communication – disadvantage and advantage of oral and written communication

**UNIT 2: Team Work** - Introduction to team work- Social loafing- Difference between team building and team work- ways to solve problems in a team- Group vs Team

**UNIT 3: Emotional Intelligence** - Introduction to Emotional intelligence- Modes of Emotional intelligence- skills of Emotional intelligence- ways to deal with Emotional imbalance

**UNIT 4: Professional Skills and Body Language**- Introduction to Professional skills and Body Language- Effective use of Body Language- how to acquire professional skills- Professional life vs Personal life

**UNIT 5: Review about the Topic**- Analysis of T.V Programme- Reality vs Fake- Analysis of day to day activities- Analysis of Government

#### **BEN-351 Applied Language Skills Lab**

**Objective:** The Language Lab activities are framed with the specific purpose of enhancing the communication power of the students; to develop the skill to generate language through creative expressions; to develop confidence & fluency through structured and well prepared speeches; to develop proficiency to browse the internet and do the reference work and gather information; to practise attractive etiquettes and manners to be a better personality

#### **English Language Lab: Ten practical classes. Following activities are distributed:-**

1. Listening to an audio clip ( a speech / an interview) and write down the summary or answer the questions.
2. Read the given passage and answer the given questions and also make a precise of the given passage.
3. Reading skill: Make the students read the given text individually in front of the class. The reading should be audible, clear and with proper intonation and pausing.

4. English Edge Self learning Intermediate & Advanced programme – Each module should be cleared systematically as time permits. Students are free to go at their pace with the module even while they are away from the campus.
5. JAM – Train the student to speak on the topic with clarity and confidence. They may be given sometime to write down the points and then to present it in front of the class.
6. GD – Give clear idea about the rules and purpose of GD, give a video clip on GD and discuss the merits and demerits, start with the most comfortable topic like the discussion on the popularity of a movie or some topics which they all are very familiar with, give correct feedback ; ensure the participation of each student.
7. Interpretation – Show video clips of cartoons / some interesting pictures and make students express their feelings orally in simple sentences. Make each student interpret the same picture and let them enjoy the variety of ideas. They have to record their thoughts in paper.
8. Discussion – Conduct discussion on the prescribed soft skills and let them do case studies and share their observations from the prominent corporate offices; Make them realize the importance of those soft skills in their personal life.
9. Research Paper: Make the students go through the sample Research papers, and then give topics to prepare Research papers
10. Presentation:- Give a presentation ( well prepared) on the given topic.

**Note:** By the end of the semester, the student must be well versed in expressing their thoughts independently, sharing their views in a group with confidence, to think freely and critically on any issue and to refine their personality with positive qualities.

## **BEN-302 Postcolonial Literature**

**UNIT 1: Post Colonialism** – Introduction to Post Colonialism, Feminism-Humanism- Magic realism- Characteristics of Postcolonial world & Literature

**UNIT 2:** Chinua Achebe: Things Fall Apart- Gabriel Garcia Marquez: Chronicle of a Death Foretold

**UNIT 3:** Bessie Head: The Collector of Treasures- Ama Ata Aidoo: The Girl who can

**UNIT 4:** Mamang Dai : Small Towns and the River, The Voice of the Mountain- Grace Ogot: The Green Leaves

**UNIT 5:** Pablo Neruda: Tonight I can Write, The Way Spain Was- Derek Walcott: A Far Cry from Africa, Names

## **BEN 303 LANGUAGE LITERATURE AND CULTURE**

### **UNIT 1**

1. Morpheme
2. Slang

### UNIT 2

3. Language and Identity
4. Language and gender
5. Link Language

### UNIT 3

6. Multilingualism
7. Communication
8. National language
9. Written Language

### UNIT 4

Factors contributing to Language change

Role of speaker, listener and message in communication

Role of Hindi in independence movement in India

**NIRGUN AND SAGUN BHAKTI MOVEMENT**

Sangam literature

Eklavya episode from Mahabharata

Relevance of folk songs

### UNIT 5

Select poems of Mirabai, her rebellious attitude.

Kabir

Cinema as a socially meaningful medium

Role of advertisement on children

Globalisation and culture

## **BEN-304 Literary Theory**

**Unit 1:** Basic concepts of structuralism, Post structuralism, Saussurean linguistics, Dialogism, Deconstruction.

**Unit 2:** Introduction to different theories of Postcolonialism, Orientalism, Psychopathology of Colonialism, Subaltern, Diaspora, Cosmopolitanism.

**Unit 3:** Marxist theory and class, Marxism and culture, Art, work and production, Ideology, Hegemony.

**Unit 4:** Introduction to feminism, Difference between sex and gender, Social construction of gender, Materialistic view of feminism, A brief study of the works of Mary Wollstonecraft and Simone de Beauvoir.

**Unit 5:** Introduction to the basic concepts of Neo Historicism and Cultural Materialism, Culture as text and Cultural Text, the politics of interpretation.

### **BEN-305 Indian Classical Literature**

**UNIT 1:** Introduction to Indian Classical Literature

**UNIT 2:** Kalidas: Abhijanamsakuntalam

**UNIT 3:** Mahabharat: Dicing, Dicing sequel

**UNIT 4:** [Ilango Adigal](#): Silappatikaram: The Tale of an Anklet

**UNIT 5:** [Panini](#): [Ashtadhyayi](#)

## **B.A. (HONORS) ENGLISH**

### **SEMESTER-VI**

#### **BEN-307- Literature of the Indian Diaspora**

##### **UNIT 1**

- A brief introduction to Diaspora and Diasporic writings (background, explanation and details)
- Bhabha, Homi K: "The location of Culture"
- Iyenagar, K.R Srinivas: "Indian writing in English"
- Spivak, Gayatri Chakravorty: "Diasporas Old and New: Women in the Transnational World"

##### **UNIT 2**

- Lahiri, Jhumpa: *The Namesake*
- Parmeswaran, Uma: *Trishanku*

##### **UNIT 3**

- Ghosh, Amitav: *Shadow Lines*

- Lahiri, Jhumpa: *Unaccustomed Earth* (Stories from the collection)

#### UNIT 4

- Alexander, Meera : *Night theatre*  
*Dog days of Summer*  
*Impossible grace, a poem and journey*

#### UNIT 5

Aziz, Nurejan: Tales from *My mother's ashes* (selected stories)

Mistry, Rohinton: Selected stories from *Firozshah Bagh*

### **BEN-308 Modern European Drama**

**UNIT 1:** Henrik Ibsen *Ghosts*

**UNIT 2:** Bertolt Brecht *The Good Woman of Szechuan*

**UNIT 3:** Samuel Beckett *Waiting for Godot*

**UNIT 4:** Eugene Ionesco *Rhinoceros*

**UNIT 5:** August Strindberg *Miss Julie* (Methuen)

Suggested Topics and Background Prose Readings for Class Presentations

**Topics:** Politics, Social Change and the Stage Text and Performance European Drama: Realism and Beyond

Tragedy and Heroism in Modern European Drama

The Theatre of the Absurd Readings 1. Constantin Stanislavski, *An Actor Prepares*, chap. 8, 'Faith and the Sense of Truth', tr. Elizabeth Reynolds Hapgood (Harmondsworth: Penguin, 1967) sections 1, 2, 7, 8, 9, pp. 121–5, 137–46. 2. Bertolt Brecht, 'The Street Scene', 'Theatre for Pleasure or Theatre for Instruction', and 'Dramatic Theatre vs Epic Theatre', in *Brecht on Theatre: The Development of an Aesthetic*, ed. and tr. John Willet (London: Methuen, 1992) pp. 68–76, 121–8. 3. George Steiner, 'On Modern Tragedy', in *The Death of Tragedy* (London: Faber, 1995)

### **BEN-309 BRITISH LITERATURE POST WORLD WAR II**

**UNIT 1:** John Fowles *The French Lieutenant's Woman*

**UNIT 2:** Jeanette Winterson *Sexing the Cherry*

**UNIT 3:** T.S Eliot 'The Love Song of J. Alfred Prufrock' 'Sweeney among the Nightingales' 'The Hollow Men'

**UNIT 4:** Phillip Larkin ‘Whitsun Weddings’ ‘Church Going’ Ted Hughes ‘Hawk Roosting’ ‘Crow’s Fall’ Seamus Heaney ‘Digging’ ‘Casualty’

**UNIT 5:** Look Back in Anger John Osborne

Suggested Topics and Background Prose Readings for Class Presentations Topics

Postmodernism in British Literature Britishness after 1960s Intertextuality and Experimentation Literature and Counterculture Readings

1. Alan Sinfield, ‘Literature and Cultural Production’, in *Literature, Politics, and Culture in Postwar Britain* (Berkeley and Los Angeles: University of California Press, 1989) pp. 23–38.

2. Seamus Heaney, ‘The Redress of Poetry’, in *The Redress of Poetry* (London: Faber, 1995) pp. 1–16.

3. Patricia Waugh, ‘Culture and Change: 1960-1990’, in *The Harvest of The Sixties: English Literature And Its Background, 1960-1990* (Oxford: OUP, 1997)

### **BEN-310 Women Writings in 19<sup>th</sup> and 20<sup>th</sup> century**

#### **Women’s writing in the Nineteenth and Twentieth Century**

**UNIT 1:** Elizabeth Barrett Browning :Aurora Leigh, Book V, lines 1-447

**UNIT 2:** Emily Dickinson: Because I Could not Stop for Death, Elysium is as Far as to, I Had no Time to Hate, I Felt a Funeral in My Brain, I Heard a Fly Buzz, The Soul Selects Her Own Society.

**UNIT 3:** Sylvia Plath :Daddy, Lady Lazarus, Soliloquy of a Soliloquist, Mirror

**UNIT 4:** Katherine Mansfield: Bliss

**UNIT 5:** Mahasweta Devi: ‘Draupadi,’ in Gayatri Chakravarty Spivak, *In Other Worlds*, pp. 179-96

### **BACKGROUND/SUGGESTED READINGS:**

1. Virginia Woolf, Chapter 1 and selections from Chapter 3 of *A Room of One’s Own* (New York: Harvest HBJ, 1957), pp. 3-24 and 48-59.
2. Simone de Beauvoir, ‘Introduction’ in *The Second Sex*, in *New French Feminisms*, eds.Elaine Marks and Isabelle de Courtivron (New York: Schocken Books, 1981), pp.41-56.
3. Cora Caplan, ‘Women and Language,’ in Deborah Cameron,ed., *Feminist Linguistics: A Reader*.

### **BEN-311 Research Methodology**



**UNIT 1 :** Definition, Characteristics, Objectives. Types of Research. Research Ethics and Integrity. Criteria of Good Research.

**UNIT 2:** Research Process. Basic Overview: Formulating the Research Problem, Defining the Research Problem, Research Questions, Research Methods vs. Research Methodology.

**UNIT 3:** Literature Review, Formulation of Hypothesis, Characteristics of Hypothesis, Research Design, Data Collection, Questionnaires, Case Study Method.

**UNIT 4:** Writing an Article, Essay, Research Paper, Thesis, Dissertation, Reviews - Book Review, Case Review.

**UNIT 5:** Citation Methods, Foot Note, End Note, Bibliography, Citation Rules: MLA, APA, Chicago.

#### **Books for Reference:**

Correa, Delia da Sousa. *The Handbook to Literary Research*. New York: Routledge, 2009. Print.

Griffin, Gabriele. *Research Methods for the Arts and Humanities*. Edinburgh: Edinburgh University Press, 2005. Print.

#### **BEN 312 TECHNICAL WRITING**

**UNIT 1: INFORMAL CONVERSATION Vs FORMAL EXPRESSION:** Project and Report Writing and Proposals, Paragraph writing and Voice Modulation, Paper Writing and Paper Reading, Informal dialogue writing.

**UNIT 2: TECHNICAL PRESENTATION:** Types of presentation- video conferencing- participation in meetings- chairing sessions.

**UNIT 3: FORMAL AND INFORMAL INTERVIEWS:** Ambiance and polemics- interviewing in different settings and for different purposes e.g. eliciting and giving information; recruiting; performance appraisal, Writing a CV.

**UNIT 4: WRITTEN COMMUNICATION:** Differences between spoken and written communication- features of effective writing such “as clarity; brevity; appropriate tone clarity; balance etc, notices, report Writing

**UNIT 5: LETTER-WRITING:** Business form culture-style-effectiveness; promptness- Analysis of sample letters collected from industry- email; fax.

#### **TEXT BOOK**

Pal Rajendra, Korlaha, Hi, J.S., "Essentials of Business Communication", Sultan Chand & Sons

## REFERENCE BOOKS

1. Rutherford, Andrea, J., "Basic Communication Skills for Technology", Pearson Education Asia.
2. Prasad, V., "Advanced Communication Skills", Atma Ram Publications, New Delhi.
3. Madhukar, R., K., "Business Communication", Vikas Publishing House Pvt. Ltd.

## PD-392A Problem Solving Skills

### OBJECTIVE

- To contribute to the student's ability to solve nonroutine problems
- To expand the student's methods of inquiry and exploration.
- To contribute to the student's ability to form conjectures and check implications.
- To expand the student's understanding of major concepts, methods and applications of quantitative reasoning.
- To help the student to see the importance of problem solving in modern society.

The general method of the course is to involve students in "dynamic processes of inquiry and exploration, logical reasoning, making and testing conjectures, and investigating implications of conclusions" Specifically, the focus is on the processes and tools of quantitative problem solving - learning what they are and developing ability to use them.

1. Problem Solving: The Fundamentals
2. Research/Gathering Data
3. Problem Solving: Determining and Building Your Strengths and Resources
4. Problem Solving: Process, Tools, and Techniques, Quantitative Aptitude
5. Decision Making: The Fundamentals and making tough decisions
6. **UNIT 1: Communication** – Theories of communication- Oral and Written Communication – Features of oral communication – effective way of communication – barriers of communication – disadvantage and advantage of oral and written communication
7. **UNIT 2: Team Work** - Introduction to team work- Social loafing- Difference between team building and team work- ways to solve problems in a team- Group vs Team

8. **UNIT 3: Emotional Intelligence** - Introduction to Emotional intelligence- Modes of Emotional intelligence- skills of Emotional intelligence- ways to deal with Emotional imbalance
9. **UNIT 4: Professional Skills and Body Language**- Introduction to Professional skills and Body Language- Effective use of Body Language- how to acquire professional skills- Professional life vs Personal life
10. **UNIT 5: Review about the Topic**- Analysis of T.V Programme- Reality vs Fake- Analysis of day to day activities- Analysis of Government

## *School of Civil Engineering*

### Scheme for B.Tech. (Regular)

B.Tech.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101B	AppliedMathematics–I	3	1	0	4
2	PH-103B	AppliedPhysics	3	1	0	4
3	CS-105B	ComputerProgramming	3	0	0	3
4	EN-107B	CommunicationSkills–I	3	0	0	3
5	CE-109B	EnvironmentScience andEcology	2	0	0	2
6	CH-113B	Applied Chemistry	3	1	0	4
7	PH-151B	AppliedPhysics Lab	0	0	2	1
8	EN-153B	CommunicationSkillsLab – I	0	0	2	1
9	CS-155B	ComputerProgrammingLab	0	0	2	1
10	CH-161B	AppliedChemistryLab	0	0	2	1
11	ME-163B	ComputerBasedEngineeringGraphics	0	0	4	2
Total			17	3	12	26

B.Tech.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102B	AdvancedMathematicsandNumerical Methods	3	1	0	4
2	EN-104B	CommunicationSkills–II	3	0	0	3
3	BA-106B	Engineering Economics and Industrial Management	3	0	0	3
4	ME-108B	Engineering Mechanics	3	1	0	4
5	EL-111B	Basics of Electrical & Electronics Engg.	3	1	0	4
6	CE-110B	Surveying	3	0	0	3
7	MA-150B	Applied Numerical Methods Lab	0	0	2	1
8	PD-191B	Co-curricular Activities/Hobby Club	0	1	0	1
9	EL-157B	Basics of Electrical & Electronics Engg. Lab	0	0	2	1
10	ME-159B	Workshop Practice–I	0	0	4	2
11	CE-162B	Surveying Lab	0	0	2	1

		<b>Total</b>	<b>18</b>	<b>4</b>	<b>10</b>	<b>27</b>
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<b>B.Tech. (I. B.Tech 3rd Year- SEMESTER-V)</b>			<b>Semester</b>			<b>III</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-201B	StructuralAnalysis-I	3	1	0	4
2	CE-203B	Surveying-II	3	1	0	4
3	CE-205B	FluidMechanics-I	3	1	0	4
4	CE-207B	WaterSupply&WasteWaterEngineering	3	1	0	4
5	CE-209B	EngineeringGeology	3	1	0	4
6	CE-251B	StructuralAnalysis-IILab	0	0	2	1
7	CE-253B	SurveyingIIILab	0	0	2	1
8	CE-255B	FluidMechanics-IILab	0	0	2	1
9	CE-257B	EngineeringGeologyLab	0	0	2	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>8</b>	<b>24</b>

<b>B.Tech. (I. B.Tech 3rd Year- SEMESTER-VI)</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-202B	EnvironmentalEngineering	3	1	0	4
2	CE-204B	FluidMechanicsII	3	1	0	4
3	CE-206B	StructuralAnalysis–II	3	1	0	4
4	CE-208B	TransportationEngineering–I	3	1	0	4
5	CE-210B	DesignofConcreteStructures –I	3	1	0	4
6	CE-252B	EnvironmentalEngineeringLab	0	0	2	1

7	CE-254B	FluidMechanics–IILab	0	0	2	1
8	CE-256B	StructuralAnalysis – IILab	0	0	2	1
9	CE-258B	TransportationEngineering-IILab	0	0	2	1
10	CE-260B	CADLAB	0	0	2	1
<b>Total</b>			<b>15</b>	<b>5</b>	<b>10</b>	<b>25</b>

<b>B.Tech. (I. B.Tech 4<sup>th</sup> Year- SEMESTER-VII)</b>			<b>Semester</b>			<b>V</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-301B	BuildingConstruction &Material	3	1	0	4
2	CE-303B	ConcreteTechnology	3	1	0	4
3	CE-305B	GeotechnicalEngineering– I	3	1	0	4
4	CE-307B	Costing,Estimating,Billing&Accounts	3	1	0	4
5	CE-309B	DesignofSteelStructure–I	3	1	0	4
6	CE-351B	BuildingConstruction&Material Lab	0	0	2	1
7	CE-353B	ConcreteTechnologyLab	0	0	2	1
8	CE-355B	GeotechnicalEngineering-IILab	0	0	2	1
<b>Total</b>			<b>15</b>	<b>5</b>	<b>6</b>	<b>23</b>

<b>B.Tech. (3<sup>rd</sup> YearSEMESTER–VI)</b>			<b>Semester</b>			<b>VI</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-302B	HighwayPlanning&Management	3	1	0	4
2	CE-304B	Construction&Pavement Materials	3	1	0	4
3	CE-306B	BridgeEngineering	3	1	0	4
4	CE-308B	MassTransportSystem	3	1	0	4

5	CE-310B	AirportEngineering	3	1	0	4
6	CE-352B	MaterialTestingLab	0	0	4	2
<b>(SpecializationinStructuralEngineering)</b>						
7	CE-312B	DesignofConcreteStructure-II	3	1	0	4
8	CE-314B	Advanced DesignofSteelStructures	3	1	0	4
9	CE-306B	BridgeEngineering	3	1	0	4
10	CE-316B	IndustrialStructures	3	1	0	4
11	CE-318B	StructuralDynamics	3	1	0	4
12	CE-352B	MaterialTestingLab	0	0	4	2
<b>Total</b>			<b>30</b>	<b>10</b>	<b>8</b>	<b>44</b>

<b>B.Tech. (4<sup>th</sup> Year SEMESTER – VII)</b>			<b>Semester</b>			<b>VII</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-401B	RailwayEngineering	3	1	0	4
2	CE-403B	Docks&HarbourEngineering	3	0	0	3
3	CE-405B	Transportation&Environment	3	0	0	3
4	CE-407B	Analysis &DesignofPavement	3	1	0	4
5	CE-409B	TrafficEngineering	3	1	0	4
6	OE	OpenElective–I	3	0	0	3
7	CE-451B	Traffic&TransportEngg.Lab.	0	0	2	1
8	CE-	Seminar	0	0	4	2

	453B					
9	PDP	ProblemSolvingSkill	0	1	0	1
<b>Specialization in Structural Engineering</b>						
1	CE-411B	CompositeMaterials	3	0	0	3
2	CE-413B	AdvancedStructuralAnalysis	3	1	0	4
3	CE-415B	EarthquakeAnalysis&DesignofStructures	3	1	0	4
4	CE-417B	AdvancedRCCDesign	3	1	0	4
5	CE-419B	Construction&MaintenanceManagement	3	0	0	3
6	OE	OpenElective–I	3	0	0	3
7	CE-453B	Seminar	0	0	4	2
8	CE-455B	AdvancedStructuralEngg.Lab	0	0	2	1
9	PDP	ProblemSolvingSkill	0	1	0	1
		<b>Total</b>	<b>36</b>	<b>8</b>	<b>12</b>	<b>50</b>

<b>B.Tech. (I. B.Tech 5<sup>h</sup> Year- SEMESTER-IX)</b>			<b>Semester</b>			<b>VIII</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-402B	MOOC	3	0	0	3
2	CE-452B	Internship	0	0	32	16
		<b>Total</b>	<b>3</b>	<b>0</b>	<b>32</b>	<b>19</b>

### Departmental Elective– I



B.Tech.			Semester			
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CE-423A	Environmental Pollution and Control	3	0	0	3
2	CE-431A	Open Channel Flow	3	0	0	3
3	CE-442A	Professional Studies and Advancement	3	0	0	3
4	CE-433A	Environmental Impact Assessment & Management	3	0	0	3
Total			12	0	0	12

### Departmental Elective – II

B.Tech. (I. B.Tech 5 <sup>h</sup> Year- SEMESTER-IX)			Semester			
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CE-424A	Advance Geo-tech Engineering	3	0	0	3
2	CE-443A	Basic of Green Building	3	0	0	3
3	CE-462A	Advance Construction Material & Equipment	3	0	0	3
4	CE-463A	Repair & Maintenance of Building	3	0	0	3
Total			12	0	0	12

## Vision

To contribute to India and the World through excellence in scientific and technical education and research; to serve as a valuable resource for industry and society; and remain a source of pride for all Indians.

## Mission

- ☐ To generate new knowledge by engaging in cutting-edge research and to promote academic growth by offering state of- the-art undergraduate, postgraduate and doctoral programmes.
- ☐ To identify, based on an informed perception of Indian, regional and global needs, areas of specialization upon which the Institute can concentrate.
- ☐ To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry.
- ☐ To develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

## Values

- ☐ Academic integrity and accountability.
- ☐ Respect and tolerance for the views of every individual.
- ☐ Attention to issues of national relevance as well as of global concern.
- ☐ Breadth of understanding, including knowledge of the human sciences.
- ☐ Appreciation of intellectual excellence and creativity.
- ☐ An unfettered spirit of exploration, rationality and enterprise.

## Courses of Study 2017 – 2021

(Applicable to Undergraduate Students of Entry Year 2017)

Bachelor of Technology In

Civil Engineering

Department of Civil Engineering

Lingaya's Vidyapeeth, Faridabad

## Preface

There has been a concern about quality of technical education in India although in terms of access and equity, India has done very well. Lingaya's Vidyapeeth is mandated for planned and coordinated development of Technical Education with the guidelines of AICTE; regulate proper maintenance of norms & standards and expansion of technical Education with Quality.

During the meetings held for developing model curriculum for undergraduate engineering courses, a concern was shared that in the present system, the first-year syllabus is heavily loaded and it is of utmost importance that the students entering into the first year of an engineering course should feel at ease by lowering the burden of syllabus and credits. This is necessary for a student to acclimatize to the new environment of a college and to create a bonding between the teacher and a student. An idea to introduce induction program in the curriculum to equip the students with communication skills, and get them acquainted with the culture of institution and human values was formalized. A student has to undergo this induction program after joining the institute and before the commencement of classes. Normal classes of the engineering program shall begin after the students have undergone a three-weeks induction program. The Induction program for students comprises of Physical activities; Learning an art form; Literature & Cinema; Social Awareness; Lectures & Visits; Universal Human Values; Familiarization to Department/ Branch, College & Innovations.

Also, Lingaya's Vidyapeeth has made one semester internships mandatory before completion of under graduation. This will equip the students with practical understanding and training about industry practices in a suitable industry or organization.

Lingaya's Vidyapeeth will ensure the revision of the model curriculum on regular basis and this updation will certainly help students to achieve better employability; start-ups and other avenues for higher studies.

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## LIST OF ABBREVIATIONS/SYMBOLS

Abb./Symbols	Description
AICTE	All India Council of Technical Education
DCE	Department of Civil Engineering
UG	Under Graduate
PG	Post Graduate
PE	Programme Elective
OE	Open Elective
UID	Unique Identification Number
NC	Non-credited
CE	Civil Engineering
L-T-P	Lecture-Tutorial-Practical
SGPA	Semester Grade Point Average
CGPA	Cumulative Grade Point Average
NP	Not Pass
DGPA	Degree Grade Point Average
R & D	Research & Development

## 1. ACADEMIC SYSTEM

## Introduction

The medium of instruction in the University is English. The University follows the Credit Based Semester System for all courses running in the Civil Engineering Department. The academic year runs from July through June each year and comprises of two regular semesters. Typically, the first semester (odd semester) starts in July and ends in December. The second semester (even semester) starts in January and ends in May. Detailed scheduled for the Semester is given before the commencement of every new semester.

## Academic Structure:

The major academic units of the University are its various Schools and Departments. The activities of departments include teaching and research at all levels.

## (a) Academic Programmes:

Department of Civil Engineering at Lingaya's Vidyapeeth, Faridabad, Haryana offers a variety of academic programmes such as B.Tech, M.Tech & Ph.D for students with a wide range of backgrounds. Admission to these programmes are based on performance in national / University level entrance tests/ other entrance examinations followed by interviews in some cases. The courses offered by Department of Civil Engineering at Lingaya's Vidyapeeth are presently classified into Diploma, Undergraduate, Postgraduate and Research programmes.

This classification is based primarily on entry/admission qualification of students rather than the level of degree offered. For all undergraduate programmes, students are admitted after 10+2 schooling while for all postgraduate programmes, students are admitted after they have obtained at least a college level Bachelor's degree. In certificate and diploma programs the entry level qualification may vary from program to program.

(b) Student's Unique ID/Roll Number (UID):

Each admitted student is given unique identification number (UID). This UID will remain the same during the entire tenure of the student with university. eg. 18CE001 which means the student admitted in 2018 in Civil Engineering Department. For any communication, students must mention their UID/Roll Number.

## 2. COURSE STRUCTURE AND CREDIT SYSTEM

### Course Numbering Scheme

Normally every course at Department of Civil Engineering at Lingaya's Vidyapeeth runs for the full length of the semester. At the beginning of the semester, the students register for courses that they want to study and at the end of the semester a grade is awarded. On obtaining a pass grade, the student earns all the credits associated with the course. A fail grade does not get any credit. Partial credits are also not awarded.

### Credit System:

Education at the University is organized around the semester-based credit system of study. A student is allowed to attend classes in a course and earn credit for it, only if he/she has registered for that course. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grade obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the programme. Also, a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All programmes are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

### Course Credits Assignment:

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One laboratory hour per week per semester is assigned half credit. Some courses are without credit and are referred to as non-credit (NC) courses.

Example: Course CE-202C Soil Mechanics & Engineering Geology, 4 credits (3-1-0) The credits indicated for this course are computed as follows

3 hours/week lectures	= 3 credits
1 hours/week tutorial	= 1 credit
0 hours/week practical	= $0 \times 0.5 = 0$ credit
Total = $3 + 0 + 1 = 4$ credits	

Also, (3-0-2) 4 credit course = (3 h Lectures + 0 h Tutorial + 2 h Practical) per week = 5 contact hours per week

#### Earning Credits:

At the end of every course for which a student has registered, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average. A student has the option of auditing some courses. Grades obtained in these audit courses are not counted for computation of grade point average. However, a pass grade is essential for earning credits from an audit course; this does not apply to postgraduate programmes.

A minimum number of earned credits are required in order to qualify for a degree and continuation of registration at any stage. Currently students in the postgraduate programmes can opt audit courses but they do not count towards earned credits.

The credit system enables continuous evaluation of a student's performance and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

#### Course Content Description

Course content description consists of following components: (i) Course Number, (ii) Title of the Course; (iii) Credit and L-T-P; (iv) Pre-requisites; (v) Overlapping/Equivalent courses; and (vi) Description of the content. An example is given below:

#### GRADING SYSTEM

The grading reflects a student's own proficiency in the course. While relative standing of the student is clearly indicated by his/her grades, the process of awarding grades is not necessarily based upon fitting performance of the class to some statistical distribution. The course coordinator and associated faculty for a course formulate appropriate procedure to award grades that are reflective of the student's performance vis-à-vis instructor's expectation. The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

#### Evaluation of Performance

The performance of a student will be evaluated in terms of three indices, viz. the Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester, Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point in time, and Degree Grade Point Average (DGPA).

The Earned Credits (EC) is defined as the sum of course credits for courses in which A - D or NP or S grades have been obtained.

Points earned in a semester =  $\Sigma$  (Course credits x Grade point) for courses in which A - D grade has been obtained)

The SGPA is calculated on the basis of grades obtained in all courses, except audit courses and courses in which S/Z grade is awarded, registered for in the particular semester.

$SGPA =$

Points secured in the semester

Credits registered in the semester, excluding non credited grade courses

The CGPA is calculated on the basis of all pass grades, except audit courses and courses in which S/Z grade is awarded, obtained in all completed semesters.

$CGPA =$

Cumulative points secured in all courses

Cumulative earned credits, excluding non credited grade courses

#### 4. REGISTRATION AND ATTENDANCE

##### 4.1. Registration

Registration is a very important procedural part of the academic system. The registration procedure ensures that the student's name is on the roll list of each course that he/she wants to study. No credit is given if the student attends a course for which he/she has not registered. Registration for courses to be taken in a particular semester will be done according to a specified schedule before the end of the previous semester. Each student is required to complete the registration form and deposit the semester fee well in advance.



Various activities related to registration, the relevant dates are included in the Semester Schedule that is available before the start of the semester.

#### 4.2. Registration and Student Status

Registration by a student confirms his/her status as student at the University. Failure to register before the last date for registration will imply that the student has discontinued studies and his/her name will be struck-off the rolls.

Every registered student is considered as a full-time student at the University. They are expected to be present at the University and devote full time to academics. Students registered only for a self- study course or only for project or thesis are also considered as full-time students.

#### 4.3. Advice on Courses

At the time of registration, each student must consult his/her Mentor/programme coordinator to finalize the academic programme, keeping in view factors, such as, minimum/maximum numbers of total lecture credits, past performance, backlog of courses, SGPA/CGPA, pre-requisite, work load and student's interests, amongst others.

#### 4.4. Registration Validation

Before the first day of classes, every student is required to be present on campus and validate his/her registration by their class in charges. The updated registration record will be available on the Byndr and the hard copy will be available with the student's advisor/programme coordinator / Examination Section/HOD. Students who do not register themselves will not be permitted to add/drop courses. However, for the first semester, all the courses are compulsory and students need not to do this exercise.

#### 4.5. Late Registration

Late registration is permitted with certain file as applicable.

#### 4.6. Registration for The Practical Training

Before proceeding for practical training or training as part of curricular requirement, the student should register for the respective course after obtaining approval from the training coordinator and Head of the department. On returning after training a continuation grade will be awarded and the students must register for the course in the regular semester immediately following the training period. During this semester, evaluation of the training will be carried out and regular grade will be awarded.

#### 4.7. Continuous Absence and Registration Status

If a student is absent from the University for more than four weeks without notifying the Head of Department/Dean, his/her registration will be terminated and name will be removed from the University rolls.

#### 4.8. Attendance Rule

- a) It is mandatory for the students to attend all classes. Attendance Records of all students for each course will be maintained.
- b) For all 1st year courses the attendance will be taken and maintained by U.G. Section. If any student's attendance falls below 75% attendance in any of these courses, he/she may be put under academic probation. Henceforth, he/she will be governed by the rules for student under academic probation.
- c) For all other courses, the Course Coordinator will announce the class policy on attendance with respect to grading etc., at the beginning of the semester. This shall be done keeping in mind the importance of classroom learning in the teaching-learning process. Once the class attendance policy has been made clear to all the students registered for the course, the Course Coordinator will implement the same in totality.

For the purpose of attendance calculation, every scheduled practical class will count as one unit irrespective of the number of contact hours.

Attendance record will be maintained based upon roll calls (or any equivalent operation) in every scheduled lecture, tutorial and practical class. The course coordinator will maintain and consolidate attendance record for the course (lectures, tutorials and practical's together, as applicable).

## UNDERGRADUATE DEGREE REQUIREMENTS, REGULATIONS AND PROCEDURES

### 5.1 Overall Requirements

B.Tech.

The total credit requirement for the B.Tech. (4-year programme) is 190 credits. For B.Tech. programmes, the total credits are distributed over following categories:

The Undergraduate core (UC) has following categories:

Course

Category	Description
BSC	Basic Science Courses
PCC	Professional Core Courses
HSMC Courses	Humanities and Social Sciences including Management
ESC	Engineering Science Course
PEC	Professional Elective Course
OEC	Open Elective Course

MC	Mandatory Course
PROJ	Project
INT	Internship
MOOC	Massive Open Online Courses
5.2	Degree Requirements Breakup

The degree requirements for the various programmes listed earlier are detailed below.

#### 5.2.1 Earned Credits

- i. Completion of 180 earned credits out of 190 credits for 4-year B. Tech. Programmes subject to pass in all compulsory courses.

These credits are needed to be earned under different categories for individual programmes.

#### 5.2.2 Degree Grade Point Average (DGPA) Requirement

A student must obtain a minimum DGPA of 5.0 to be eligible for award of the B.Tech., M.Tech. programme.

All exceptions to the above conditions will be dealt with as per following regulations:

If a student completes required credits for B.Tech./M.Tech. with DGPA less than 5, then the student will be permitted to do additional elective courses under appropriate category to improve the DGPA within the maximum time limit for completion of B.Tech./ M.Tech. degree respectively, as the case may be. In case a DGPA of 5 or more is achieved within the stipulated period, a B.Tech./ M.Tech. degree will be awarded and in case the same is not achieved no degree will be awarded.

#### 5.2.3 Practical Training

A student of the B.Tech. must complete the prescribed number of days of practical training to the satisfaction of the concerned department. This training will be arranged in the 8th semester. Practical training duration is a minimum of 50 working days. Practical training should be carried out preferably in industry or R & D institutions in India. Practical training in academic institutions is not permitted. In some special cases the permission may be granted with prior approval of Academic Council.

#### 5.2.4 Break-Up of Credits

The breakup of various categories of course are as follows:

Course

Category	Description	Credit
BSC	Basic Science Courses	23
PCC	Professional Core Courses	77
HSMC Courses	Humanities and Social Sciences including Management	16
ESC	Engineering Science Course	23
PEC	Professional Elective Course	20
OEC	Open Elective Course	3
MC	Mandatory Course	3
PROJ	Project	7
INT	Internship	16
MOOC	Massive Open Online Courses	3

The breakup of course semester wise are as follows:

Sr.No.	Semester	Credits
1	First	24
2	Second	20
3	Third	22
4	Fourth	27
5	Fifth	27
6	Sixth	26
7	Seventh	25
8	Eighth	19
Total		190

### 5.3 Lower and Upper Limits for Credits Registered

A student must register for a minimum of 12 credits and a maximum of 27 credits in a semester. The minimum and maximum lecture credits that a student can register for in a semester are 9 and 18, respectively except the 8th semester of B.Tech programme when minimum credits are 9 and maximum credits are 18.

For Integrated M.Tech. programmes, the above limits apply up to the 8th semester. In the 9th and 10th semesters, these students will normally register for a minimum of 9 credits and a

maximum of 22 credits per semester. Under exceptional circumstances a student can register for a maximum of 28 credits including not more than 6 (six) 'L' (Lecture) courses. However, this will be permitted at most twice during the programme in semesters other than 1st and 2nd and those in which the student is registered for Major Project Part 1 or 2. These conditions will not be applicable for those students who are on probation according to the criteria defined.

#### 5.4 Maximum Duration for Completing Degree Requirements

1. The maximum permitted duration of each programme will be determined in terms of number of registered regular semesters, hereinafter called registered semesters. Any semester in which a student has registered for a course will be called a registered semester subject to the following:

(a) Only the 1st and 2nd semesters of an academic year can be registered semesters. The summer semester will not be considered as a registered semester.

(b) A semester when a student has been granted semester withdrawal or granted leave will not be considered as a registered semester.

(c) The semester when a student is suspended from the Institute on disciplinary grounds will not be counted towards the number of registered semesters.

The summer semesters falling in between the permitted registered semesters shall be available for earning credits. After the student has registered for the maximum permissible number of registered semesters, the subsequent summer semesters will not be available for earning credits.

2. The maximum permissible number of registered semesters for completing all degree requirements would be:

Table 9. Maximum permissible duration for completing degree requirements.

#### Programme

Name	Maximum number of registered semesters permitted for completing degree requirements
------	---

B.Tech.	12 (*)
---------	--------

M.Tech.	8 (*)
---------	-------

Note: (\*) If a student opts for the slow-paced programme (as defined in clause B1), then the maximum permissible number of registered semesters shall be increased by two semesters.

## 5.5

### Courses of Special Nature

a)

#### Major Project

A course under this title may be floated by departments from fifth semester onwards. Major project will be a regular course to conduct a design and fabrication type project. The student and teacher would decide upon the topic, prepare a plan of work and get the approval of the Course Coordinator before the end of the semester when the course is registered for. The duration of the course will be the entire semester. A project report would be submitted by the student on completion of the course. The student's performance will be evaluated by a departmental committee via a mid-term and a final evaluation. Major-project can be done jointly by 3 students

b)

#### Practical Training

Practical Training is to be done typically in eighth semester. The duration for practical training is one semester, preferably in an industry or R&D institution in India. Practical training in academic institutions is not permitted.

It is the joint responsibility of the departments and the Training and Placement (T&P) unit to arrange for training for all their students. In the beginning of each academic session, T&P unit will prepare programme-wise lists of potential training organizations in consultation with the respective departments. These organizations will be approached by the T&P unit with a request to provide training seats. Consolidated lists of training offers will be made available to the students through departments in the beginning of the second semester of the session. If a student is interested in making his/her own arrangement for the training seat, he/she will need to have the training organization approved and route the application through the departmental training in charge and T&P unit. All such applications must be completed before the end of first semester. No self-arranged practical training, not approved through the above process, will be allowed and faculty members will not sign any forms for the purpose.

The department will appoint a training supervisor for each student. The supervisor is expected to keep contact with the assigned students through e-mail and /or telephone. The students will be required to get their training plan reviewed by their supervisor within the first week and report their progress on weekly basis. The supervisor, if desired, may visit the organization. Visits within the country will be supported by the institute.

c)

#### Open Category

Open category credits should provide an opportunity to a student to exercise his/her options in an unrestricted fashion.

A student can complete open category credits by choosing courses from different departments. The student will be permitted to register for maximum of 2 courses under open category.

## 5.6

### Major Project Guidelines

All students who are on project are required to submit the report (One per Group) after the work done.

## Evaluation

1. Weightage of different evaluation components are shown in below table

Evaluation Component	Weightage (%)
----------------------	---------------

### Regular Assessment

6 Interaction with Guide of 5 Marks Each	30
--	----

- 2 Presentation of 10 Marks each (PPT + Progress Report)
- Along with Mid Term I & II respectively

20

### End Semester Evaluation

Presentation	15
--------------	----

Viva	15
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Final Report	10
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### Paper Publication/Presentation

Paper Presentation in National or International Conference or seminar held in IIT/NIT.

Paper Presentation in National or International Conference or seminar held in any college.

Paper published in recommended/index journal. Paper published in open access journal.

Paper published/presented in any university

Note: Maximum 10 marks can be obtained in paper presentation/published category.

Total	100
-------	-----

2. Suggested points to be judged through each evaluation component

2.1 Evaluation by supervisor on weekly basis: Observation is a channel for the evaluation of student performance on the basis of their frequent interaction with the faculty supervisor. The students are required to make the handwritten report of their progress in every week with the faculty supervisor.

2.2 Project Report: The draft of the Project Report should be submitted at the submission of project at the campus. The report is a written presentation of the work done by the students on his

overall learning in the project. If a group of students are working on same project they are required to submit individual report.

Guidelines and format for writing a project report are given at the end of document which may be reviewed by faculty supervisor. The assessment of project report will be done by the committee consisting of external examiner and faculty supervisor during presentation.

2.3 Publication on project: The students should publish a paper on project work.

2.4 Presentation/Viva: The students need to present their project report. Through these presentations the faculty supervisor will be able to evaluate the students on their overall learning in the project. This presentation will be conducted at the campus by the committee consisting of external examiner and faculty supervisor.

2.5 Evaluation by Examiner: The evaluation by external examiner will also be done on viva basis.

2.6 Major Project Registration Form: Attached as Annexure I.

2.7 Report Writing Guidelines

- Write in Times New Roman font with 12 font size.
- Spacing between consecutive lines should be 1.5.
- Separate successive paragraphs by before 10 points and after 4 points.
- Page Margins- Top: 1", Bottom: 1", Left: 1.5", Right: 1".
- Figure name, table name, should be in Times New Roman font with 10 font size.
- Chapter title should be bold and write in Arial font with 16 font size.
- Each heading should be bold and write in Times New Roman with 14 font size.
- Subheading should be bold and write in Times New Roman with 12 font size.
- Heading and subheading matter should be in Times New Roman with 12 font size.
- A total of THREE hard bound copies in black color background with text in golden color must be prepared – one for the guide, second for department and third for the library.
- Project Report should be minimum in 60 pages.



- A soft copy containing the document and presentation should be submitted with the report.
- It should completely refer to the synopsis submitted.
- The project work should be implemented at the laboratory before the project Presentation.
- Presentation duration for each group is a maximum of 30 minutes and maximum 2 students can enroll in a group.
- Presentation should be presented through Power Point slide show containing at least 20 slides.
- It is also suggested to students keep one hard copy with them duly signed by the supervisor and External examiner.

#### Course Category Description & Credit Distribution

Course Category	Description	Credit
BSC	Basic Science Courses	23
PCC	Professional Core Courses	77
HSMC Courses	Humanities and Social Sciences including Management	16
ESC	Engineering Science Course	23
PEC	Professional Elective Course	20
OEC	Open Elective Course	3
MC	Mandatory Course	3
PROJ	Project	7
INT	Internship	16
MOOC	Massive Open Online Courses	3

#### Total Credit Count

Sr.No.	Semester	Credits
1	First	26
2	Second	27
3	Third	24
4	Fourth	25

5	Fifth	23
6	Sixth	21
7	Seventh	25
8	Eighth	19
Total		190

B.Tech(CE)

1st Year SEMESTER – I

SN	Category	Course		
Code	Course Name	L-T-P	Cr.	
1	BSC MA-101B 4 ALL	Applied Mathematics – I	3-1-0	4
2	BSC PH-103B ALL	Applied Physics	3-1-0	4
3	ESC CS-105B 3 ALL	Computer Programming	3-0-0	
4	HSMC EN-107B 3 ALL	Communication Skills – I	3-0-0	
5	MC CE-109B 2-0-0 2 ALL	Environment Science and Ecology		
6	BSC CH-113B ME+CE	Applied Chemistry	3-1-0	4
7	BSC PH-151B ALL	Applied Physics Lab	0-0-2	1
8	HSMC EN-153B 0-0-2 1 ALL	Communication Skills Lab – I		
9	ESC CS-155B 1 ALL	Computer Programming Lab	0-0-2	
10	BSC CH-161B 1 ME+CE	Applied Chemistry Lab	0-0-2	
11	ESC ME-163B 0-0-4 2 ME+CE	Computer Based Engineering		

Graphics

## 1st Year SEMESTER – II

SN	Category	Course			
Code	Course Name	L-T-P	Cr.		
1 Numerical Methods	BSC MA-102B	Advanced Mathematics and	3-1-0	4	ALL
2	HSMC EN-104B	Communication Skills – II	3-0-0	3	ALL
3 Industrial Management	MC BA-106B	Engineering Economics and	3-0-0	3	ALL
4	ESC ME-108B	Engineering Mechanics	3-1-0	4	CE+ME
5 Engg.	ESC EL-111B	Basics of Electrical & Electronics	3-1-0	4	CE+ME
6	PCC CE-110B	Surveying	3-0-0	3	CE
7	BSC MA-150B	Applied Numerical Methods Lab	0-0-2	1	ALL
8 Club	PDP PD-191B	Co-curricular Activities/Hobby	0-0-2	1	ALL
9 Engg. Lab	ESC EL-157B	Basics of Electrical & Electronics	0-0-2	1	CE+ME
10	ESC ME-159B	Workshop Practice – I	0-0-4	2	CE+ME
11	PCC CE-162B	Surveying Lab	0-0-2	1	CE
12			14-2-		

### 2nd Year SEMESTER – III

SN	Category	Course Code	Course Name	L-T-P	Cr.
1	PCC CE+ME	CE-201B	Structural Analysis-I	3-1-0	4
2	PCC	CE-203B	Surveying-II	3-1-0	4
3	PCC CE+ME	CE-205B	Fluid Mechanics-I	3-1-0	4
4 Engineering	PCC 3-1-0	CE-207B 4	Water Supply & Waste Water		CE
5	PCC CE	CE-209B	Engineering Geology	3-1-0	4
6	PCC 1	CE-251B CE+ME	Structural Analysis-I Lab		0-0-2
7	PCC CE	CE-253B	Surveying II Lab	0-0-2	1
8	PCC 1	CE-255B CE+ME	Fluid Mechanics-I Lab		0-0-2
9	PCC 1	CE-257B CE	Engineering Geology Lab		0-0-2
		15-5-8	24		

### 2nd Year SEMESTER – IV

SN	Category	Course Code	Course Name	L-T-P	Cr.
1	PCC 4	CE-202B CE	Environmental Engineering	3-1-0	
2	PCC CE	CE-204B	Fluid Mechanics II	3-1-0	4
3	PCC 4	CE-206B CE	Structural Analysis – II		3-1-0
4	PCC 3-1-0	CE-208B 4	Transportation Engineering – I		CE

5	PCC 3-1-0	CE-210B 4 CE	Design of Concrete Structures – I	
6	PCC 0-0-2	CE-252B 1 CE	Environmental Engineering Lab	
7	PCC 1	CE-254B CE	Fluid Mechanics – II Lab	0-0-2
8	PCC 1	CE-256B CE	Structural Analysis – II Lab	0-0-2
9	PCC 0-0-2	CE-258B 1 CE	Transportation Engineering - I Lab	
10	PCC	CE-260B	CAD LAB	0-0-2 1 CE
15-5-10 25				

### 3rd Year SEMESTER – V

SN	Category	Course Code	Course Name	L-T-P	Cr.
1	PCC 3-1-0	CE-301B 4 CE	Building Construction & Material		
2	PCC CE	CE-303B	Concrete Technology	3-1-0	4
3	PCC 4	CE-305B CE	Geotechnical Engineering – I	3-1-0	
4 Accounts	PCC 3-1-0	CE-307B 4 CE	Costing, Estimating, Billing &		
5	PCC 4	CE-309B CE	Design of Steel Structure – I	3-1-0	
6 Lab	PCC 0-0-2	CE-351B 1 CE	Building Construction & Material		
7	PCC 1	CE-353B CE	Concrete Technology Lab	0-0-2	
8	PCC 0-0-2	CE-355B 1 CE	Geotechnical Engineering - I Lab		
15-5-6 23					

### 3rd Year SEMESTER – VI (Specialization in Transportation Engineering)

SN	Category	Course Code	Course Name	L-T-P	Cr.
	Sp.				
1	PEC	CE-302B	Highway Planning & Management		
	3-1-0	4	TE		
2	PEC	CE-304B	Construction & Pavement		
Materials	3-1-0	4	TE		
3	PEC	CE-306B	Bridge Engineering	3-1-0	4
	TE				
4	PEC	CE-308B	Mass Transport System		3-1-0
	4	TE			
5	PEC	CE-310B	Airport Engineering	3-1-0	4
	TE				
6	PEC	CE-352B	Material Testing Lab	0-0-4	2
	TE				
	15-5-4	21			

### 3rd Year SEMESTER – VI (Specialization in Structural Engineering)

SN	Category	Course Code	Course Name	L-T-P	Cr.
	Sp.				
1	PEC	CE-312B	Design of Concrete Structure-II		
	3-1-0	4	SE		
2	PEC	CE-314B	Advanced Design of Steel		
Structures	3-1-0	4	SE		
3	PEC	CE-306B	Bridge Engineering	3-1-0	4
	SE				
4	PEC	CE-316B	Industrial Structures	3-1-0	4
	SE				
2	PEC	CE-318B	Structural Dynamics	3-1-0	4
	SE				
5	PEC	CE-352B	Material Testing Lab	0-0-4	2
	SE				
	15-5-4	21			

### 4th Year SEMESTER – VII (Specialization in Transportation Engineering)

SN	Category	Course
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Code	Course Name	L-T-P	Cr.
1	PEC CE-401B Railway Engineering	3-1-0	4
	TE		
2	PEC CE-403B Docks & Harbour Engineering	3-0-0	3
	TE		
3	PEC CE-405B Transportation & Environment	3-0-0	3
	TE		
4	PEC CE-407B Analysis & Design of Pavement	3-1-0	4
	TE		
5	PEC CE-409B Traffic Engineering	3-1-0	4
	TE		
6	OE OE Open Elective – I	3-0-0	3
			ALL
7	PEC CE-451B Traffic & Transport Engg. Lab.	0-0-2	1
	TE		
8	PCC CE-453B Seminar	0-0-4	2
			TE
9	PDP PDP Problem Solving Skill	0-0-2	1
			CE
	18-3-8	25	

#### 4th Year SEMESTER – VII (Specialization in Structural Engineering)

SN	Category	Course
Code	Course Name	L-T-P Cr.
1	PEC CE-411B Composite Materials	3-0-0 3
	SE	
2	PEC CE-413B Advanced Structural Analysis	3-1-0
	4 SE	
3	PEC CE-415B Earthquake Analysis & Design of	
Structures	3-1-0 4 SE	
4	PEC CE-417B Advanced RCC Design	3-1-0
	4 SE	
5	PEC CE-419B Construction & Maintenance	
Management	3-0-0 3 SE	
6	OE OE Open Elective – I	3-0-0 3
		ALL
7	PCC CE-453B Seminar	0-0-4 2
		SE

8	PEC 0-0-2	CE-455B 1 SE	Advanced Structural Engg. Lab
9	PDP 18-3-8	PDP 25	Problem Solving Skill0-0-2 1 CE

	COURSE CODE	COURSE NAME
Open Elective-I	CE-423B	Building Construction & Materials
	CE-425B	Transportation Engineering & Systems

#### 4th Year SEMESTER – VIII

SN	Category	Course Code	Course Name	L-T-P	Cr.
1	MOOC	CE402B	MOOC	3-0-0 3	CE
2	INT	CE452B	Internship	0-0-32 16	CE
				3-0-32 19	

Course Code	Course Name	L-T-P	Credit
MA-101B	Applied Mathematics	3-1-0	4

#### Unit I: Matrices (10 lectures)

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, Skew- symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

#### Unit II: Sequences and series: (12 lectures)

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

#### Unit III: Calculus: (8 lectures)

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

#### Unit IV: Calculus: (8 lectures)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

#### Unit V: Multivariable Calculus (Differentiation): (10 lectures)



Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

#### Suggested Text/Reference Books

- (i) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- (ii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- (iii) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- (iv) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
- (v) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
- (vi) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- (vii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

#### Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Code	Course Name	L-T-P	Credit
PH-103B	Applied Physics	3-1-0	4

#### Unit I: Electrostatics and Magnetostatics (12 lectures)

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential, Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

#### Unit II: Mechanics (8 lectures)

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical Coordinates

### Unit III: Quantum Mechanics (8 lectures)

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

### Unit IV: Wave optics (10 lectures)

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.

Fraunhauffer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

### Unit V: Lasers (8 lectures)

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO<sub>2</sub>), solid-state

lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

### Suggested Text/Reference Books

- (i) David Griffiths, Introduction to Electrodynamics.
- (ii) W. H. Hayt and J. A. Buck. Engineering Electromagnetics.
- (iii) Engineering Mechanics, 2nd ed. — MK Harbola.
- (iv) Introduction to Mechanics — MK Verma
- (v) Eisberg and Resnick, Introduction to Quantum Physics
- (vi) D. J. Griffiths, Quantum mechanics.
- (vii) A. Ghatak, Optics
- (viii) O. Svelto, Principles of Lasers

Course Code

Course Name L-T-P Credit

CS-105B

Computer Programming 3-0-0 3

Unit-1: BASICS OF PROGRAMMING AND OVERVIEW OF C PROGRAMMING:

Programming Fundamental, Problem definition, Idea of Algorithm, steps to solve logical and numerical problems, Representation of Algorithms: Flow charts/ Pseudocode with example, Types of programming languages, Translators, From algorithms to programs; source code, variables and memory location, Introduction to C, Structure of C program, C character set, Identifier and Keywords, Data types, constants, variables, Declaration, Arithmetic expressions & precedence, statements, Symbolic constants, type conversion, Types of operators, Input and output functions in C, header files, common programming errors, Control Statements, Sequencing, Selection, Condition and iteration.

Unit-2: ARRAYS AND STRING: Declaring, Referencing and initializing arrays, array subscript, using for loop for sequential access, multi-dimensional array, String basics string library functions, assignment and substring, concatenation, string comparison.

Unit-3: FUNCTIONS AND POINTERS: Definition of function, function prototype, Purpose of main function, passing parameters, Scope of function, recursion, Call by value and reference, Types of storage classes, Scope of variable: Global and local, static variables, Recursion.. Pointer variables, initializing pointers, pointer operators, pointer expressions, pointers and arrays, pointer and functions,

Unit-4: STRUCTURES, UNIONS & RECURSION

Defining a structure, Declaring structure variables, Structure initialization, Copying and Comparing Structure variables, Array of structures, Arrays within structure, nested structures, Unions. Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit-5: DYNAMIC MEMORY ALLOCATION AND FILE PROCESSING: C's dynamic allocation functions. Streams and file types, opening and closing a data file, input and output operations, text mode versus binary mode, formatted input output operations with files, random access to files.

Reference Books:-

1. Programming in C by Schaum Series, McGraw Hills Publishers, New Delhi.
2. Let Us C by YashwantKanetkar; BPB Publication, New Delhi.
3. Exploring C by YashwantKanetkar; BPB Publications, New Delhi.
4. Application Programming in C by RS Salaria, Khanna Book Publishing Co. (P) Ltd., New Delhi.
5. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.

6. Programming with C Language by C Balaguruswami, Tata McGraw Hill, New Delhi.
7. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi

Course Code	Course Name	L-T-P	Credit
EN-107B	Communication Skills - I	3-0-0	3

#### Detailed contents

1. Vocabulary Building
  - 1.1 The concept of Word Formation
  - 1.2 Root words from foreign languages and their use in English
  - 1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
  - 1.4 Synonyms, antonyms and standard abbreviations.
2. Basic Writing Skills
  - 2.1 Sentence Structures
  - 2.2 Use of phrases and clauses in sentences
  - 2.3 Importance of proper punctuation
  - 2.4 Creating coherence
  - 2.5 Organizing principles of paragraphs in documents
  - 2.6 Techniques for writing precisely
  - 2.7 Jane Austen: Pride and Prejudice(novel)
3. Identifying Common Errors in Writing
  - 3.1 Subject-verb agreement
  - 3.2 Noun-pronoun agreement
  - 3.3 Misplaced modifiers
  - 3.4 Articles

3.5	Prepositions
3.6	Redundancies
3.7	Clichés
4.	Nature and Style of sensible Writing
4.1	Describing
4.2	Defining
4.3	Classifying
4.4	Providing examples or evidence
4.5	Writing introduction and conclusion
5.	Writing Practices
5.1	Comprehension
5.2	Précis Writing
5.3	Essay Writing
5.4	Charles Dickens : Oliver Twist( novel)
6.	Oral Communication

#### Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995. (ii) Remedial English Grammar. F.T. Wood. Macmillan.2007 (iii) On Writing Well. William Zinsser. Harper Resource Book. 2001

Course Code	Course Name	L-T-P	Credit
CE-109B	Environmental Science & Ecology	2-0-0	2

1. **THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

2. **NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over- exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of

extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

3. **ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem - forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

4. **BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

5. **ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e- waste management; disaster management –floods, earthquake, cyclone and landslides.

6. **SOCIAL ISSUES AND THE ENVIRONMENT:** Water conservation, rain water harvesting, watershed management; climate change, global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

7. **HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, population explosion – family welfare programmes; role of information technology in environment and human health; case studies, Chipko movement, Sardar Sarovar dam, mining and quarrying in Udaipur, salinity and water logging in Punjab, Haryana and Rajasthan, Bhopal gas tragedy, Chernobyl nuclear disaster, arsenic pollution in ground water.

#### TEXT BOOK

Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition, New Age International Publishers, 2004

#### REFERENCE BOOKS

1. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.

2. Bharucha Erach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.

3. Brunner R. C., "Hazardous Waste Incineration", 1st Edition McGraw Hill Inc., 1989.
  4. Clark R.S., "Marine Pollution", 1st Edition Clanderson Press Oxford, 1989
  5. .Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., "Environmental Encyclopedia", 2nd Edition, Jaico Publ. House, 2001.
  6. De, A. K., "Environmental Chemistry", 2nd Edition, Wiley Eastern, 1989
  7. Jadhav, H. and Bhosale, V.M., "Environmental Protection and Laws", 1st Edition, Himalaya Pub. House, Delhi, 1995.
  8. Mckinney, M.L. and Schoel. R.M., "Environmental Science Systems & Solutions", 2nd Edition, Web enhanced edition, 1996.
  9. Rao M.N. and Datta, A.K., "Waste Water Treatment", 2nd Edition, Oxford & IBH Publ.Co., 1987.
- Sharma B.K., "Environmental Chemistry", 2nd Edition, Goel Publ. House, Meerut, 2001  
 Trivedi R.K. and Goel, P.K., "Introduction to Air Pollution", 2nd Edition, Techno-science Publications, 1996.

Course Code	Course Name	L-T-P	Credit
CH-113B	Applied Chemistry	3-1-0	4

#### Unit-I PHASE RULE

Terminology, Definition of phase rule, Derivation of phase rule equation, One component system (H<sub>2</sub>O system and CO<sub>2</sub> system), two components system, Simple eutectic system (Pb – Ag), Pattinson's Process, congruent system (Zn–Mg), incongruent system (Na-K system), Merits and demerits of phase rule.

#### UNIT-II THERMODYNAMICS

Second law of thermodynamics, entropy change for reversible & irreversible processes, Entropy change for ideal gas, variation of free energy with temperature & pressure, Gibbs-Helmholtz equation, Clapeyron- Clausius equation & it's integrated form Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications.

#### UNIT-III CORROSION AND ITS PREVENTION

Definition, Types of corrosion: Dry, wet corrosion (rusting of iron), galvanic corrosion, differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, sacrificial protection and barrier protection), Soil Corrosion.

## UNIT-IV SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Part-A: Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques.

## UNIT-V INTERMOLECULAR FORCES AND POTENTIAL ENERGY SURFACES

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena, Potential energy surfaces of H<sub>2</sub>, H<sub>2</sub>F and HCN and trajectories on these surfaces.

## UNIT-VI ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

## UNIT-VII STEREOCHEMISTRY

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

Suggested Text Books :

- (i) University chemistry, by B. H. Mahan
- (ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane (iii) Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- (iv) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan (v) Physical Chemistry, by P. W. Atkins
- (vi) Organic Chemistry: Structure and Function by K. P. C. Vollhardt and N. E. Schore, 5th Edition  
<http://bcs.whfreeman.com/vollhardtschore5e/default.asp>

Course Code	Course Name	L-T-P	Credit
PH-151B	Applied Physics Lab	0-0-2	1

List of Experiments:

- 1) To study response curve of a series LCR circuit.
- 2) To determine the Planck's constant using LEDs.
- 3) To determine the Rydberg's constant of Hydrogen atom.



- |     |   |
|-----|---|
| 4)  | To find the refractive index and Cauchy's constants of a prism.   |
| 5)  | To find the wavelength of light by Newton's rings experiment.     |
| 6)  | To determine the thickness of a thin wire by interference.        |
| 7)  | To determine the wavelength of LASER using diffraction grating.   |
| 8)  | To determine the resolving power of a telescope.                  |
| 9)  | To find the numerical aperture of an optical fiber cable.         |
| 10) | To find the wavelength of light using Michelson's interferometer. |

Course Code	Course Name	L-T-P	Credit
EN-153B	Communication Skills – I Lab	0-0-2	1

- |    |  |
|----|--|
| 1. | Comprehension  |
| 2. | Pronunciation, Intonation, Stress and Rhythm                                       |
| 3. | Common Everyday Situations: Conversations and Dialogues communication at Workplace |
| 4. | Interviews   |
| 5. | Formal Presentations   |

Course Code	Course Name	L-T-P	Credit
CS-155B	Computer Programming Lab	0-0-2	1

## LIST OF EXPERIMENTS

(Students have to do at 3-4 programs from each section) SEQUENTIAL CONTROL STATEMENTS

- |   |   |
|---|---|
| 1 | Write a program to Print HELLO                        |
| 2 | Write a program to add two numbers                    |
| 3 | Write a program to calculate simple interest          |
| 4 | Write a program to calculate average of three numbers |
| 5 | Write a program to swap two numbers                   |

- |               |   |
|---------------|---|
| 6             | Write a program to illustrate mixed data types              |
| 7             | Write a program to calculate area and circumference of      |
| circle        |   |
| 8             | Write a program to evaluate a polynomial expression         |
| 9             | Write a program to add digits of a four digit number        |
| 10            | Write a program to check whether the person if eligible for |
| voting or not |   |

#### CONDITIONAL CONTROL STATEMENTS

- |    |  |
|----|--|
| 11 | Write a program to find greatest of two numbers          |
| 12 | Write a program to find out which type of triangle it is |
| 13 | Write a program to find out greatest of three numbers    |
| 14 | Write a program to evaluate performance of the student   |
| 15 | Write a program to make a basic calculator               |

#### LOOP CONTROL STATEMENTS

- |    |  |
|----|--|
| 16 | Write a program to print Fibonacci up-to the given limit |
| 17 | Write a program to find the sum of digits of a number    |
| 18 | Write a program to find factorial of a number            |
| 19 | Write a program to print table of any number             |
| 20 | Write program for printing different pyramid pattern     |

#### ARRAYS AND STRINGS

- |                       |  |
|-----------------------|--|
| 21                    | Write a program to enter the elements in a one       |
| dimensional array     |  |
| 22                    | Write a program to find the sum and average of five  |
| numbers               |  |
| 23                    | Write a program to sort the array elements           |
| 24                    | Write a program to enter the marks of 50 students an |
| calculate the average |  |
| 25                    | Write a program to add 2 matrix                      |
| 26                    | Write a program to multiply 2 matrices               |
| 27                    | Write a program to calculate the length of string    |

- 28 Write a program to concatenate 2 strings
- 29 Write a program to reverse the string
- 30 Write a program to count the numbers of characters in a string
- 31 Write a program that converts lower case characters to upper case
- 32 Write a program without using predefined functions to check whether the string is palindrome or not

### FUNCTIONS & POINTERS

- 33 Write a program using function to find the largest of three numbers
- 34 Write a program using function to sum the digits of a number
- 35 Write a program to calculate factorial of a number using recursive function
- 36 Write a program to print first n Fibonacci using recursive function
- 37 Write a program to illustrate the concept of chain of pointers
- 38 Write a program using function to swap two numbers using call by reference
- 39 Write a program to calculate the area and perimeter of circle using pointers
- 40 Write a program to copy the contents of one array into another in the reverse order using pointers

### STRUCTURES

- 41 Write a program to read an employee record using structure and print it
- 42 Write a program to prepare salary chart of employee using array of structures
- 43 Write a program to print the name and percentage of 20 students (array of structures and arrays within structures).
- 44 Write a program to demonstrate structure within structure.

## FILE HANDLING

45. Write a program to create, open, and close files.
46. Write a program to demonstrate the purpose of different file opening modes.
47. Write a program to count the number of characters, spaces, tabs, new line characters in a file.
48. Write a program to receive strings from keyboard and write them to a file.
49. Write a program to copy a file to another.
50. Write a program to read strings from a file and display them on screen.

Course Code

Course Name L-T-P Credit

CH-161B

Applied Chemistry Lab0-0-2 1

Chemistry Laboratory

Choice of 10-12 experiments from the following:

Determination of surface tension and viscosity

Thin layer chromatography

Ion exchange column for removal of hardness of water

Determination of chloride content of water

Colligative properties using freezing point depression

Determination of the rate constant of a reaction

Determination of cell constant and conductance of solutions

Potentiometry - determination of redox potentials and emfs

Synthesis of a polymer/drug

Saponification/acid value of oil

Chemical analysis of a salt

Lattice structures and packing of spheres

Models of potential energy surfaces

Chemical oscillations- Iodine clock reaction

Determination of the partition coefficient of a substance between two immiscible liquids

Absorption of acetic acid by charcoal

Use of the capillary viscosimeters to demonstrate the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

#### Laboratory Outcomes

- The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
- Synthesize a small drug molecule and analyse a salt sample.

Course Code

Course Name L-T-P Credit

ME-163B

Computer Based Engineering Graphics

0-0-2 1

#### Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Dimensioning

#### Module 2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes;

#### Module 3: Projections of Solids

Projections of planes inclined Planes - Auxiliary Planes; Projection of Regular Solids covering those inclined to both the planes, Auxiliary Views; Section of such solids and the true shape of the section.

#### Module 4: Sections and Sectional Views of Right Angular Solids

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; objects from industry and dwellings (foundation to slab only) Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids Conversion of Isometric Views to Orthographic Views and Vice-versa

## Module 5: Overview of Computer Graphics,

Introduction to Computer Aided Drafting and CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

### Suggested Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers (Corresponding set of) CAD Software Theory and User Manuals

Course Code	Course Name	L-T-P	Credit
MA-102B	Advanced Mathematics & Numerical Methods	4	3-1-0

### Unit-1

#### Interpolation and Approximation

Newton forward interpolation, Newton backward interpolation for equal intervals, Lagrange's interpolation and Newton divided differences interpolation for unequal intervals. Greogry-Newton forward, Greogry-Newton backward, Stirling and Bessel interpolation for central differences.

### Unit-2

#### Numerical Differentiation and Integration

Numerical Differentiation for unequal, equal and central differences formula, Numerical Integration by Trapezoidal methods, Simpson 1/3 rule, Simpson 3/8th rule, Gauss Quadrature formula.

### Unit-3

#### Solution of Ordinary Differential equations

Picard's method, Euler's method, Euler's, modified method, Runge-Kutta method, Milne P-C method, Adams-Bashforth method.

#### Unit-4

Solution of system of linear equations

Direct methods (Cramer rule, Gauss elimination method, Gauss Jordan method, Doolittle's method, Crout's method) Partition method, iteration method (Jacobi method, Gauss Seidel iteration method).

#### Unit-5

Solution of nonlinear equation in one variable

Bisection method, Secant method, Regula falsi method, Newton Raphson method and their rate of convergence, Descartes Rule of signs, Birge-Vita method, Bairstow method for solution of polynomial equations.

#### LIST OF RECOMMENDED BOOKS:

1. Numerical Methods-Jain Iyenger Jain.

Numerical Analysis-Goyal-Mittal, Pragati prakashan.

Course Code	Course Name	L-T-P	Credit
EN-104B	Communication Skills - II	3-0-0	3

#### Module 1:

Information Design and Development- Different kinds of technical documents,

Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

#### Module 2:

Technical Writing, Grammar and Editing- Technical writing process, forms of

discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, localization.

#### Module 3:

Self Development and Assessment- Self assessment, Awareness, Perception and

Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

#### Module 4:

Communication and Technical Writing- Public speaking, Group discussion, Oral presentation, Interviews, Graphic presentation, Presentation aids, Personality Development.

Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

#### Module 5:

Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes,

Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

#### Text/Reference Books:

1.David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004 2.Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843) 3.Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN:07828357-4) 6.Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002. 7.Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

Course Code	Course Name	L-T-P	Credit
BA-106B	Engineering Economics & Industrial Management	3	3-0-0

#### Unit- 1: Introduction to Economics:

Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity.

#### Unit-2: Theory of Production

production function, meaning, factors of production (meaning & characteristics of Land, Labour, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost;



meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical

### Unit- 3 : Macro-Economic Indicators

Macro-Economic Indicators, Changes in the Gross Domestic Product (GDP), Gross National Product (GNP), Inflation, Employment & Unemployment Indicators, Currency Strength, Interest rates, Corporate Profits, Balance of Trade, Agricultural Production, Current Account balance, Foreign exchange, Foreign Trade, Industrial Production Index, Wholesale Price Index (WPI), Retail Price Index (RPI), Consumer Price Index (CPI).

### Unit-4 : Introduction to Management

Definitions, Nature, scope Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory.

Functions to Management: Planning, Organizing, Staffing, Directing, Controlling ( meaning, nature and importance) Organizational Structures; meaning, principles of organization, types- formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization.

### Unit-5 : Introduction to Marketing & Production Management

Marketing Mix, concepts of marketing, demand forecasting and methods, market segmentation Introduction to Finance Management; meaning, scope, sources, functions

Production Management: Definitions, objectives, functions, plant layout-types & factors affecting it, plant location- factors affecting it. Introduction to Human Resource Management; definitions, objectives of manpower planning, process, sources of recruitment, process of selection

### Reference Books:

1. Engineering Economics, R.Paneerselvam, PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins

S.P. and Decenzo David A.

3. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning

4. Principles and Practices of Management by L.M.Prasad.

Course Code

Course Name L-T-P Credit

ME-108B

Engineering Mechanics

3-1-0 4

### UNIT-1: FORCE SYSTEMS

Basic concepts of space, time, mass, force, particle and rigid body; scalars and vectors; principle of transmissibility; force classification; Representation of force in vector form; rectangular components of two-dimensional force systems; resultant of two dimensional and concurrent force systems. moment about a point; Varignon's theorem; Representation of moment in vector form; couple. Numerical.

## UNIT-2: EQUILIBRIUM

Equilibrium in two dimensions; Lame's Theorem; system isolation and the free-body-diagram; modelling the action of forces; equilibrium conditions; Numerical.

## UNIT-3: PROPERTIES OF SURFACES/CROSS SECTIONS

Centre of mass; determining the centre of gravity; centre of gravity of areas including composite sections; moments of inertia; MI of plane figures; parallel axis & perpendicular axis theorem; MI of composite figures. Numerical.

## UNIT-4: RECTILINEAR AND CURVILINEAR MOTION

Types of motion, definitions of displacement, distance, velocity, speed, acceleration Newton's laws of motion, Uniform and non-uniform motion equations of motion, motion under gravity. Numerical.

## UNIT-5: PROJECTILES

Angle of projection, Trajectory, Range of projectile, Duration of flight, Path of Projectile, Greatest height attained by a projectile. Numerical

## TEXT BOOKS

Meriam, J. L. "Engineering Mechanics", John Wiley & Sons.

Beer, F.P. and Johnston, E.R. "Mechanics of Materials", Tata McGraw Hill Shames, I.H. "Engineering Mechanics", 4th Edition, Pearson Education, 2003

Pytel, A and Kiusalaas, J. Thomsom, "Mechanics of Materials", Brooks & Cole, 2003

Course Code	Course Name	L-T-P	Credit
EL-111B	Basics of Electrical & Electronics Engineering		3-1-0
	4		

## Learning Objectives:

To understand and analyze basic electric and magnetic circuits

To study the working principles of electrical machines and power converters. To introduce the components of low voltage electrical installations.

## Detailed contents:

Unit 1: DC Circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton and maximum power transfer Theorems.

#### Unit 2: AC Circuits (8 hours)

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.

#### Unit 3: Transformers (8 hours)

Construction, working principle of transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and its comparison with ordinary transformer.

#### Unit 4: Electrical Machines (8 hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single- phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

#### Unit 5: Power Converters & Electrical Installations (8 hours)

DC-DC converters and AC-DC converters, Switches, Fuses, MCBs, Earthing and its types, Important Characteristics for Batteries and battery backup. Elementary calculations for energy consumption, power factor improvement.

#### Suggested Text / Reference Books

- (i) D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
- (ii) D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
- (iii) L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
- (iv) E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
- (v) V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

#### Course Outcomes

Students are able to understand and analyze basic electric and magnetic circuits

Students are able to understand the working principles of electrical machines and power converters.

Course Code	Course Name	L-T-P	Credit
CE-110B	Surveying	3-0-0	3

Unit I: Introduction to Surveying: Basic principles, Concept and purpose of surveying, Measurements & its Units, Instruments used for taking measurements Classification based on surveying instruments, etc. Chain Surveying: Introduction Advantages and Disadvantages, Direct and indirect ranging Offsets and Recording of field notes. Compass surveying: Purpose, Use of prismatic compass.

Unit II: Levelling: Definitions of various terms in levelling. Different types of levelling, sources of errors in levelling curvature and refraction corrections. Temporary adjustment of dumpy and tilting levels. Computation and adjustment of levels. Profile levelling; L-Section and cross-sections. Mid ordinate, Average ordinate, Trapezoidal rule, Simpsons rule.

Plane Table Surveying: Purpose of plane table surveying, Equipment used in plane table survey, Setting of a plane table, Methods of plane table surveying Radiation Intersection Traversing Resection, Concept of Two point and Three point problems, Errors in plane table survey and precautions to control them Testing and adjustment of plane table and alidade.

Unit III: Triangulation: Merits and demerits of traversing, triangulation and trilateration. Grades of triangulation, Strength of figure, field procedure of triangulation. Reconnaissance and selection of triangulation stations. Adjustment of Triangulation Figures: Adjustment of levels. Adjustment of triangulations figures, braced quadrilateral Triangle with central, station. Approximate and method of least squares for figure adjustment, Trilateration.

Unit IV: Measurement of Distances, directions and elevations by different methods. Traversing. Vertical control, Precise levelling, Trigonometric levelling. Contouring: Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps. Measurement of Angles & Direction: Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass Errors of measurements and their adjustments.

Unit V: Introduction to the use of Modern Surveying equipment and techniques such as: EDM or Distomat, Total station, Study and use of Digital Planimeter, Introduction to remote sensing and GPS.

Text Book:

Surveying & Levelling by B. C. Punmia.

Course Code	Course Name	L-T-P	Credit
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MA-150B	Applied Numerical Methods Lab	0-0-2	1
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#### List of Experiments: (Using C++ Software)

1. Bisection Method.
2. Newton Raphson Method.
3. Secant Method.
4. Regula Falsi Method.
5. LU decomposition Method.
6. Gauss-Jacobi Method.
7. Gauss-Siedel Method.
8. Lagrange Interpolation or Newton Interpolation.
9. Simpson's rule.
10. Trapezoidal Rule

Course Code	Course Name	L-T-P	Credit
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PD-191B	Co-curricular Activity/Hobby Club	0-0-2	1
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#### ABOUT THE CLUB

The Green club is a part of academic curriculum scheme of Lingaya's Vidyapeeth and taken up by the students of First Year so that they could get the first-hand knowledge of Environment and its sustainability. This club is born with a vision to make the campus green and Eco-friendly and educate the youth about the importance of sustainable development, outside of the campus also.

#### OBJECTIVE

To make the Environment clean and green and pollution free.

#### ACTIVITIES OF THE CLUB

1. Colour coded dustbins for Recyclable and Non-Recyclable.
2. Work on renovating a unusual waste area/dump to provide value to the region.
3. Recycling of waste.
4. Create Blog of "Simply Green".
5. Water conservation day.

6. Reduce water usage.
7. Recycle waste water.
8. Reduce Power Consumption.
9. Cook Using Solar Cooker.
10. Rain Water Harvesting.
11. Tree planting.
12. Practical solution of ozone depletion.
13. Speech by a notable speaker/local environmentalist.
14. Quiz and GD on environmental issues
15. Debate on environmental issue
16. Collaborate with municipality and organic clean day.
17. Green march/marathon.
18. Cycle rally.
19. Zero food wastage awareness drive.
20. Writing articles and publicity them in the local newspapers.
21. Establishing link with local NGO's and works with them to save the degraded environment.
22. Zero waste campus.

Course Code	Course Name	L-T-P	Credit
EL-157B	Basics of Electrical & Electronics Engineering Lab	0-0-2	1

#### List of Experiments:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi – meter, oscilloscope. Resistors, capacitors and inductors.
2. Demonstration of cut – out sections of machines.
3. Torque speed characteristic of dc motor.
4. Parallel operation of single-phase Transformer.
5. Open circuit & short circuit test on single phase transformer.

6. To verify the Thevenin's & Norton's theorem.
7. To verify the Superposition theorem.
8. To study frequency response of series & parallel RLC Circuit.
9. Load test on D.C. Shunt generator
10. Torque – speed characteristics of three phase Induction motor & direction reversal by change of phase sequence of connection.
11. To plot field current Vs Armature voltage characteristics of synchronous generator.

Course Code

Course Name L-T-P Credit

ME-159B

Workshop Practice 0-0-4 2

Course Outcomes: Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops. Upon completion of this course, the students will gain knowledge of the different manufacturing processes and day to day industrial as well domestic life which are commonly employed in the industry, to fabricate components using different materials.

(A) Fitting Trade:

1. Preparation of T-Shape Work piece as per the given specifications.
2. Preparation of U-Shape Work piece which contains:  
Filing, Sawing, Drilling, Grinding.

(B) Machine shop: Study of machine tools in particular Lathe machine (different parts, different operations, study of cutting tools)

1. To obtain required diameters (steps) on a cylinder work piece with the given lengths.
2. To obtain the required diameters (taper) on a cylinder work piece with the given dimensions.

(C) Carpentry: Study of Carpentry Tools, Equipment and different joints

1. To make a dovetail lap joint.
2. To make a cross half lap joint.

(D) allowances, ingredients of their purposes Foundry Trade: Introduction to foundry, Patterns, pattern molding sand and melting furnaces. Foundry tools and

1. To prepare a sand mold, using the given single piece pattern.

2. To prepare a sand mold, using the given split piece pattern.

(E) Equipment (Gas and Arc welding) Welding: Introduction, Study of Tools and welding

1. To make a single v-butt joint, using the given mild steel pieces and by arc welding.

2. To make a T-joint using the given mild steel pieces and by arc welding.

(F) Electrical and Electronics: Introduction to House wiring, different types of cables. Types of power supply, types of motors, Starters, distribution of power supply, types of bulbs, parts of tube light, Electrical wiring symbols.

1. Two lamps connected in series - measure and check the voltage and current using multimeter.

2. Two lamps connected in parallel - measure and check the voltage and current using multimeter.

(G) CNC Machining: To study the working principle of CNC machining.

#### Reference Books:

1. Mechanical Workshop Practice by K C John, PHI Learning

Course Code	Course Name	L-T-P	Credit
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CE-162B	Surveying Lab	0-0-2	1
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#### List of Experiments:

1. To determine the difference in elevation of two given points Dumpy Level with AI Stand

2. Profile leveling and cross sectioning of a given route.

3. To measure the horizontal angle by the method of reiteration and repetition, theodolite traversing and error adjustment.



4. To prepare the contour map of an area by the method of radial lines.
5. Determination of elevation of top of tower using theodolite
6. Plane tabling by the method of radiation and intersection.
7. Solution of Three-point problem in plane tabling
8. Setting out of simple circular curve by one theodolite and by two theodolite method
9. To prepare the contour map of an area by the method of Total Station.

Course Code

Course Name L-T-P Credit

CE-201B

Structural Analysis – I 3-1-0 4

#### Unit I: Basic Introductory Concepts

Structural Systems - Equilibrium and compatibility - Stability and Indeterminateness - Types of Loadings

-Free body diagram.

#### Analysis of Forces in Statically Determines Structures

Analysis Trusses (Including compound trusses), Beams and Frames (Including internal hinges)  
– Analysis of Beams and Frames (Including internal hinges)

#### Unit II: Analysis of Space Trusses Using Tension Coefficient Method.

Introduction to Force (Flexibility) And Displacement (Stiffness) Method of Analysis

#### Unit III: Analysis for Moving Loads

Influence lines for determinate beams and trusses - Criteria for maxima of internal forces for beams and trusses.

#### Unit IV: Displacement of Statically Determine Structures

Determination of slope and deflections of beams using successive integration and conjugate Beam methods – Determination of deflection of trusses using virtual work method – Williot Mohr Diagram

#### Unit V: ANALYSIS OF INDETERMINATE TRUSSES

Statically indeterminate structures –Force and Displacement method of analysis - Analysis by superposition – Selection of redundant restraints – Method of consistent deformations

## BOOKS RECOMMENDED

1. Gupta S P and Pandit G S, “ Theory of Structures”  
Volume 1 and 2, Tata Mc Graw Hill, New Delhi, 1999
2. Vaidyanathan, R and Perumal P “Structural Analysis”,  
Vol – I & II, 3rd edition, Laxmi Publication, New Delhi, 2007
3. Negi L S and Jangid R S, “Structural Analysis”, Tata Mc  
Graw Hill, New Delhi, 1999
4. Utku, S, Norris, C H and Wilbur, J B “elementary  
Structural Analysis”, Mc Gra Hill, NY, USA., 1991
5. Hibbler R C, “Structural Analysis”, 6th edition, Prentice  
Hall, NJ, USA, 2006

Course Code	Course Name	L-T-P	Credit
CE-203B	Surveying - II	3-1-0	4

**TRIGONOMETRICAL LEVELLING:** Introduction-Height and Distance (Base of an object accessible and inaccessible)-Difference in elevations between two points-Geodetical observations and correction for temperature, refraction, curvature and signal.

**TRIANGULATION:** Triangulation systems, classification, strength of figure, selection of triangulation stations, grade of triangulation, field work of triangulation, triangulation computations. Survey adjustments: Definite weight of an observation, most probable values Types of error, principle of least squares and adjustment of triangulation figure.

**FIELD ASTRONOMY:** Definitions of Astronomical terms, Star at prime vertical, star at horizon, star at culmination, introduction of celestial sphere, celestial co-ordinate systems, Napier’s rule of circular parts. A brief introduction of different types of time. Determination of Azimuth, altitude by astronomical observations.

**ELEMENTS OF PHOTOGRAMMETRY:** Introduction, types of photographs, Aerial photography and its interpretation, Flight planning for Aerial survey, Stereoscope and stereoscopic vision.

**REMOTE SENSING:** Special emphasis on applications of remote sensing in civil and environmental engineering. Concept of G.I.S and G.P.S-Basic components. Introduction to modern survey equipment’s, their principle of working with special emphasis on total station, EDM (Electra Optical, Inferared, Microwave) and electronic precision, optic theodolite, automatic laser level etc.

## TEXT BOOK

Punmia, B. C., Jain, Ashok Kumar., “Surveying Volume –II & III”, Laxmi Publication Pvt limited, New Delhi.

Course Code	Course Name	L-T-P	Credit
CE-205C	Fluid Mechanics-I	3-1-0	4

#### UNIT-1: FLUID PROPERTIES AND FLUID STATICS

Concept of fluid and flow; ideal and real fluids; Continuum concept; properties of fluids; Newtonian and non-Newtonian fluids; Pascal's Law; hydrostatic equation; hydrostatic forces on plane and curved surfaces; stability of Floating and submerged bodies; relative equilibrium; Problems

#### UNIT-2: FLUID KINEMATICS AND DYNAMICS

Eulerian and Lagrangian description of fluid flow; stream; streak and path lines; types of flows; flow rate and continuity equation; differential equation of Continuity; rotation; vorticity and circulation; stream and potential functions; Problems Concept of system and control volume; Euler's equation; Bernoulli's equation; venturimeter; pitot tubes; orifice meter; kinetic and momentum correction factors; Impulse momentum relationship and its applications; Problems

#### UNIT-3: VISCOUS FLOW

Flow regimes and Reynolds's number; Relationship between shear stress and pressure gradient; uni- directional flow between stationary and moving parallel plates; Counter flow; laminar flow through pipes

#### UNIT-4: FLOW THROUGH PIPES

Friction loss in pipe flow; Darcy-Weisbach formula co-efficient of friction and friction factor: Major and minor losses in pipes; hydraulic Gradient and total energy lines; series and parallel connection of pipes; branched pipes; Equivalent pipe; power transmission through pipes; Problems

#### UNIT-5: BOUNDARY LAYER CONCEPT

Displacement; momentum and energy thickness; von-karman momentum integral equation; laminar and turbulent boundary layer flows; drag on a flat plate; boundary layer separation; Stream lined and bluff bodies; lift and drag on a cylinder and an airfoil; Problems

TEXT BOOKS: Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publication House, 2002

#### REFERENCE BOOKS:

1. Kumar, D. S., "Fluid Mechanics and Fluid Power Engineering", SK Kataria and Sons, 1998
2. Wylie, E. B, Streeter VL; "Fluid Mechanics"; McGrawHill 1983

3.

SomSKandBiswasG., "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill, 1998

4.

Bansal RK, "A Text Book of Fluid Mechanics" Laxmi Publications

5.

Agrawal, S.K. "Fluid Mechanics and Machinery", Tata McGraw Hill.

Course Code

Course Name L-T-P Credit

CE-207B

Water Supply & Waste Water Engineering 3-1-0 4

Unit I Introduction to waste water engineering: Systems of sanitation, Types of sewage and sewerage systems, Components of a sewerage system, Design and planning of a sewerage system, Financing the sewerage projects

Sewers, their construction and maintenance: Shapes of sewer pipes, Forces acting on Sewer pipes, Sewer materials, Laying and testing of sewer pipes

Sewer appurtenances: Manholes, drop manholes and lamp holes, clean outs, street inlets, Catch basins, flushing tanks, Grease and oil traps

Unit II Hydraulic design of Sewers and S.W. Drain sections: Difference in the design of water supply pipes and sewer pipes, Provision of free board in sewers and S.W. Drains, Hydraulic formulas for determining flow velocities in sewers and drains

Estimating the design sewage discharge and peak drainage discharge: Estimating the sewage discharge, Design periods for different components of a sewerage scheme, Future forecasts and estimating design sewage discharge, the runoff process and peak runoff rate, Estimating the peak runoff

Unit III Quality and characteristics of sewage: Decay and decomposition of sewage, Physical characteristics of sewage, Chemical characteristics of sewage, Population equivalent and relative stability Primary Treatment of Sewage: Classification of treatment processes, Types of screens, their designs and cleaning, Grit chambers: Aerated grit chambers, Detritus tanks, skimming tanks, Sedimentation, Sedimentation aided with coagulation

Unit IV Secondary Treatment of Sewage: Sewage filtration, Contact beds and intermittent sand filters for biological filtration of sewage, Trickling filters, Sludge digestion process, Stages in sludge digestion process, Sludge digestion tank, Disposal of sludge, Activated sludge process, Rotating biological contractors, Oxidation ponds, Septic tanks, Imhoff tanks

Unit V Disposal of sewage effluents by dilution: Conditions favoring disposal by dilution, Disposal of waste waters in rivers and self-purification of natural streams, Disposal of waste water in lakes and sea Disposal of sewage effluents on land: Disposal of waste water on land for irrigation, Methods of applying sewage effluents to farms, Sewage sickness, Dilution method v/s land disposal for disposal of sewage

Text Books:

1. SEWAGE DISPOSAL AND AIR POLLUTION ENGINEERING by S.K.GARG, KHANNA PUBLISHERS, 23th Edition, (2010)
2. WASTEWATER ENGINEERING TREATMENT AND REUSE by METCALF AND EDDY, MCGRAW HILL EDUCATION, 4th Edition, (2003)
3. water & waste water engg by B.C.Punmia
4. Manual of Waste Water and Water Treatment, Ministry of Urban Development, Govt.of India

Course Code	Course Name	L-T-P	Credit
CE-209B	Engineering Geology	3-1-0	4

Module 1: Introduction-Branches of geology useful to civil engineering, scope of work- GSI, Granite Dimension Stone Cell, NIRM. Mineralogy-Mineral, Origin and composition. Physical properties, Rock forming minerals, megascopic identification of common primary & secondary minerals.

Module 2: Petrology-Rock forming processes. Specific gravity of rocks. Igneous petrology. Types of volcanic eruption. Concept of Hot spring and Geysers. Division of rock on the basis of depth of formation, and their characteristics. Chemical and Mineralogical Composition. Texture and its types. Various forms of rocks. Sedimentary petrology. Texture and its types, Structures, Gradation of Clastic rocks. Classification of sedimentary rocks and their characteristics.

Module 3: Physical Geology- Weathering. Erosion and Denudation. Strength Behavior of Rocks- Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Earthquake and Subsidence. Strength of Igneous rock structures. Geological Hazards. Concept of sliding blocks. Different controlling factors. Ground water Earthquake: Magnitude and intensity of earthquake.

Module 4: Rock masses as construction material: rock properties and behavior. Effect of alteration and weathering. Classification of Rock material strength. Geology of dam and reservoir site. Failure of Reservoir. Favorable & unfavorable conditions in different types of rocks in presence of various structural features.

Module 5: Rock Mechanics- Sub surface investigations in rocks and engineering characteristics of rocks masses; Structural geology of rocks. Classification of rocks, Field & laboratory tests on rocks, Stress deformation of rocks, Failure theories and shear strength of rocks, Bearing capacity of rocks.

Text/Reference Books:

1. Engineering and General Geology, Parbin Singh, 8th Edition (2010), S K Kataria & Sons.
2. Text Book of Engineering Geology, N. Chenna Kesavulu, 2nd Edition (2009), Macmillan Publishers India.
3. Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press (1982).

Course Code	Course Name	L-T-P	Credit
CE-251B	Structural Analysis – I Lab	0-0-2	1

List of Experiments:

1. Determination of Shear force for simply supported beams.
2. Determination of Bending Moment for simply supported beams
3. Determination of Slope of continuation beams.
4. Determination of Deflection of continuous beams.
5. Determination of deflection of pin-jointed trusses.
6. Determination of reaction of portal frames
7. Determination of deflected shape of portal frames.
8. Determination of influence line determinate beams.

Course Code	Course Name	L-T-P	Credit
CE-253B	Surveying II Lab	0-0-2	1

List of Experiments:

1. To determine the difference in elevation of two given points Dumpy Level with AI Stand
2. Profile leveling and cross sectioning of a given route.
3. To measure the horizontal angle by the method of reiteration and repetition, theodolite traversing and error adjustment.
4. To prepare the contour map of an area by the method of radial lines.
5. Determination of elevation of top of tower using theodolite

6. Plane tabling by the method of radiation and intersection.
7. Solution of Three-point problem in plane tabling
8. Setting out of simple circular curve by one theodolite and by two theodolite method
9. To prepare the contour map of an area by the method of Total Station.

Course Code

Course Name L-T-P Credit

CE-255B

Fluid Mechanics I Lab 0-0-2 1

List of Experiments:

1. To study the constructional details and draw characteristic and constant efficiency curves of a Pelton turbine
2. To study the constructional details and draw characteristic and constant efficiency curves of a Francis turbine
3. To study the constructional details and draw characteristic and constant efficiency curves of a Kaplan turbine
4. To study the constructional details and draw characteristic curve of centrifugal pump
5. To study the constructional details and draw characteristic curve of a reciprocating pump
6. To study the constructional details and draw performance curve of gear oil pump
7. To study the constructional details and determine the efficiency of a hydraulic Ram
8. To study the constructional details of a centrifugal compressor
9. To study the model of hydro power plant and draw it's layout
10. To determine the volumetric efficiency of a reciprocating compressor

Course Code

Course Name L-T-P Credit

CE-257B

Engineering Geology Lab 0-0-2 1

List of Experiments:

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.

Course Code

Course Name L-T-P Credit

CE-202B

Environmental Engineering 3-1-0 4

Module 1: Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.

Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes

Module 2: Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

Module 3: Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile



pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

Module 4: Noise- Basic concept, measurement and various control methods.

Module 5: Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, recovery and recycle. Disposal methods- Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

Module 6: Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and

fittings used.

Suggested Readings:

1- Water Supply by S.K. Garg, Khanna Publishing Co.

2. Environmental Engineering by Peavy, H.S., Rowe D.R. and Tchobanoglous, Mc Graw Hill, Book Company.

3. Manual of Water Supply and Water Treatment, Ministry of Urban Development, Govt.of India.

Course Code	Course Name	L-T-P	Credit
CE-204B	Fluid Mechanics - II	3-1-0	4

1. TURBULENT FLOW: Introduction to turbulent flow, Prandtl mixing length theory, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes.

2. FLOW THROUGH PIPES: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length of pipe, Hydraulic Gradient Line (H.G.L), Total Energy Line (T.E.L), pipes in series, pipes in parallel, branching of pipes, pipe network siphon, water Hammer (only quick closure case). Transmission of power through pipelines.

3. FLOW IN OPEN CHANNEL: Uniform flow, basic concept, Resistance equation chezy's and manning formula, uniform flow construction of efficient channel section, specific energy concept critical flow, and channel transition.

4. TURBINES: Classification, definitions, similarly laws, specific speed and unit quantities, Pelton turbines- their construction and settings, speed regulation dimensions of various elements. Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines construction & setting draft tube theory, runaway speed, working proportion of hydraulic turbines and characteristic curves, cavitations. Forces on immersed bodies: types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift.

5. PUMPS: Centrifugal pumps: Various types and their important components, manometric and total head, net positive suction head, specific speed, shut off head, cavitations. Principle of working and characteristic curves. Priming and maintenance. Submersible pumps.

Reciprocating Pumps: principle working, coefficient of discharge, slip, single acting and double acting pump. Manometric head, Acceleration head, working of air vessels, construction and discharge of Air lift pump.

#### TEXT BOOK

Modi & Sethi., “Fluid Mechanics & Hydraulics”, Standard Book House, New Delhi

#### REFERENCE BOOKS

1. K. Jain., “Fluid Mechanics”, Khanna Publishers, New Delhi, (2008)
2. Subramanyam., “Fluid mechanics”, Tata McGraw-Hill, New Delhi
3. Rajput, R.K., “Fluid Mechanics and Hydraulic Machines”, Standard Publishing House, New Delhi, 2002
4. F.M. White., “Fluid Mechanics”, Tata McGraw-Hill, New Delhi, 2008
5. Jagdish, Lal., “Hydraulics Machines”, Metropolitan Book Co, New Delhi, 2003
6. Kumar, K.L., “Fluid Mechanics”, Eurasia Publishing House (P) Ltd., New Delhi, 1995

Course Code

Course Name L-T-P Credit

CE-206B

Structural Analysis – II 3-1-0 4

#### Unit I: Analysis of Indeterminate Structures

Concept of fixed and propped cantilever beams - Slope deflection method - Moment Distribution method for continuous beams and rigid frame with and without support settlement.

## Unit II: Matrix Method of Analysis

Introduction to force and displacement method of analysis - Stiffness method of analysis using direct element approach

## Unit III: Analysis for Moving Loads for Indeterminate Beams

Construction of Influence lines for Beams - Application of Mueller Breslau's principle

## Unit IV: Analysis of Three and Two Hinged Arches, Parabolic & Circular Arch

## Unit V: Plastic Analysis of Structures, Portal and Sway Mechanism

Structural Vibrations: Study of Single and Multiple degrees of freedom system, damping.

## BOOKS RECOMMENDED

1. Reddy C S (2007) "Basic Structural Analysis" 2nd edition, Tata Mc Graw Hill, New Delhi
2. Structural Analysis, Ramamurtham
3. Meghere A S and Deshmukh S K (2003) "Matrix method of Structural Analysis" Charotar Publishing House, Anand.
4. Negi L S and Jangid R S (1999) "Structural Analysis", Tata Mc Graw Hill, New Delhi

Course Code

Course Name L-T-P Credit

CE-208B

Transportation Engineering – I3-1-0 4

Unit 1: Highway development and planning-Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation.

Unit 2: Geometric design of highways-: Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems

Unit 3: Traffic engineering & control- Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems

Unit 4: Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems

Unit 5: Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements components and functions; factors affecting design and performance

List of Recommended Books:

1. Transportation Engg by S.K Sharma
2. Highway Engg by L.R Khadiyali
3. Highway Engg by Justo and Khanna

Course Code

Course Name L-T-P Credit

CE-210B

Design of Concrete Structures - I 3-1-0 4

1. INTRODUCTION TO VARIOUS DESIGN PHILOSOPHIES: Introduction to Various Design Philosophies, Working stress and limit state methods, Building code, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads , Design of Rectangular Singly and Doubly Reinforced Sections by Working Stress Method.

2. LIMIT STATE METHOD: Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly Reinforced beams, T-beams, L-beams by Limit State Design Method

3. SHEAR, DEVELOPMENT LENGTH, ANCHORAGE BOND, FLEXURAL BOND:- Behavior of RC beams in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method).

4. DESIGN OF COLUMNS:- Design of Columns by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression requirements for reinforcement, Column with helical reinforcement, Short column under axial load

5. DESIGN OF SLABS:- Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations.

NOTE : All designs shall be conforming to IS : 456 – 2000

#### TEXT BOOK

I.C. Syal & A.K. Goel., N.Subramanian “Reinforced Concrete”, A.H. Wheeler & Co. Delhi.

#### REFERENCE BOOKS

1. P. Dayaratnam., “Design of Reinforced Concrete Structures”, Oxford & IBH Pub. N. Delhi
2. Jain, A.K., “Reinforced Concrete-Limit State Design”, Nem Chand & Bros., Roorkee.

3. Sinha, S. N., “Reinforced Concrete Design”, Tata McGraw Hill.
4. SP-16(S&T)-1980, “Design Aids for Reinforced Concrete”, to IS: 456, BIS, N. Delhi.
5. SP-34(S&T)-1987 Handbook on Concrete Reinforcement and Detailing, BIS, N. Delhi.

Course Code	Course Name	L-T-P	Credit
CE-252B	Environmental Engineering Lab	0-0-2	1

List of Experiments:

1. To determine pH value of given water sample.
2. To determine the residual chlorine content of water sample.
3. To determine turbidity of water sample using Turbidity meter.
4. To determine dissolved oxygen of given sample.
5. To determine the BOD content of a given water sample.
6. To perform jar test of water sample to calculate the optimum dose of coagulant.
7. To determine the Conductivity and Total dissolved solids content of a water sample.
8. To determine the hardness of given water sample.
9. To demonstrate the laying of SW pipes for sewers.
10. To study the waste water treatment process by visiting a sewage treatment plant.

Course Code	Course Name	L-T-P	Credit
CE-254B	Fluid Mechanics – II Lab	0-0-2	1

List of Experiments:

1. To determine the coefficient of drag by Stokes law for spherical bodies.
2. To study the phenomenon of cavitation's in pipe flow.

3. To determine the critical Reynolds number for flow through commercial pipes.
4. To determine the coefficient of discharge for flow over a broad crested weir.
5. To study the characteristics of a hydraulic jump on a horizontal floor and sloping Glacis including friction blocks.
6. To study the scouring phenomenon around a bridge pier model.
7. To study the scouring phenomenon for flow past a spur.
8. To determine the characteristics of a centrifugal pump.
9. To study the momentum characteristics of a given jet.
10. To determine head loss due to various pipe fittings.

Course Code

CE-256B

Course Name L-T-P Credit

Structural Analysis – II Lab 0-0-2 1

#### List of Experiments:

1. Verification of reciprocal theorem of deflection using a simply supported beam.
2. Verification of moment area theorem for slopes and deflections of the beam.
3. Deflections of a truss-horizontal deflections & vertical deflections of various joints of a pin- jointed truss.
4. Elastic displacements (vertical & horizontal) of curved members.
5. Experimental and analytical study of 3 hinged arch and influence line for horizontal thrust.
6. Experimental and analytical study of behaviour of struts with various end conditions.
7. To determine elastic properties of a beam.
8. Experiment on a two-hinged arch for horizontal thrust & influence line for Horizontal thrust.
9. Experimental and analytical study of a 3-bar pin jointed Truss.

10. Experimental and analytical study of deflections for unsymmetrical bending of a Cantilever beam.

Course Code

Course Name L-T-P Credit

CE-258B

Transportation Engineering – I Lab 0-0-2 1

List of Experiments:

1. Sieve Analysis Test of coarse aggregates ( IS: 2386 (Part I) ).

2. Determination of specific gravity and water absorption of coarse aggregates.

3. To determine the combined Flakiness and Elongation Index of Coarse Aggregates. (According to MORTH.

4. To determine the Los Angeles abrasion value for given aggregate sample.

5. To determine the aggregate crushing value of coarse aggregates as per IS: 2386 (Part IV) – 1963

6. To determine the impact value of coarse aggregates.

7. To determine the penetration value and viscosity of a given sample of bitumen by using penetrometer and viscometer.

8. To determine the softening point and specific gravity of a given bitumen sample.

9. To determine the ductility and in-flammability of a given sample of bitumen.

10. Determine the CBR value of sub grade soil sample.

Course Code

Course Name L-T-P Credit

CE-260B

CAD Lab 0-0-2 1

List of Experiments:

1. Introduction to computer aided drafting.

2. Software for CAD- Auto CAD Commands.

3. Practice exercises on CAD Commands.

4. Drawing of plans of buildings using software for Single storeyed buildings.

5. Drawing of plans of buildings using software for Multi storeyed buildings.
6. Developing sections and elevations for Single storeyed buildings.
7. Developing sections and elevations for Multi storeyed buildings.
8. Detailing of building components like doors, windows using CAD software.
9. Development of building components roof trusses using CAD software

Course Code

Course Name L-T-P Credit

CE-301B

Building Construction & Material 3-1-0 4

Unit I: Introduction: Common building material, Mechanical properties of material, Comparison of various mechanical properties. Stones: Common building stones, Requirement of a good building stones, Dressing and preservation of stones. Bricks: Manufacture of clay bricks, Classification and testing of clay bricks, Problems of efflorescence.

Unit II: Lime: Manufacture, Classification of lime. Timber: Classification and wood based products of timber, Defects and their prevention, Factors effecting the strength of timber., Seasoning and preservation of timber. Asphalt, Bitumen and Tar: Terminology, Bituminous materials, Specification and usage Cement: Properties, Uses and types; manufacturing and materials, Plastering and Form Work.

Unit III: Introduction of Buildings and Foundations: General Introduction of Buildings, Types of Buildings, Components of Buildings, Design Loads, Introduction of Foundation, Types of Foundation, Function of Foundation, Essential Requirements of a good Foundation, Site Investigation and Sub-Soil Exploration, Method of Site Exploration, Settlement of Foundation, Causes of Failures of Foundations and Remedial Measures

Unit IV: Bricks Masonry and Composite Masonry: Introduction of Brick Masonry, Types of bricks, Bonds in brick work, Supervision of brick work, Defects in brick masonry, Strengths of brick masonry, Introduction of Composite Masonry, Reinforced brick masonry, Stone composite masonry, Brick-stone composite masonry, Concrete block masonry, Hollow clay block masonry, Damp Proofing, Termite proofing and Fire Protection of Buildings.

Unit V: Walls: Types of walls, Introduction of cavity walls, General features of cavity walls, Construction of cavity walls, Introduction of partition walls, Brick partitions, Clay block partition walls, Concrete partitions, Glass partitions.



Floors and Roofs: Introduction of a Floor, Components of a Floor, Materials for Construction, Selection of Flooring Material, Cement Concrete Flooring, Brick Flooring, Marble flooring, Asphalt Flooring, Introduction of Roofs, Types of Roofs, Trussed Roofs, Steel Roof Trusses

Books:

1. Building Construction, B. C. Punmia
2. Construction Materials, S. C. Rangwala

Course Code	Course Name	L-T-P	Credit
CE-303B	Concrete Technology	3-1-0	4

Unit 1:

Cement Hydration: Cement Types, Paste Micro-structure; Workability; Durability; Factors affecting strength of concrete. Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gelspace ratio and its significance.

Aggregates: types, physical properties and standard methods for their determination.

Unit 2:

Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. \_ Factors affecting, methods of determination Hardening plasticity and fatigue; Creep and shrinkage; Fresh concrete modelling; Moisture/Ionic diffusion in concrete.

Unit 3:

Admixture in concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, their properties and effect.

Unit 4:

Quality control; Concrete mix design; Types of concrete; Concrete production; Tests of concrete in structures; Failure criteria; Fracture mechanics;

Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipment's for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipment's. Curing of concrete: various methods their suitability. Durability of concrete

Unit 5:

Fabrication and Erection Work: Fabrication of Structural steel at slopes and sites, Handling and transportation of units to be erected, Erection of Fabricated steel structures,

Prefabricated/precast construction; relative advantages & disadvantage and various precast units & Erection of Precast Reinforced Concrete Structures

Suggested Readings:

1. Concrete Technology by Neville & Brooks, Pearson Education.
2. Concrete: Microstructure, Properties & Materials by Mehta P.K, Tata Mc Graw Hill.
3. Concrete Technology by M.S.Shetty, S.Chand & Co.
4. Concrete materials by Popovics, Standard Publishers

Course Code

Course Name L-T-P Credit

CE-305B

Geotechnical Engineering - I 3-1-0 4

Unit I: Soil Exploration : Planning for soil exploration, Spacing of boring, Depth of boring, Soil Sampling, Sample disturbance, Split Spoon Sampler

Soil Bearing Capacity : Ultimate soil bearing capacity, Terzaghi's theory, Effect of ground water table on bearing capacity, Settlement of foundation, Construction practices to avoid differential settlement

Unit II: Lateral Earth Pressure: Introduction, Types of earth retaining structures, Lateral earth pressures, Earth Pressure at Rest, Earth Pressure theories, Active and Passive Pressures

Stability of Retaining Walls: Stability considerations for gravity retaining walls, Coulombs theory Vs Rankins theory, Choice of appropriate theory, Numerical Problems based on lateral earth pressure and stability of retaining walls

Unit III: Slope Stability: Infinite Slopes, Finite Slopes, Total Stress analysis for purely cohesive soil, Effect of tension cracks, Method of slices for a cohesive frictional soil, Effective Stress Analysis, Steady seepage, Rapid drawdown.

Unit IV: Shallow Foundation: Introduction to Shallow Foundation, Types of foundations settlement, Elastic settlement based on the theory of elasticity, Elastic Settlement of foundations on saturated clay, Elastic Settlement of Sand Soil, Types of Shallow foundation.

Deep Foundation: Introduction, Necessity, Classification of piles, Uses of Piles, Load carrying capacity of piles, Negative skin friction.

Design of Pile Foundation: Design of pile foundation, Construction of pile foundations, laterally loaded piles (Batter Piles)

Unit V: Well Foundations: Introduction, Advantages of well foundations, Elements of well foundation, Design Aspects of well foundation, Grip length, Forces acting on well foundation, Terzaghi analysis, Tilts and Shifts, Remedial measures for rectification of tilts and shifts

Machine Foundation: Natural frequency of machine foundation, Transmissibility, Transmitted force, Machine foundation Special features, Design Approach for machine foundation, Vibration Isolation,

Properties of isolating materials, Construction Aspects of machine foundations

Text Books: 1. SOIL MECHANICS AND FOUNDATION ENGINEERING by K.R ARORA, STANDARD PUBLISHERS & DISTRIBUTORS, 3rd Edition, (2011)

Course Code	Course Name	L-T-P	Credit
CE-307B	Costing, Estimating, Billing & Accounts	3-1-0	4

#### Unit I

ESTIMATE: Methods of estimating, Deductions for openings, Building estimate by long wall-short wall method and centre line method, Arch masonry calculations

#### Unit II

ESTIMATE OF BUILDINGS: Estimate of single room with varandah, estimate of double room with varandah, estimate of masonry platform, estimate of masonry tank, estimate of hexagonal room, estimate of septic tank, estimate of roads and canals

#### Unit III

SPECIFICATIONS: Specification of roads, Specification of various building parameters, Specification of industries, Specification of earthwork

#### Unit IV

R.C.C WORKS AND STRUCTURES: R.C.C works, Standard hooks and cranks of reinforcement bars, Estimate of R.C.C slab, Estimate of R.C.C column, Estimate of R.C.C beam, Estimate of R.C.C footing, Estimate of R.C.C retaining wall

#### Unit V

RATE ANALYSIS: Preparing analysis of rates, Analysis of rates for cement concrete foundation, Analysis of rates for Earthwork in excavation with a concept of lead and lift, Analysis of rates for RCC in roof slab, Analysis of rates for Terrazzo and marble Flooring, Analysis of rates for Brick masonry in cement mortar

Text Books:

1. ESTIMATING AND COSTING IN CIVIL ENGINEERING by B.N .DUTTA, UBS PUBLISHERS' DISTRIBUTORS

(P) LTD.-NEW DELHI, 26th Edition, (2013)

Course Code	Course Name	L-T-P	Credit
CE-309B	Design of Steel Structure - I	3-1-0	4

Unit 1: Plastic Analysis:

Plastic analysis of steel structures, static and mechanism method of analysis, shape factor.  
Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including moment- rotation.

Unit 2: Connections:

Riveted Connection, Types of bolts, load transfer mechanism, Design of bolted and welded connections under axial and eccentric loadings.

Introduction of Welded Connection: Introduction, Types of welded joints, Design of welded joint subjected to axial loads, Design of welded joints subjected to eccentric loads, Design of simple, semi- rigid and rigid connections

Unit 3: Compression Member:

Column buckling curves, Design of compression member; Axially loaded built up columns, design of lacings and battens.

Beams: Design of beams: simple and compound sections, laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.

Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members

Unit 4: Design of plate girder:

Design of welded and bolted sections. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections. Web and flange splicing. Horizontal, Intermediate and Bearing stiffeners. Design of gantry girder.

Unit 5: Column Bases:

Design of column bases, Slab base, gusseted base for axial and eccentric compressive load.

Water tanks: circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.

Reference Books:

1-Design of Steel Structures by N. Subramanian, Oxford University Press.

2. Limit state Design of Steel Structures: S K Duggal, TMH publication  
 3- Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.  
 4- Design of Steel Structures by V.L. Shah, Structures Publications.

Course Code	Course Name	L-T-P	Credit
CE-351B	Building Construction & Material Lab	0-0-2	1

List of Experiments:

- |     |   |
|-----|---|
| 1.  | Introduction and Refreshing to AutoCAD (Introduction of AutoCAD and Various Commands)   |
| 2.  | Fundamental Line Drawings (Fundamental line drawings & Practice Drawings)               |
| 3.  | Foundation Drawings (Various Types of Foundation drawings)                              |
| 4.  | Brick Masonry Drawings (Drawings of Various Types of Bond of Brick Masonry)             |
| 5.  | House Planning Drawing (Planning and Drawings of Plumbing and Electrical in all Floors) |
| 6.  | House Planning Drawing (Planning and Drawings of Different Floors)                      |
| 7.  | Office Building Drawing (Planning and Drawings of Different Floors)                     |
| 8.  | To design and draw a Primary Health Centre  |
| 9.  | To design and draw a Primary School   |
| 10. | To design and draw a Rest House   |
| 11. | To design and draw a College Library  |

Course Code	Course Name	L-T-P	Credit
CE-353B	Concrete Technology Lab	0-0-2	1

LIST OF EXPERIMENTS

- |    |  |
|----|--|
| 1. | To verify the purity of cement in the field. |
|----|--|

2. To determine the quantity of water to be mixed to obtain a cement paste of normal consistency.
3. To determine initial and final setting time of cement.
4. To verify the soundness of a given sample of cement
5. To determine the fineness of cement by sieving through standard IS 90 micron sieve.
6. To determine the compressive strength of one 1:3 cement sand mortar cubes
7. To determine quantity of silt and fine aggregates in the field.
8. Phenomena of bulking of fine aggregates and to draw a curve between water content and bulking
9. To determine bulking of fine aggregates in the field
10. To determine flakiness index and elongation index of coarse aggregates
11. To determine the particle size distribution of fine, coarse and all in (mixed) aggregates by sieve analysis
12. To determine the consistency of concrete mixes of given proportion by Slump test
13. To determine by compacting factor test, the workability of concrete mixes of given proportion
14. To determine the compressive strength of concrete.  
(Concrete mix of M15 & M 20).

Course Code

Course Name L-T-P Credit

CE-355B

Geotechnical Engineering – I Lab 0-0-2 1

#### List of Experiments:

1. Determination of liquid limit by Casagrande's apparatus.
2. Determination of plastic limit
3. Determination of shrinkage limit
4. Determination of field density by sand replacement method

5. Determination of compaction properties by standard Proctor Test Apparatus
6. To determine the compressibility parameters of soil by consolidation test
7. To determine the permeability of soil by constant and falling head methods.
8. To determine the CBR of soil.

Course Code	Course Name	L-T-P	Credit
CE-302B	Highway Planning & Management	3-1-0	4

### Unit I

Introduction. : Importance of transportation., Different modes of transportation., Classification of road transport., Importance of roads in India., Scope of highway engineering.

Highway development and planning. : Historical development of road construction., Highway development in India., Necessity of highway planning., Classification of roads., Road patterns., Planning surveys., Preparation of plans., Interpretation of planning surveys., Preparation of master plan and its phasing., Highway planning in India.

Administration and Financing of roads in India. : Classification of roads., Administration of National highways., Administration of roads under other central Ministries., Roads of Inter-state and economic importance., Administration of state roads., Road research., Road making machinery., Highway financing in India.,

Transport policy and planning., Need for transport planning., National transport policy., Types of transport plans., City and town transport plans.

### Unit II

Geometric design of Highways. : Road user and the vehicle., Human factor governing road user behavior., Pedestrian characteristics., Vehicle characteristics., Characteristics of cycle and slow moving vehicles., Highway classification., Design control and criteria., Horizontal alignment., Vertical alignment., Combination of vertical and horizontal alignment., Sight distance., Control of access., Driveways.

### Unit III

Highway project preparation. : Importance of surveys and investigations., Types of surveys., Guidelines for alignment and route location., Desk study., Use of photogrammetry in highway location and survey., Conventional ground survey., Drainage studies., Soil investigations., Pavement design investigations., Design drawings., Estimates and project report.

Highway maintenance. : Need for maintenance., Maintenance of various types of road., Maintenance of shoulders., Maintenance of slopes of embankments., Maintenance of bridges and culverts., Special problems in Hill road maintenance., Maintenance practices in India., Maintenance management system., Effect of highways on environment.

#### Unit IV

Overlay design and construction. : Need for overlays., Overlay design methods for flexible pavements., Overlay design methods for rigid pavements., Importance of skid resistance., Factors governing skid resistance., Construction of skid resistant surfaces., Maintenance of skid resistance surfaces., Need for roughness maintenance., Measurement of road roughness., Towed Fifth wheel bump integrator., Car mounted roughness measuring device.

#### Unit V

Highway economics and finance. : Highway user benefits., Cost of initial construction., Cost of maintenance., Cost of vehicle operation., Equivalencies in thickness., Role of economic evaluation., Some basic principles., Economic analysis., Highway finance

#### Text Books:

1. HIGHWAY ENGINEERING by S.K. KHANNA AND C.E. JOSTO, NEM CHAND BROTHERS, 1st Edition, (2011)

Course Code

Course Name L-T-P Credit

CE-304B

Construction & Pavement Materials 3-1-0 4

#### Unit I

Aggregates : Types of road aggregates, Requirements of a good road aggregate, Tests for road aggregates Bituminous Materials : Bitumen, Bitumen emulsion, Tar, Primer, Manufacturing of bitumen, Functions of bituminous materials, Tests for bituminous materials

#### Unit II

Polymer and Rubber Modified binders : Physical and chemical properties, Marginal and waste materials in road construction, Properties and scope, Performance based mix design Approaches., Visco- elastic properties of bitumen and bituminous mixture

Mix design : Proportioning of materials., Requirement of bitumen mixes, Design of bituminous mix, Marshall method

#### Unit III

Soils : Characteristics of soil, Particle sizes and distribution, Plasticity, Specific gravity, State of compaction, Grain or particle size classification

Soil stabilized roads : Introduction, Mechanical soil stabilization, Soil cement stabilization, Soil lime stabilization, Stabilization of soil using bituminous materials, Special problem in soil



stabilization works Subgrade soil strength : evaluation of soil strength by CBR test, Plate load test

#### Unit IV

Portland cement : Type, Functions, Requirements, Properties, Tests and specifications for use in various components road., Manufacturing of cement

Concrete : Proportioning of concrete mix, Special concrete, High strength concrete, Ready mix concrete and its manufacture, Distribution, Transportation and handling, Properties, Test of concrete

#### Unit V

Low Cost Materials : Earth roads, Kankar roads, Gravel roads, Moorum roads, Traffic bound macadam roads, Water bound macadam roads

Innovative Materials : Use of geo-synthetics., Use of Fly-ash in road embankment and cement concrete mixes.

#### Text Books:

1. HIGHWAY MATERIALS TESTING by KHANNA AND JUSTO, NEM CHAND BROTHERS, 8th Edition, (2009)

(Specialization: Transportation/Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-306B	Bridge Engineering	3-1-0	4

#### Unit 1

General; classification of bridges, site selection, geometric and hydraulic design consideration. Loading standards for highway and railway bridges, general design consideration; optimum spans.

#### Unit 2

Concrete bridges: culverts; Slab, T-beam, box girder bridges, balanced cantilever bridge, cable stayed bridge, extrados bridges; arch bridge.

#### Unit 3

Special requirements for Prestressed Concrete bridges; Steel bridges: plate girder bridge, truss bridge, suspension cable bridge, cable stayed bridge.

#### Unit 4

Substructures: design of piers and abutments, pile and well foundations, bearings and expansion joints, special wearing coats; seismic design considerations.

## Unit 5

Aerodynamic stability considerations; special durability measures; provisions for inspection and maintenance.

### Text Book:

Bridge Engineering by S.C. Rangwala, Charotar Publishing House.

Course Code	Course Name	L-T-P	Credit
CE-308B	Mass Transport System	3-1-0	4

Unit-1 Transportation System Management: Travel Demand management, Traffic Management, The problems caused by turning traffic, Advantage and dis-advantage of one way street working, Tidal flow operation, Closing side streets advantages & dis-advantages, BRT (Bus Rapid Transit)

Unit-2 Trip Interchanges: Graded-separated intersections with or without interchange, Three leg interchange, Four leg interchange, Multi-leg interchange, Trumpet interchange, Diamond interchange, Clover leaf interchange, Rotary interchange, Interchange ramp, Loop, outer connection, Direct connection, Design speed for ramps.

Unit-3 Transport Planning Process: Scope, Interdependence of land use and Traffic, Stages in Transport planning, Survey and analysis of existing conditions, Fore-cast analysis of future condition, Evaluation, Program adoption and implementation, Continuing study, Trip Distribution, Opportunity Model

Unit-4 Urban Transportation Problem: Growth of Towns, Growth of Traffic, Nature of present difficulties in urban traffic conditions, Measures to meet the problems, New Transportation study, Traffic restraint measures, Promotion of public transport, Pedestrianisation, Staggering of office Hours, Promotion of Bi-cycle traffic, Role of Public transport, Fare and subsidies.

Unit-5 Intermediate Public Transport (IPT) vehicles: Types of IPT, Characteristics of IPT modes, Traffic & Environment: Introduction, Detrimental effects of Traffic on Environment, Safety, Noise, Air pollution, Visual Intrusion, Severance. Factors affecting Fuel consumption of Motor vehicles: vehicle, Drive, Road, Fuel characteristics and environmental conditions, Measures for economy of fuel in road transport. Public-private partnership in Transport Projects: Benefits from privatization, Forms of privatization, BOT, Annuity Project, Special Purpose Vehicle (SPV), Design Build finance & Operate (DBFO)

### Suggested Readings;

1. L.R.Kadiyali, Transport Engineering and Transport Planning, Eighth Edition 2013.

2. C.S. Papacostas, P.D.Prevedouros, Transport Engineering and Planning, PHI Publication, #rd Edition 2002

Course Code	Course Name	L-T-P	Credit
CE-310B	Airport Engineering	3-1-0	4

#### Unit I

Introduction to Air transport : History of Air transport, Structure and Organisation of Air Transport, National Airports Authority, International Airports Authority of India, International Civil Aviation organisation

Airport Characteristics : General, Relation between Aircraft and Airports, Requirements of Aircraft Types, Influence of Aircraft Design on Runway Length, Weight Components, Aeorplane Component Parts, classification of Flying Activity, Relation of Aircraft to landing Facility, Aircraft characteristics Unit II

Airport Planning : Airport Master plan, Regional Planning, Data required before Site Selection, Airport Site selection, Surveys for Site Selection, Estimation of future Air Traffic needs

Airport Obstructions : Zoning Laws, Classification of Obstructions, Approach and Turning Zone

#### Unit III

Runway Design : Runway Orientation, Basic Runway Length, Correction for Elevation, Temperature and Gradient, Airport Classification, Runway Geometric Design

Taxiway Design : Factors Controlling Taxiway layout, Geometric Design standards, Exit Taxiways, Fillets, Separation Clearance, Holding Apron

#### Unit IV

Airport capacity and configuration : Airport Capacity, Runway capacity, Taxiway Capacity, Airport Configuration, Runway Configuration, Runway Intersection Design

Structural Design of Airport Pavements : Introduction, Various Design Factors, Design Methods for flexible Pavements, Design Methods for Rigid Pavements, Joints in Cement Concrete Pavements

#### Unit V

Terminal area and Airport layout : Terminal Area, Building and Building Area, Apron, Vehicular Circulation and parking area, Hangar, Blast Considerations

Visual Aids : Airport Marking, Airport Lighting

#### Unit VI

Air traffic control : Need of Air Traffic Control, Air Traffic Control Network, Air Traffic Control Aids  
Airport grading and drainage : Computation of earthwork, Airport drainage, Special Characteristic and requirements of Airport drainage

Environmental guidelines for Airport Projects : Introduction, Environmental Impact Assessment, Environment impact Statement, Environment management Plan, Measures for Offsetting Adverse Impacts, Environmental Monitoring Programme

Text Books:

1. AIRPORT PLANNING AND DESIGN by S.K. KHANNA - M.G. ARORA - S.S. JAIN, NEM CHAND & BROS, 6th Edition, (2012)

(Specialization: Transportation/Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-352B	Material Testing Lab	0-0-4	2

List of Experiments:

1. Testing the strength of steel.
2. Shape test of aggregated.
3. Strength test of aggregates.
4. Testing the Compressive strength of Concrete.
5. Bitumen adhesion test with aggregates.
6. Abrasion test of aggregates.
7. Crushing test of aggregates.
8. Crushing test of concrete.
9. Failure analysis of concrete beam/column.
10. Ductility test of bitumen.
11. Softening point test of bitumen.

Course Code	Course Name	L-T-P	Credit
CE-312B	Design of Concrete Structure – II	3-1-0	4

Unit 1

Design of continuous beams and building frames, Moment redistribution, Estimation of wind and seismic loads.

## Unit 2

Desirable features of earthquake resistant construction, Detailing for earthquake resistant construction – ductility criteria.

## Unit 3

Water tank and staging; Introduction, Design criteria, Design of rectangular and circular water tank, Design of Intze tank, Staging for overhead tank; Introduction to bridge engineering, Investigation for bridges,

## Unit 4

IRC loadings, Design of slab culvert; Design of Masonry walls and columns; Pre-stressed concrete, Introduction, pre-stressing system, losses in pre-stress, Design of simple span girders.

## Unit 5

Design of end block; Design of staircases; Design of cantilever and counter-forte type retaining wall; All design steps/process to as per the most recent BIS code of practices

Books: 1. LIMIT STATE DESIGN OF REINFORCED CONCRETE (IS 456 : 2000) by DR. BC PUNMIA, ASHOK KUMAR JAIN AND ARUN KUMAR JAINT, LAXMI PUBLICATIONS, 1st

Edition, (2010)

2. REINFORCED CONCRETE DESIGN by PILLAI AND D MENON, MCGRAW HILL EDUCATION, 2nd Edition, (2007)

Course Code	Course Name	L-T-P	Credit
CE-312B	Advanced Design of Steel Structure	3-1-0	4
Course Code	Course Name	L-T-P	Credit
CE-312B	Industrial Structures	3-1-0	4

## Unit 1

Industrial steel building frames: Types of frames, bracing, crane girders and columns, workshop sheds, trussed bents, Pressed steel tank, circular tank; Transmission and Communication towers: Types and configuration.

## Unit 2

Analysis and design; Chimneys; Loads and stresses in chimney shaft, Earthquake and wind effect, Stresses due to temperature difference, combined effect of loads and temperature, temperature. Design of chimney; Silos and Bunkers.

### Unit 3

Jassen's theory, Airy's theory, Shallow and deep bins, Rectangular bunkers with slopping bottom, Rectangular bunkers with high side walls; Steel stacks; introduction, force acting on a steel stack, design consideration, design example of stacks.

### Unit 4

Concrete Shell Structures: Folded plate and cylindrical shell structures; Introduction, structural behaviour of long and short shells, beam and arch action, analysis and design of cylindrical shell structures, Analysis and design of folded plates.

### Unit 5

Machine foundations; introduction, machine vibration, structural design of foundation to rotary machines, impact machines, vibration characteristics, design consideration of foundation to impact machine, grillage, pile and raft foundation.

Course Code	Course Name	L-T-P	Credit
CE-312B	Structural Dynamics	3-1-0	4

Analysis of the dynamic response of structures and structural components to transient loads and foundation excitation; single-degree-of-freedom and multi-degree-of-freedom systems; response spectrum concepts; simple inelastic structural systems; and introduction to systems with distributed mass and flexibility.

Course Code	Course Name	L-T-P	Credit
CE-401B	Railway Engineering	3-1-0	4

### Unit 1

Railway track gauge, alignment of railway lines, engineering surveys and construction of new lines, tracks and track stresses.

### Unit 2

Rails, sleepers; ballast; subgrade and formation, rack fittings and fastenings, creep of rails.

### Unit 3

Geometric design of track, curves and super-elevation, points and crossings, track junctions and simple track layouts; rail joints and welding of rails.

### Unit 4

Track maintenance, track drainage; modern methods of track maintenance, rehabilitation and renewal of track; tractive resistance and power, railway stations and yards.

#### Unit 5

Railway tunneling; signaling and interlocking; maintenance of railways and high speed trains.

Text Book:

Railway Engineering by S.C. Saxena.

Course Code

Course Name L-T-P Credit

CE-403B

Docks & Harbour Engineering 3-0-0 3

#### Unit 1

Harbour Planning: Types of water transportation, water transportation in India, requirements of ports and harbours, classification of harbours, selection of site and planning of harbours, location of harbour, traffic estimation, master plan, ship characteristics, harbour design, turning basin, harbour entrances, type of docks, its location and number.

#### Unit 2

Site investigations – hydrographic survey, topographic survey, soil investigations, current observations, tidal observations; Docks and Repair Facilities: Design and construction of breakwaters, berthing structures - jetties, fenders, piers, wharves, dolphins, trestle, moles,

#### Unit 3

Harbour docks, use of wet docks, design of wet docks, repair docks, lift docks, dry docks, keel and bilge blocking, construction of dry docks, gates for dry docks, pumping plant, floating docks, slipways, locks, size of lock, lock gates, types of gates; Navigational Aids: Requirements of signals, fixed navigation structures, necessity of navigational aids, light houses, beacon lights, floating navigational aids, light ships, buoys, radar.

#### Unit 4

Dredging and Coastal Protection: Classification, types of dredgers, choice of dredger, uses of dredged materials, coastal erosion and protection, sea wall, revetment, bulkhead, coastal zone and beach profile; Port facilities: Port development, port planning, port building facilities, transit sheds, warehouses, cargo handling facilities, container handling terminal facilities, shipping terminals, inland port facilities.

#### Unit 5

Inland waterways, Inland water transportation in India, classification of waterways, economics of inland waterways transportation, national waterways.

Course Code

Course Name L-T-P Credit

CE-405B

Transportation & Environment 3-0-0 3

### Unit I

The Nature of Road Safety : Defining Road Safety, Road Safety “ a Complex Field, Science-based Road Safety Research, Road Safety Demographics, Crash Contributing Factors and Interactions, Road User Decisions, Intervention Tools and Countermeasures

The History of Road Safety Management : The Foundation for Road Safety Management Policy, Safety Management Roles and Responsibilities, The Influence of Interest Groups, Road Safety Education Opportunities, Road Safety and Other Transportation Priorities

Road Safety Program Management : The Importance of Scientific Management Techniques, Strategies for Integrating and Amplifying Safety in the Transportation Planning Processes, Organizational Leadership and Support Needs, Current Research Supporting Road Safety Management

### Unit II

Crash estimation methods : Observed crash frequency and crash rate methods, Crash estimation using statistical method, Indirect safety measures

### Unit III

The Origins, Characteristics, and Uses of Crash Data : Using Data to Identify Safety Problem, State and Local Data Systems, Crash Data Collection, National Road Safety Databases

### Unit IV

Environment and its interaction with human activities : Environmental imbalances, Concept of Environmental Impact Assessment, Environmental Impact Statement, Objectives of EIA, Advantages and Limitations of EIA, Attributes, Impacts, Indicators and Measurements

Environmental Impact Assessment For Transportation Projects : Basic Concepts, Transportation Related Environmental Impacts, Roadway Impacts, Objectives, Construction Impacts, Environmental Impact Asses, Environment Audit, Typical case studies, Statement, Vehicular Impacts, Safety & Capacity Impacts

### Unit V

Environmental Indicators : Indicators for climate - Indicators for terrestrial subsystems, Indicators for aquatic subsystems, Selection of indicators – Socioeconomic indicators, Indicators for economy, Indicators for health and nutrition - Cultural

Environmental Issues in Industrial Development : On-site and Off-site impacts during various stages of industrial development, Long term climatic changes, Environmental impact of Highways, Green house effect, Industrial effluents and their impact on natural cycle

### Unit VI



Methodologies for Carrying Environmental Impact Assessment : Overview of Methodologies, Checklist, Overlays, Benefit Cost Analysis, Choosing A Methodology.

Course Code	Course Name	L-T-P	Credit
CE-407B	Analysis & Design of Pavement	3-1-0	4

#### Unit I

Component of pavement : Soil properties on pavement performance, Importance of Sub-Grade soil properties on pavement performance., Functions of Sub-Grade, sub-base, base course and wearing course. Unit II

Stresses in flexible pavements : Stresses in homogeneous masses and layered system, deflections, shear failures, equivalent wheel and axle loads., Stresses in homogeneous masses and layered system, Deflections, Shear failures, Equivalent wheel and axle loads

Elements in design of flexible pavement : Loading characteristics-Static, impact and repeated loads, Affects of dual wheels and tandem axles, Area of contact and tyre pressure, CBR value of different layers, Equivalent single wheel load, Equivalent stress equivalent deflection criterion, Equivalent wheel load factors, Climatic and environmental factors

#### Unit III

Design methods for flexible pavement : Group Index method, California bearing ratio (CBR), Triaxial method, Mcleod Method, Benkelman Beam method, Boussiusqs and Burmisters analysis and design method

#### Unit IV

Elements in design of Rigid pavements : Wheel load, Westergaards analysis, Basic properties of concrete elasticity, shrinkage & creep, rigid pavement design, concrete mix design

Method of rigid pavement design : IRC method of rigid pavement design, Importance of joint in rigid pavement, Types of joints, Use of tie bar and dowell bar

#### Unit V

Pavement evaluation : Benkleman beam method, Pavement Maintenance Measures, Implementation of Maintenance management programs

#### Unit VI

Types of distress : Structural and functional, Fatigue, Factors affecting performance

Temperature stresses : Thermal properties of aggregates and concrete, Effect of temperature variations on concrete pavements, Combination of stresses due to different causes

Pavement failures : Failures in flexible pavements-type and causes, Rigid pavement failures-type and causes

Text Books:

1. HIGHWAY ENGINEERING by SK KHANNA AND CJ JUSTO, NEM CHAND & BROS, 8th Edition, (2001)

Course Code	Course Name	L-T-P	Credit
CE-409B	Traffic Engineering	3-1-0	4

#### Unit I

Traffic engineering administration and functions. : Traffic engineering., Functions., Organisation of traffic engineering department., Importance of traffic engineering under Indian conditions., Human factors governing road user behaviour., Other vehicle characteristics., Characteristics of slow moving traffic in India.

#### Unit II

Analysis and Interpretations of traffic studies. : Statistical methods for traffic engineering., Poisson and binomial distributions., Normal distribution., Linear regression and correlation., Multiple linear regression., General trends in speed data., Time mean speed and space mean speed., Traffic forecasting., Limitations of traffic forecasting., Types of traffic., Forecasts and mathematical models., Period for forecasting.

#### Unit III

Traffic surveys. : Speed, Journey time and delay surveys., Methods of measuring spot speeds., Presentation of travel time and journey speed data., Vehicle volume count., Classification and occupancy., Types of counts., Methods available for traffic counts., Planning and programming of traffic counts., Origin-destination survey., Checking the accuracy of survey data., Parking surveys.

Geometric design. : Highway classification., Horizontal alignment., Vertical alignment., Sight distance., Intersections., Grade separated intersections., Design for pedestrian facilities., Design criteria for separate cycle tracks., Traffic and parking problems., Design standards for on street parking facilities., Off street parking facilities.

#### Unit IV

Traffic control. : Importance of traffic sign., Need for international standardisation., General principles of traffic signing., Types of traffic signs., Location, height and maintenance of traffic signs., Road markings., Types of road markings., Traffic signals., Advantages and disadvantages of traffic signals., Fixed time signals and vehicle actuated signals., Coordinated control of signals., Area traffic control., Traffic control aids and street furnitures.

Traffic regulations and traffic safety. : Traffic regulations and traffic safety., Basic principles of traffic regulation., Regulation of speed and vehicles., Regulation concerning the driver., General rules concerning traffic., Road accidents., Cause and prevention., Road accidents and traffic engineering., Accident situation in India., Statistical methods for analysis of accident data., Roads and its effect on accidents., Cost of road accidents., Traffic management measures and their influence on accident prevention.

#### Unit V

Street lighting. : Need for street lighting., Definition of common term., Some laws of illumination., Discernment of artificial lighting., Appearance of lighted pavement., Types of surfaces., Types of lamps., Illumination of traffic rotaries., Lighting at bends., Lighting dual carriageways., Lighting bridges., Tunnel lighting., Maintenance off lighting installations.

#### Text Books:

1. TRAFFIC ENGINEERING. by MATSON T.M. SMITH, W.S AND HURD F.W., M. G.HILLS, 1st Edition,

Course Code	Course Name	L-T-P	Credit
CE-451B	Traffic & Transport Engg. Lab	0-0-2	1

#### List of Experiments:

1. To study the traffic flow characteristics.
2. To conduct traffic survey
3. To conduct spot speed study
4. To study the various types of intersections.
5. To study the ITS systems of world.
6. To study the ITS systems in India.
7. To study the congestions problem & solutions.
8. To generate road networks through Open Street Map.
9. To generate the road networks using SUMO Simulator.
10. To study & perform the traffic simulation using software.

Course Code	Course Name	L-T-P	Credit
CE-453B	Seminar	0-0-4	2

#### Seminar:

Various transportation/structural problems will be discussed and presentations on the solutions of various types of Transportation/structural problem by the students.

Course Code	Course Name	L-T-P	Credit
PDP	Problem Solving Skills	0-0-2	1
Course Code	Course Name	L-T-P	Credit
CE-411B	Composite Materials	3-0-0	3

#### Unit 1

Introduction: Definition, Classification, Constituents, Interfaces and Interphases, Distribution of constituents, Nano-composites

Performance of Structural Composites: Combination effects (Summation, Complementation and Interaction), Basic analytical concepts (Qualitative black box approach and Quantitative analytical approach), Strengthening mechanisms, Stress distribution in fibre and the matrix (shear stress and axial tensile stress in the fibre along its length), Nano-structured composites

#### Unit 2

Performance of Composite in Nonstructural Applications : Composites in Electrical, Superconducting and Magnetic Applications, Nano-composite devices

Fabrication Composites : Fabrication of Metal Matrix Composites, Basic Requirements in Selection of constituents, solidification processing of composites - XD process, Spray processes - Osprey Process, Rapid solidification processing, Dispersion Processes - Stir-casting, Screw extrusion, Synthesis of In situ Composites; Fabrication of Polymer Matrix Composites, Moulding method, Low pressure closed moulding, pultrusion, Fabrication of ceramic matrix composites, Fabrication of nano-composites

#### Unit 3

Characterisation Composites : Control of particle/fibre and porosity content, particle/fibre distribution, Coating of reinforcing component, Strength analysis

Composite : Forging and extrusion of composites – critical issues, mechanical properties; Induction Heating, Fusion Bonding, Ultrasonic welding, Gas tungsten arc welding, Gas metal arc welding, Resistance spot & seam welding, Resistance brazing, Resistance spot joining, Resistance spot brazing, Resistance welding of thermoplastic graphite composite, Weld bonding, Brazing of MMC.

#### Unit 4

Industrial Application of Composite Materials : Civil constructions of structures/panels, Aerospace industries, Automobile and other surface transport industries, Packaging industries, House hold and sports components etc.

#### Unit 5

Fracture & Safety of Composite : Fracture behaviour of composites, Mechanics and Weakest link statistics, Griffith theory of brittle fracture and modification for structural materials, Basic fracture mechanics of composite (Fracture toughness, COD and J-integral approaches, Fatigue crack growth rate), Fracture Mechanics of brittle matrix fibre composite, Fracture mechanics of metal matrix fibre composite, Experimental evaluation (composite), Elementary reliability analysis.

#### References:

1. Composite materials, K.K. Chawala, 2nd ed., (1987)  
Springer-Verlag, New York.
2. Nanocomposite Science and Technology, P. M. Ajayan, L. S. Schadler, P. V. Braun, (2003), Wiley-VCH Verlag GmbH Co. KGaA, Weinheim.

Course Code	Course Name	L-T-P	Credit
CE-413B	Advanced Structural Analysis	3-1-0	4

#### Unit 1

Elasticity: Introduction, Components of strain and strain, Hooke's law, Plane stress and plane strain,

#### Unit 2

Equations of equilibrium and compatibility, Boundary conditions, Two dimensional problems in rectangular and polar coordinates, Bending of simple and cantilever beams.

#### Unit 3

Model Analysis: Structural similitude, Direct and indirect model analysis, Model material and model making.

#### Unit 4

Measurement for forces and deformations; Introduction to Finite element method for structural analysis; Review of principle of virtual work, Ritz method.

#### Unit 5

Discretization of domain, Basic element shape, Discretization process; Application of finite element method to one and two dimensional plane stress strain elements.

Course Code	Course Name	L-T-P	Credit
CE-415B	Earthquake Analysis & Design of Structures	3-1-0	4

#### Unit 1

Theory of Vibrations; Concept of inertia and damping - Types of Damping - Difference between static forces and dynamic excitation.

## Unit 2

Degrees of freedom – SDOF idealization - Equations of motion of SDOF system for mass as well as base excitation – Free vibration of SDOF system - Response to harmonic excitation - Impulse and response to unit impulse - Duhamel integral.

## Unit 3

Multiple Degree of Freedom System; Two degree of freedom system – Normal modes of vibration - Natural frequencies - Mode shapes - Introduction to MDOF systems - Decoupling of equations of motion

- Concept of mode superposition (No derivations).

## Unit 4

Elements of Seismology; Causes of Earthquake - Geological faults - Tectonic plate theory - Elastic rebound – Epicentre; Hypocentre - Primary, shear and Raleigh waves - Seismogram - Magnitude and intensity of earthquakes - Magnitude and Intensity scales - Spectral Acceleration - Information on some disastrous earthquakes;

## Unit 5

Response of Structures to Earthquake; Response and design spectra – Design earthquake - concept of peak acceleration - Site specific response spectrum - Effect of soil properties and damping - Liquefaction of soils - Importance of ductility - Methods of introducing ductility into RC structures Design Methodology IS 1893, IS 13920 and IS 4326 - Codal provisions - Design as per the codes - Base isolation techniques.

Course Code	Course Name	L-T-P	Credit
CE-417B	Advanced RCC Design	3-1-0	4
Course Code	Course Name	L-T-P	Credit
CE-419B	Construction & Maintenance Management	3-0-0	3

## Unit 1

Maintenance and Repair Strategies Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

## Unit 2

Strength and Durability Of Concrete- Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete – Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion – Effects of cover thickness; Special

Concretes- Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self-compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

### Unit 3

Techniques for Repair and Protection Methods- Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

### Unit 4

Repair, Rehabilitation and Retrofitting of Structures- Evaluation of root causes; Underpinning & shoring; some simple systems of rehabilitation of structures; Gunite, shotcreting; Non-Destructive testing systems.

### Unit 5

Use of external plates, carbon fibre wrapping and carbon composites in repairs. Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Demolition Techniques – Engineered demolition methods – Case studies.

Course Code

Course Name L-T-P Credit

CE-455B

Advanced Structural Engineering Lab 0-0-2 1

#### List of Experiments:

1. Study of various types of loads on structures.
2. Analysis of loading in portal frame.
3. Analysis of slope & deflection of a beam under certain loading.
4. Design of multistorey building using Staad pro.
5. Design of elevated water tank using Staad Pro.
6. Analysis & design of bridge deck.
7. Seismic analysis of multi storey building.
8. Analysis & design of steel truss.
9. Study of dynamic response of structures.
10. Seismic analysis of water tank.

Course Code

Course Name L-T-P Credit

Unit I: Introduction: Common building material, Mechanical properties of material, Comparison of various mechanical properties. Stones: Common building stones, Requirement of a good building stones, Dressing and preservation of stones. Bricks: Manufacture of clay bricks, Classification and testing of clay bricks, Problems of efflorescence.

Unit II: Lime: Manufacture, Classification of lime. Timber: Classification and wood based products of timber, Defects and their prevention, Factors effecting the strength of timber., Seasoning and preservation of timber. Asphalt, Bitumen and Tar: Terminology, Bituminous materials, Specification and usage Cement: Properties, Uses and types; manufacturing and materials, Plastering and Form Work.

Unit III: Introduction of Buildings and Foundations: General Introduction of Buildings, Types of Buildings, Components of Buildings, Design Loads, Introduction of Foundation, Types of Foundation, Function of Foundation, Essential Requirements of a good Foundation, Site Investigation and Sub-Soil Exploration, Method of Site Exploration, Settlement of Foundation, Causes of Failures of Foundations and Remedial Measures

Unit IV: Bricks Masonry and Composite Masonry: Introduction of Brick Masonry, Types of bricks, Bonds in brick work, Supervision of brick work, Defects in brick masonry, Strengths of brick masonry, Introduction of Composite Masonry, Reinforced brick masonry, Stone composite masonry, Brick-stone composite masonry, Concrete block masonry, Hollow clay block masonry, Damp Proofing, Termite proofing and Fire Protection of Buildings.

Unit V: Walls: Types of walls, Introduction of cavity walls, General features of cavity walls, Construction of cavity walls, Introduction of partition walls, Brick partitions, Clay block partition walls, Concrete partitions, Glass partitions.

Floors and Roofs: Introduction of a Floor, Components of a Floor, Materials for Construction, Selection of Flooring Material, Cement Concrete Flooring, Brick Flooring, Marble flooring, Asphalt Flooring, Introduction of Roofs, Types of Roofs, Trussed Roofs, Steel Roof Trusses

Books:

1. Building Construction, B. C. Punmia
2. Construction Materials, S. C. Rangwala

Course Code

Course Name L-T-P Credit

CE-423B

Transportation Engineering & Systems

3-0-0 3

UNIT 1:

Transportation Systems and their classification and description. Role of Roads, Road Transport and Planning in India. Road User and the Vehicle.



Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans

## UNIT 2:

Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD.

Highway Project Preparation: Surveys and Investigations. Controlling Factors and Surveys for Highway Alignment. Road Patterns

## UNIT 3:

Pavements: Types of Pavements, Road Construction Materials. Highway Maintenance.

Traffic Engineering: Traffic Characteristics, Functions, PIEV theory, Traffic Survey, PCU, Parkings & survey, Traffic signs, Road Markings, Traffic Signals, Traffic Safety.

## UNIT 4:

Introduction to Railway Engineering

Permanent Way Components: Types and Selection of Gauges, Permanent way & its requirements, functions of rail, requirements of an ideal rail, types of rails, markings & length of rails, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings, Coning of Wheels, Wear Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Yards.

Tunneling: Introduction, advantages, disadvantages.

## UNIT 5:

Airport Engineering:-Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size, Obstructions, Zoning.

Planning and Design of Airport: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway Length, Layout of Taxiways, Exit or Turnaround Taxiways, Apron and Hangers, Wind-rose diagram.

List of Recommended Books:

4. Transportation Engg by S.K Sharma
5. Highway Engg by L.R Khadiyali
6. Highway Engg by Justo and Khanna
7. Railway Engineering by S. C. Saxena

Airport Planning & Design by S. K. Khanna, Nem Chand & Bros. Publications

Course Code	Course Name	L-T-P	Credit
CE-402B	MOOC	3-0-0	3

On-line MOOC courses may contribute upto 20% of the credits. One MOOC course to be completed by the student from NPTEL and have to pass the examination conducted by the NPTEL.

Course Code	Course Name	L-T-P	Credit
CE-452B	Internship	0-0-32	16

Presentation by each student on his/her practical training and other topics specified by the course coordinator.

Project Allotment Form ( B.Tech Civil)      Annexure-I

Subject Code & Name:

Project Title

Abstract

S. No.	Roll Number (B.Tech)	Name of Student
--------	----------------------	-----------------

1

2

3

4

Group Leader Name & Contact No.:

Name of the Guide .....

Signature of the Guide .....

Remarks of Project Coordinator

.....

...

.....

...

Signature of Project Coordinator..... Signature of HOD .....

Department of Civil Engineering Lingaya's Vidyapeeth

(Approved by MHRD/AICTE/PCI/BCI/COA/

NCTE, Govt.of India, u/s 3 of UGC Act 1956)

Nachauli, Jasana Road, Faridabad – 121002 [www.lingayasuniversity.edu.in](http://www.lingayasuniversity.edu.in)

### Scheme for Diploma Civil Engg. & Technology

Diploma			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EN-101D	Basics of Communication Skills-I	3	0	0	3
2	MA-101D	Basics of Mathematics- I	4	0	0	4
3	PH-101D	Basics of Physics -I	4	0	0	4
4	CH-101D	Basics of Chemistry -I	4	0	0	4

5	CS-101D	Basics of Information Technology	2	0	0	2
6	ME-151D	Engineering Drawing-I	1	0	3	3
7	ME-152D	General Workshop Practice-I	0	0	3	1
8	EN-151D	Basics of Communication Skills-I Lab	0	0	2	1
9	PH-151D	Basics of Physics- I Lab	0	0	2	1
10	CH-151D	Basics of Chemistry-I Lab	0	0	2	1
11	CS-151D	Basics of Information Technology Lab	0	0	2	1
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>14</b>	<b>25</b>

Diploma			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EN-102D	Basics of Communication Skills-II	3	0	0	3
2	MA-102D	Basics of Mathematics- II	3	1	0	4
3	PH-102D	Basics of Physics –II	3	1	0	4
4	CH-102D	Basics of Chemistry –II	3	0	0	3
5	ME-103D	Applied Mechanics	3	1	0	4
6	ME-154D	Engineering Drawing-II	1	0	4	3
7	ME-155D	General Workshop Practice-II	0	0	4	2
8	EN-152D	Basics of Communication Skills-II Lab	0	0	2	1
9	PH-152D	Basics of Physics- II Lab	0	0	2	1
10	CH-152D	Basics of Chemistry-II Lab	0	0	2	1
11	ME-153D	Applied Mechanics Lab	0	0	2	1
		<b>Total</b>	<b>16</b>	<b>3</b>	<b>16</b>	<b>27</b>

Diploma			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-202D	Maths	4	0	0	4
2	CE-201D	Survey -I	4	0	0	4
3	CE-202D	Construction Material	3	0	0	3
4	CE-203D	Structure Mechanic	4	0	0	4

5	CE-207D	Fluid Mechanics	3	0	0	3
6	CE-251D	Survey -I Lab	0	0	2	1
7	CE-252D	Civil Engineering Drawing	0	0	4	2
8	CE-253D	Structure Mechanic Lab	0	0	2	1
9	CE-257D	Fluid Mechanics Lab	0	0	2	1
10	CE-276D	Concrete & Material Lab	0	0	2	1
11		Co-curricular Activities	0	1	0	1
		<b>Total</b>	<b>18</b>	<b>1</b>	<b>12</b>	<b>25</b>

Diploma			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CE-210D	Water Supply & Waste Water Engineering	3	0	0	3
2	CE-205D	Survey-II	3	0	0	3
3	CE-232D	RCC Design	4	0	0	4
4	CE-207D	Concrete Technology	3	0	0	3
5	CE-236D	Irrigation Engineering	4	0	0	4
6	CE-238D	Measurements and Measuring Instruments in Civil Engineering	2	0	0	2
7	CE-276D	Concrete And Material Lab	0	0	2	1
8	CE-255D	Survey-II Lab	0	0	2	1
9	PD-293A	Interpersonal Skill	2	0	0	2
10	CE-252D	Civil Engineering Drawing II	0	0	4	2
11		Co-curricular Activities	0	1	0	1
		<b>Total</b>	<b>21</b>	<b>1</b>	<b>8</b>	<b>26</b>

Diploma			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CEA-101D	Environmental Science and Ecology	2	0	0	2

2	CE-301 D	Highway Engineering	4	0	0	4
3	CE-303 D	Constructional operational Management	3	0	0	3
4	CE-305 D	Design of Steel Structure	4	0	0	4
5	CE- 321 D	Computer Application in Civil Engineering	3	0	0	3
6	CE-329 D	Soil & Foundation Engineering	4	0	0	4
7	CE-351 D	Highway Engineering Lab	0	0	2	1
8	CE-259 D	Soil & Foundation Lab	0	0	2	1
9	CE-391 D	Survey Camp	0	0	4	2
10	PD-391	Employability Skills	2	0	0	2
11		Co-curricular Activities	0	1	0	1
		<b>Total</b>	<b>22</b>	<b>1</b>	<b>8</b>	<b>27</b>

Diploma			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	PD – 393 D	Employability Skills-2	0	1	0	1
2	BA – 225D	Entrepreneurship Development and Management	3	0	0	3
3	CE - 271 D	Quantity Surveying & Evaluation	3	0	0	3
4	CE - 273 D	Repair Maintenance Building	3	0	0	3
5	CE - 353 D	Railway , Bridge & Tunnel	3	0	0	3
6	CE – 386 D	Major Project	0	0	12	6
7	CE – 387 D	Seminar	0	0	2	1
8	PD – 291 D	Co-curricular Activities	0	1	0	1
		<b>Total</b>	<b>12</b>	<b>2</b>	<b>14</b>	<b>21</b>

## Scheme for M. Tech. in Construction Technology & Management

<b>M. Tech. (Construction Technology &amp; Management)</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CEC-501	Quantitative Methods in Construction Management	3	1	0	4
2	CEC-503	Building Science	3	1	0	4
3	CEC-505	Construction Project Management	3	1	0	4
4	CEC-511	Departmental Elective – I (Composite Materials)	3	1	0	4
5	CEC-551	Project Management Lab	0	0	4	2
6	CEC-553	Seminar on Construction Technology & Management	0	0	4	2
<b>Total</b>			<b>12</b>	<b>4</b>	<b>8</b>	<b>20</b>

<b>M. Tech. (Construction Technology &amp; Management)</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CEC-502	Construction Economics & Finance	3	1	0	4
2	CEC-504	Construction Practices & Equipment	3	1	0	4
3	CEC-506	Advanced Concrete Technology	3	1	0	4
4	CEC-512	Departmental Elective II (Construction Materials)	3	1	0	4
5	CEC-552	Advanced Concrete Technology Lab	0	0	4	2
6	CEC-554	Minor Project	0	0	4	2
<b>Total</b>			<b>12</b>	<b>4</b>	<b>8</b>	<b>20</b>

M. Tech. (Construction Technology & Management)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CEC-601	Construction Contract Management	3	1	0	4
2	CEC-611	Departmental Elective III (Construction and Maintenance Management)	3	1	0	4
3	CEC-651	Dissertation Work-I	0	0	12	6
4	CEC-653	Seminar-I	0	0	8	4
Total			6	2	20	18

M. Tech. (Construction Technology & Management)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CEC-652	Seminar – II	0	0	8	4
2	CEC-654	Dissertation Work-II	0	0	24	12
3	CEC-656	Teaching Practice	0	0	8	4
Total			0	0	40	20



## Scheme for M. Tech. in Environmental Engineering

M. Tech. (Environmental Engineering)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CEE-501	Environmental Chemistry & Microbiology	3	1	0	4
2	CEE-503	Water & Wastewater Treatment Processes-I	3	1	0	4
3	CEE-505	Advance Water Supply & Wastewater Management	3	1	0	4
4	CEE-507	Hazardous Waste Management (Departmental Elective – I)	3	1	0	4
5	CEE-509	Special Lab Assignment-I	0	0	4	2
Total			12	4	4	18

M. Tech. (Environmental Engineering)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CEE-502	Water and Wastewater Treatment Technologies-II	3	1	0	4
2	CEE-504	Air Pollution & Control	3	1	0	4
3	CEE-506	Solid Waste Management	3	1	0	4
4	CEE-512	Environmental Safety and Management (Departmental Elective-II)	3	1	0	4
5	CEE-508	Special Lab Assignment-II	0	0	4	2
Total			12	4	4	18

M. Tech. (Environmental Engineering)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CEE-601	Environmental Impact Assessment	3	1	0	4
2	CEE-603	Industrial Impact Assessment	3	1	0	4
3	CEE-611	Climate change and Sustainable Development (DE-III)	3	1	0	4

4	CEE-621	Dissertation Work – I	0	0	12	6
5	CEE-623	Seminar - I	0	0	4	2
<b>Total</b>			<b>9</b>	<b>3</b>	<b>16</b>	<b>20</b>

<b>M. Tech. (Environmental Engineering)</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CEE-622	Seminars - II	0	0	8	4
2	CEE-624	Dissertation Work-II	0	0	24	12
3	CEE-626	Teaching Practice	0	0	8	4
<b>Total</b>			<b>0</b>	<b>0</b>	<b>40</b>	<b>20</b>

### M. Tech. in Structural Engineering

<b>M. Tech. (Structural Engineering)</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CES-501	Advanced Structural Engineering	3	1	0	4
2	CES-503	Advanced RCC Design	3	1	0	4
3	CES-505	Structural Dynamics	3	1	0	4
4	CES-511	Departmental Elective-I (Composite Materials)	3	1	0	4
5	CES-521	Advanced Material Testing Lab	0	0	4	2
<b>Total</b>			<b>12</b>	<b>4</b>	<b>4</b>	<b>18</b>

<b>M. Tech. (Structural Engineering)</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CES-502	Design of Bridges	3	1	0	4
2	CES-504	Advanced Design of Steel Structures	3	1	0	4

3	CES-506	Finite Elements Method in Structural Engineering	3	1	0	4
4	CES-512	Departmental Elective-II (Advanced Engineering Geology)	3	1	0	4
5	CES-522	Computational Lab for Structural Engineering	0	0	4	2
<b>Total</b>			<b>12</b>	<b>4</b>	<b>4</b>	<b>18</b>

<b>M. Tech. (Structural Engineering)</b>			<b>Semester</b>			<b>III</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CES-601	Earthquake Analysis & Design of Structures	3	1	0	4
2	CES-611	Departmental Elective III (Construction and Maintenance Management)	3	1	0	4
3	CES-621	Dissertation Work-I	0	0	12	6
4	CES-623	Seminar - I	0	0	12	6
<b>Total</b>			<b>6</b>	<b>2</b>	<b>24</b>	<b>20</b>

<b>M. Tech. (Structural Engineering)</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CES-622	Seminars - II	0	0	8	4
2	CES-624	Teaching Practice	0	0	8	4
3	CES-626	Dissertation Work -II	0	0	24	12
<b>Total</b>			<b>0</b>	<b>0</b>	<b>40</b>	<b>20</b>

## Scheme for M. Tech. in Transportation Engineering

M. Tech. (Transportation Engineering)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CE-501-T	Highway Planning and Geometric Design	4	0	0	4
2	CE-503-T	Advance Soil Engineering	4	0	0	4
3	CE-505-T	Construction Project Management	4	0	0	4
4	CE-507-T	Departmental Elective – I (Engineering Geology)	4	0	0	4
5	CE-521-T	Transportation Engineering Lab/Case Study	0	0	4	2
6	CE-523-T	Concrete Lab / Case Study	0	0	4	2
Total			16	0	8	20

M. Tech. (Transportation Engineering)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CE-502-T	Highway & Airport Pavement Materials	3	1	0	4
2	CE-504-T	Analysis & Structural Design of Pavements	3	1	0	4
3	CE-506-T	Mass Transit System	3	1	0	4
4	CE-508-T	Transportation & Environment	3	1	0	4
5	CE-512-T	Departmental Elective II (Construction Materials)	3	1	0	4
6	CE-522-T	Traffic & Transportation Engineering Laboratory / Case Study	0	0	4	2
7	CE-524-T	Seminar-I	0	0	4	2

8	CE-526-T	Minor Project	0	0	4	2
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>26</b>

<b>M. Tech. (Transportation Engineering)</b>			<b>Semester</b>			<b>III</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-601-T	Airport, Docks & Harbour	3	1	0	4
2	CE-603-T	Advanced Railway Engineering	3	1	0	4
3	CE-611-T	Departmental Elective III (Bridge Engineering)	3	1	0	4
4	CE-621-T	Advanced Surveying Lab / Case study	0	0	2	1
5	CE-623-T	Dissertation Work-I	0	0	8	4
6	CE-625-T	Seminar-II	0	0	4	2
		<b>Total</b>	<b>9</b>	<b>3</b>	<b>14</b>	<b>19</b>

<b>M. Tech. (Transportation Engineering)</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CE-622-T	Seminars - III	0	0	8	4
2	CE-624-T	Dissertation Work-II	0	0	24	12
3	CE-626-T	Teaching Practice	0	0	8	4
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>20</b>

## SYLLABUS FOR M. TECH. CIVIL ENGG. & TECHNOLOGY

# Guidelines for Dissertation work

### Preamble

These Guidelines are intended to give both students and teachers a set of procedures and expectations that will make the Dissertation evaluation process easier, more predictable, and more successful. These Guidelines should be interpreted as the minimum requirements of the degree awarded by Lingaya's Vidyapeeth, Faridabad. The Dissertation Committee assigned for various programmes offered by Lingaya's Vidyapeeth, Faridabad may add requirements or guidelines as deemed fit.

### 1.1 Dissertation Work

The Dissertation Work for M. Tech consists of Dissertation Work – I and Dissertation Work–II. ***Dissertation Work–I*** is to be undertaken during ***semester III*** and ***Dissertation Work–II***, which may be a continuation of Dissertation Work–I, is to be undertaken during ***semester IV***.

### 1.2 General Suggestions and Expectations

The Dissertation Work is by far the most important single piece of work in the post-graduate programme. It provides the opportunity for student to demonstrate independence and originality, to plan and organize a large Dissertation over a long period and to put into practice some of the techniques student have been taught throughout the course. The students are advised to ***choose a Dissertation that involves a combination of sound background research, a solid implementation, or piece of theoretical work, and a thorough evaluation of the Dissertation's***

**output in both absolute and relative terms.** Interdisciplinary Dissertation proposals and innovative Dissertations are encouraged and more appreciable.

It is good to try to think of the Dissertation as a deliverable

- Postgraduate students are to decide on the Dissertation Work-I and Dissertation Work-II Dissertation with their proposal and Dissertation Teacher in the beginning of semester with a Synopsis consisting of **three chapters - Introduction, Literature Review and Methodology, which** should highlight the deliverables.
  - In Case of re-reviews, any number of re-reviews can happen depending on the discretion of the committee and it should happen within the prescribed time.
  - If the student fails to attend, the Teacher refuses to endorse the student's work. The committee can invite Head of the Department who is empowered to resolve among further matters.
  - If the work of the candidate is found to *be insufficient and plagiarism*, the committee and Head of the Department will decide the further process.
  - Head of the Department can initiate further steps to ensure the smooth implementation as deems appropriate of guidelines.
- 
- Marks split-up
    - Committee - 60 Marks (Each 10 marks)
    - Teacher - 40 Marks
    - Total - 100 marks**

### 1.3 Choosing the Right Dissertation

The idea for student's Dissertation may be a proposal from a faculty member or student's own, or perhaps a combination of the two. The Dissertations offered by faculty member may vary substantially in breadth, depth and degree of difficulty. The most important thing is to shortlist a set of Dissertations that are right for *student*. Some students are better suited to well-defined and relatively safe Dissertations that provide scope for demonstrating proficiency with a low risk of failure. Other students are better advised to tackle harder, riskier Dissertations that require a high degree of original input and/or technical problem solving. The potential Teachers will be happy to offer advice on the suitability of a Dissertation, given student's individual background, strengths and ambitions. Remember that it is important to balance

ambition and realism when making a choice. For better help of Dissertations student can search from websites like (*IEEE, ACM, Elsevier, Springer, NPTEL etc...*)

### 1.4 Internal Assessment of the Dissertation Work

- The assessment of Dissertation Work for I and II shall be done independently in the respective semesters and marks shall be allotted as per the weightages.
- There shall be **two** assessments (**Phase-1 and phase-II**), by a departmental review committee formed by the HOD concerned during each of the dissertation work semesters for M.Tech. programmes (each 100 marks). The student shall make presentation on the progress made before the committee - one during middle of the semester explaining the title and its implications and second presentation towards the end of the semester with spiral bound hard copy before the examination with enough time to incorporate the feedback after the presentation so that it can be finalized and submitted.
- The Dissertation Work shall be assessed for a maximum of 100 marks of which 30 marks will be through internal assessment. The Dissertation Work prepared according to approved Guidelines and duly signed by the Teacher(s) and the Head of the Department shall be submitted to the competent authorities.
- If the candidate fails to obtain 50% of the internal assessment marks in the Phase-I and Phase-II, he/she will not be permitted to submit the report for that particular semester. This applies to both Dissertation Work-I and Dissertation Work -II.
- Every candidate doing M.Tech. shall be encouraged to send a paper / patent for publication in a journal or a conference - preferably a concept paper related to their topic and a second paper highlighting their contribution and the results of their work. An acknowledgement from the Teacher for having communicated to the journal or conference shall be attached to the report of the Dissertation Work.
- A copy of the approved Dissertation report after the successful completion of viva examinations shall be kept in the library of the department.

### 1.5 Student-Proposals



If student has his/her own idea for an individual Dissertation, it is the student's responsibility to find a faculty member who both approves of the proposed programme of work and is willing to be the Teacher. Student should first get the permission of Dissertation Committee, and may proceed with the consistent consent of the Teacher.

## **1.6 Teacher**

The Teacher can suggest Dissertation titles focusing more on the current field of research and ensure the level of innovation. Also, Teachers are advised to check for the formatting of the presentation and Dissertation report.

## **1.7 Teacher to Check**

For Dissertations proposed by faculty member, student should discuss the Dissertation with the proposer as soon as possible so that student have plenty of time to think about the best choices for student. Note that every Dissertation is not suitable for every student; some may be specifically tailored to a particular degree and some may only suit students with a very specific set of interests. Each proposal will indicate these constraints in order to help student to make an informed choice.

- Advised to check for the formatting of the presentation and the documentation.
- Check for the attendance of the students (Regular meeting for the discussions)
- Advise the students to contribute some new techniques and publish a paper at the end of the Dissertation

## **1.8 Student's Meeting with Teacher**

Student must make sure that s/he arranges regular meetings with Teacher. The meetings may be brief once student's Dissertation is under way but student's Teacher need to know that student's work is progressing. If student need to talk to the Teacher and cannot locate him/her in office, contact him/her asking for a time when s/he will be available. When a student goes to see the Teacher s/he should have prepared a written list of points s/he wish to discuss. Take notes during the meeting so that student does not forget the advice s/he was given or the conclusions that were reached.

## 1.9 Dissertation Committee

The Dissertation committee is advised to conduct the Dissertation reviews for the students of various programmes within the stipulated period and review the marks to be sent the HOD at the month end. The Dissertation committee is also advised to make necessary arrangements required (Seminar hall availability and Dissertation or, etc...) for the smooth conduct of reviews.

- The committee is advised to find the enough complexity in the Dissertation.
- All the three panel members must be present during the review.
- The reviews to be conducted in the seminar hall and the available class rooms (in the department).

## 1.10 Dissertation Presentation / Demonstration

The presentation is also a compulsory component of the Dissertation. The Dissertation committee will not allocate marks for a Dissertation unless there has been a formal presentation. One of the most important skills which the Dissertation aims to assess is student's ability to communicate his/her ideas and work. The objective of the presentation is to find out exactly what s/he seem to have done and to ensure that s/he get relevant marks that is consistent with other Dissertations. As part of the assessment, the student will be required to give a presentation and demonstration of his/her Dissertation to the Dissertation Committee. Each presentation will be for 30 minutes. Teachers will help him/her to structure the talk and be willing to go through it with student beforehand. Other PG students could be encouraged to attend the presentations as observers only, as the feedback by the committee will benefit everybody.

## 1.11 Dissertation Work-I Requirements: M.Tech.

First Review Within 8 Weeks	Second Review Within 16 Weeks
<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Introduction</li><li>• Literature Survey</li><li>• References</li></ul>	<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Introduction</li><li>• Literature Survey</li><li>• Methodology</li></ul>

	<ul style="list-style-type: none"> <li>• Modules Split-up and Gantt Chart</li> <li>• Proposed System (Phase 1)</li> <li>• Equations /Design and software to be used</li> <li>• Algorithms / Techniques used</li> <li>• Expected outcomes</li> </ul>
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## Dissertation Evaluation Form

**M.Tech – DW-I**

### III Semester

**Dissertation Title : FIRST REVIEW**

Candidate Details			
Sl. No	University Register/ Roll No.	Candidate Name	Teacher
Candidate Contribution and Performance			
Subject Matter		Marks	
Understanding background and topic			
Specifies Dissertation goals			
Literature Survey			
Dissertation Planning			
Question and Answer			
Presentation skills			
<b>Total</b>			
<b>C o m m e n t s</b>			

**Member 1****Member 2****Member 3****HOD**

# Dissertation Evaluation Form

**M.Tech – DW-I****III Semester****Dissertation Title : SECOND REVIEW**

Candidate Details			
Sl.No	University Registration / Roll No	Candidate Name	Teacher

Candidate Contribution and Performance	
Subject Matter	Marks
Abstract	
Specifies Dissertation goals	
Literature Survey	
Summaries algorithms and highlights the Dissertation features	
Specifies the testing platforms and benchmark systems	
Dissertation Planning	
Technical Design	
Summarises the ultimate findings of the Dissertation	
Implementation (60 Percentage)	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>C o m m e n t s</b>	

Member 1

Member 2

Member 3

HOD

## 1.12 Dissertation Work-II Requirements: M.Tech.

First Review Within 4 Weeks	Second Review Within 16 Weeks
<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Work completed for Phase I</li><li>• Expected outcomes</li><li>• Draft copy of conceptual paper</li><li>• References</li></ul>	<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Work completed for Phase II</li><li>• Detailed Design (if any deviation)</li><li>• Contribution of the candidate</li><li>• Experimental Results</li><li>• Performance Evaluation</li><li>• Comparison with Existing system</li><li>• Result Analysis and Conclusion</li><li>• References</li><li>• Draft copy of a dissertation for publishing</li></ul>

**Note:**

- The presentation should have maximum of 30 slides
- Presentation will be for 30 minutes
- A draft copy of the conference paper to be prepared at the end based on the Dissertation Work.
- System to be tested using testing software's.

## Dissertation Evaluation Form

**M.Tech – DW-II**

**IV Semester**

Dissertation Title: **FIRST REVIEW**

Candidate Details			
Sl. No.	University	Candidate Name	Teacher

	<b>Registration/ Roll No</b>		
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<b>Candidate Contribution and Performance</b>	
<b>Subject Matter</b>	<b>Marks</b>
Abstract	
Work to be completed in Phase 1	
Architecture /System Design – Phase 1 and 2	
Work to be completed in Phase 2	
Summaries the techniques implemented / to be implemented	
Contribution of the Candidate	
Results obtained and Summaries the ultimate findings of the Dissertation	
Implementation (60 Percentage)	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>C o m m e n t s</b>	

**Member 1**

**Member 2**

**Member 3**

**HOD**

## Dissertation Evaluation Form

### M.Tech – DW-II

### IV Semester

**Dissertation Title: SECOND REVIEW**

<b>Candidate Details</b>			
<b>Sl. No.</b>	<b>University Registration No</b>	<b>Candidate Name</b>	<b>Teacher</b>

<b>Candidate Contribution and Performance</b>	
<b>Subject Matter</b>	<b>Marks</b>
Abstract	
Architecture /System Design – Phase 2	
Overall Architecture /System Design – Phase 2	
Summarises the techniques implemented	
Contribution of the Candidate	
Results obtained and Performance Evaluation	
Summarises the ultimate findings of the Dissertation	
Implementation (100 Percentage)	
Pre-final draft of entire dissertation	
Draft of the paper to be published	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>Comments</b>	

**Member 1**

**Member 2**

**Member 3**

**HOD**

## **Detailed Contents**

### **Semester First**

<b>Course Code</b>	<b>Course Name</b>	<b>L-T-P</b>	<b>Cr</b>	<b>Theory</b>	<b>Internal Assessment</b>	<b>Total</b>	<b>Duration</b>
CEC-501	Quantitative Methods in Construction Management	3-1-0	4	60	40	100	3 hr

Introduction and concepts of probability and statistics, Linear programming, Transportation and assignment problems. Dynamic programming, Queuing theory, Decision theory, Games theory. Simulations applied to construction, Modifications and improvement on CPM/PERT techniques.

### **Suggested Reading;**

#### **1. Operational Research by D.S. Heera**

<b>Subject Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr</b>	<b>Theory</b>	<b>Internal Assessment</b>	<b>Total</b>	<b>Duration</b>
CEC-503	Building Science	3-1-0	4	60	40	100	3 hours

Introduction to environmental features relevant to functional design. Their measures description and quantification. Periodic nature of variation of environmental descriptors. Heat exchange of building with environment under diurnal periodic variation temperature and modelling. Estimation of hourly internal temperature through CIBS method. Thermal Design philosophy and optimization for decision variables such as shape, orientation, envelope properties etc. Purpose of ventilation, wind and stack effect as driving force. Design for desired flow and indoor velocity. Fundamentals of acoustics, Sound ion free field and enclosure. External and Internal air borne noise control. Protection against structure borne noise. Lighting principles and daylighting. Day light factor, and design for desired illumination and glare free lighting.

### **Suggested Readings:**

<b>Subject Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr</b>	<b>Theory</b>	<b>Internal Assessment</b>	<b>Total</b>	<b>Duration</b>
CEC-505	<b>Construction Project Management</b>	3-1-0	4	60	40	100	3 hr

### **Unit I**

Project Management: Basic forms of organization with emphasis on Project; Project life cycle, planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic-environmental impact analysis, project clearance procedures and necessary documentation for major works like dams, multi-storeyed structures, ports, tunnels, Qualities,



role and responsibilities of project Manager, Role of Project Management Consultants, Web based project management.

## **Unit II**

Project Scheduling: Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT, techniques, Precedence Network Analysis.

## **Unit III**

Project Controlling: Monitoring and Control, Crashing, Resource Levelling, Updating. Work Study: Definition, Objectives, and basic procedure, and method study and work measurement.

## **Unit IV**

Work-study applications in Civil Engineering. Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams.

## **Unit V**

Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating.

### **Suggested Readings;**

- 1 Construction Planning & management By P S Gahlot & B M Dhir, New Age International Limited Publishers
2. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
- 3 Construction Project Management Theory & practice --- Kumar Neeraj Jha, Pearson, 2012
4. Construction management Fundamentals by Knutson, Schexnayder, Fiori, Mayo, Tata McGraw Hill, 2nd Edition.

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CEC-551	Project Management Lab	0-0-4	2	30	20	50	3 hours

Introduction to construction project models - analytical and numerical. Application software for project planning, scheduling & control (Primavera Software). Programming exercises for estimation, network planning and control, LP in construction. MATLAB Programming in linear and non-linear programming.

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration

CEC-553	<b>Seminar on Construction Technology &amp; Management</b>	0-0-4	2	30	20	50	3 hours
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Presentation based seminar in recent advancements in Construction Technology & Management. (Case Studies, Technology advancements, etc.)

# Semester Second

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-502	<i>Construction Economics &amp; Finance</i>	3-1-0	4	60	40	100	3 hours

Engineering economics, Time value of money, discounted cash flow, 180 NPV, ROR, PI. Basis of comparison, Incremental rate of return, Benefitcost analysis, Replacement analysis, Break even analysis. Depreciation and amortization. Taxation and inflation, Evaluation of profit before and after tax. Risks and uncertainties and management decision in capital budgeting. Working capital management, financial plan and multiple source of finance. Budgeting and budgetary control, Performance budgeting. Profit & Loss, Balance Sheet, Income statement, Ratio analysis, Appraisal through financial statements, International finance, forward, futures and swap. Practical problems and case studies.

## Suggested Readings:

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-504	<i>Construction Practices &amp;</i>	3-1-0	4	60	40	100	3 hours

Form work design and scaffolding, slipform and other moving forms, Shoring, Reshoring, and Backshoring in multistoreyed Building construction. Prestressing, Steel and composites construction methods: Fabrication and erection of structures including heavy structures, Prefab construction, Industrialized construction, Modular coordination. Special construction methods: High rise construction, Bridge construction including segmental construction, incremental construction and push launching techniques. Factors affecting selection of equipment - technical and economic, Analysis of production outputs and costs, Characteristics and performances of equipment for major civil engineering activities such as Earth moving, erection, material transport, pile driving, Dewatering, and Concreting.

## Suggested Readings:

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-506	<i>Advanced Concrete Technology</i>	3-1-0	4	60	40	100	3 hours

Hydration of cements and microstructural development, Mineral additives, Chemical admixtures, Rheology of concrete, Creep and relaxation, Shrinkage, cracking and volume stability, deterioration processes, special concretes, Advanced characterisation techniques, sustainability issues in concreting, Modelling properties of concrete.

#### Suggested Readings;

##### 1. Concrete Technology by Nebille

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CEC-552	<i>Advanced Concrete Technology Lab</i>	0-0-4	2	30	20	100	3 hours

#### Suggested Readings;

##### 1. Concrete Technology by Nebille

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CEC-554	<i>Minor Project</i>	3-1-0	4	30	20	50	3 hours

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-601	<i>Construction Contract</i>	3-1-0	4	60	40	100	3 hours

## Semester III

Professional Ethics, Duties and Responsibilities of Parties. Owner's and contractor's estimate, Bidding Models and Bidding Strategies, Qualification of Bidders. Tendering and Contractual procedures, Indian Contract Act 1872, Definition of Contract and its Applicability, Types of Contracts, Clauses in Domestic and International Contracts - CPWD, MES, FIDIC, AIA, NEC, JCT, etc. Contract Administration, Delay Protocol, Change Orders Analysis, Claim Management and Compensation, Disputes and Resolution Techniques, Arbitration and Conciliation Act 1996, Arbitration Case Studies.

Suggested Readings:

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CEC-651	<i>Dissertation Work-I</i>	0-0-12	6	30	20	100	3 hours

M. Tech thesis part 1.

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CEC-653	<i>Seminar-I</i>	0-0-8	4	30	20	50	3 hours

Seminar on Dissertation Work-I.

## Semester IV

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CEC-652	<i>Seminar-II</i>	0-0-8	4	30	20	50	3 hours

Seminar on Dissertation Work-II.

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CEC-654	<i>Dissertation Work-II</i>	0-0-12	6	30	20	100	3 hours

M. Tech thesis part 1.

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
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CEC-656	<i>Teaching Practice</i>	0-0-8	4	30	20	50	3 hours
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## Detailed Syllabus of Departmental Electives

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-511	<i>Departmental Elective III (Composite)</i>	3-1-0	4	60	40	100	3 hours

**1. Fibre Reinforced Concrete:** Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fibre reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

**2. Fly Ash Concrete:** Classification of Indian Flyashes, Properties of Flyash, Reaction Mechanism, Proportioning of Flyash concretes, Properties of Flyash concrete in fresh and hardened state, Durability of flyash concrete.

**3. Polymer Concrete:** Terminology used in polymer concrete, Properties of constituent materials, Polymer impregnated concrete, Polymer modified concrete, Properties and applications of polymer concrete and polymer impregnated concrete.

**4. Ferro Cement:** Constituent materials and their properties, Mechanical properties of ferro cement, Construction techniques and application of ferro cement.

**5. High Performance Concrete:** Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.

**6. Sulphur Concrete And Sulphur Infiltrated Concrete:** Process technology, Mechanical properties, Durability and applications of sulphur concrete, Sulphur infiltrated concrete, Infiltration techniques, Mechanical properties, Durability and applications of sulphur infiltrated concrete.

**7. Light Weight Concrete:** Properties of light weight concretes, Pumice concrete, Aerated cement mortars, No fines concrete, Design and applications of light weight concrete.

Books recommended:

1. Concrete Technology-A.M. Neville
2. Concrete Technology-M.L. Gambhir.

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-512	<i>Departmental Elective III (Construction)</i>	3-1-0	4	60	40	100	3 hours

**Unit :1.** Classification & Criteria for selection of building materials (e.g. Stones, Bricks – Concrete Blocks- Fly ash, Lime – Cement – Aggregates – Mortar) Tests on stones – Bricks — Tests on bricks – Compressive Strength – Water Absorption – Efflorescence –) Types and Grades, Compressive strength & Tensile strength – Properties of cement and Cement mortar – Hydration– Aggregates –Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading – Sand Bulking.

**Unit:2.** Concrete – Ingredients – RMC – Properties of fresh concrete – Slump – Flow and compaction Factor – Properties of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proportioning – BIS method – High Strength Concrete and – Behaviour of all types of concretes – Properties and Advantages of High Strength and High Performance Concrete, Applications of Fibre, Reinforced Concrete, Self-compacting concrete, Alternate Materials to concrete.

**Unit:3.** Timber– Industrial timber– Plywood –Thermacole, paints for various uses,– Bitumens–Types and properties of Water Proofing Compounds – Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application.

**Unit:4** Types of Steels and Advantages of new alloy steels – Properties and advantages of aluminium and its products – Types and applications of Coatings & Coatings to reinforcement

**Unit:5.** Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractory – Composite materials – Types & Applications of laminar composites – Fibre textiles – Geomembranes and Geo-textiles for earth reinforcement. Advantages of Reinforced polymers –Types of FRP its Applications.

#### **Suggested Readings:**

- Varghese. P.C, “Building Materials”, PHI Learning Pvt. Ltd, New Delhi, 2012.
- Rajput. R.K., “Engineering Materials”, S. Chand and Company Ltd., 2008.
- Shetty. M.S., “Concrete Technology (Theory and Practice)”, S. Chand and Company Ltd., 2008.
- Gambhir. M.L., “Concrete Technology”, 3rd Edition, Tata McGraw Hill Education, 2004
- Duggal. S.K., “Building Materials”, 4th Edition, New Age International, 2008.
- Jagadish K.S, “Alternative Building Materials Technology”, New Age International, 2007.
- IS456 – 2000: Indian Standard specification for plain and reinforced concrete, 2011
- IS4926–2003 : Indian Standard specification for ready–mixed concrete, 2012

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-611	<i>Departmental Elective III (Construction &amp; Maintenance Management)</i>	3-1-0	4	60	40	100	3 hours



### **1. Services in Residential, Commercial and Medical buildings**

- (A) Sanitation, water supply, electric wiring, rain water disposal, lighting & illumination, calculation methods for these services.
- (B) Air Conditioning & Ventilation: Natural ventilation, control cooling systems, modern systems of air conditioning, ducting systems, different mechanical means of air conditioning.
- (C) CCD-CS: General principles of transmission and passage of sound reverberation, absorption, reflection, acoustic materials and their efficiency, principles of good acoustic design.
- (D) Thermal Insulation: Behavior of various building materials & thermal conductivity. Thermal insulation for air conditioned interior spaces, working out air conditioning loads for different spaces.
- (E) Fire Safety Dye.

**2. Architectural controls and building byelaws:** Role of building byelaws in a city, local byelaws and architectural controls, façade control and zoning plans.

**3. Regional planning:** Understanding of physical, social and economical parameters for regional planning.

**4. Landscaping:** Forces of man and nature, their relationship and effect on shaping landscape, site analysis, site and.

### **Books Recommended:**

1. Building Repair and Maintenance Management by P. S. Gahlot
2. Maintenance of Buildings by A C Panchdhari.

## Detailed Contents

### Semester First

#### **CEE-501 ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY**

1: **Types of chemical reactions** - calculations from chemical equations; gas laws; Equilibrium and Le Chatelier's Principle – factors affecting chemical equilibrium - activity and activity coefficient - ionic strength. Physical Chemistry:- Thermodynamics – heat and work – enthalpy – entropy – free energy – temperature dependence of equilibrium constant; membrane processes; principles of solvent extraction; ; electrochemistry; chemical kinetics; adsorption.

2 **Equilibrium Chemistry**:-Variations of Equilibrium relationships; ways of shifting chemical equilibrium; solutions to equilibrium problems - acid base equilibrium – solubility equilibrium – oxidation reduction equilibrium.

3. **Organic Chemistry And Biochemistry**:-Organic compounds of interest to environmental engineers, general properties of the functional groups of organic compounds; Enzymes, classification enzymes catalyzed reaction, energy considerations coupling of reaction; Breakdown and synthesis of carbohydrates, fats, proteins under aerobic and anaerobic reactions; CNP cycles under aerobic and anaerobic reactions;,. Concepts of BOD, COD, TOC.

4. **Environmental Chemistry**:-Fundamentals of surface and colloidal chemistry; chemistry involved in water treatment procedure like coagulations – softening - fluoridation, defluoridation - iron and manganese removal – demineralization - analysis of pesticide and heavy metals; Atmospheric chemistry; soil chemistry

5. **Environmental Microbiology**:- Introduction of microbiology, classification and characterization of microorganisms, viruses; Morphology and structure of bacteria, nutrient requirement, growth of bacteria; Basic microbiology of water and sewage; Basic principals involved in the analysis of fecal indicator bacteria – coli forms and streptococci, plankton

#### **CEE-503 WATER AND WASTEWATER TREATMENT TECHNOLOGIES**

1. **Water – Quality, Standards and Criteria**: Physical, chemical and biological water quality; Heavy metals and pesticide pollution; Water quality guidelines, criteria and standards.
2. **Water Treatment Technologies**: Treatment of surface waters and ground waters; Water treatment technologies overview; Water treatment plants producing drinking water, process water, soft water, RO water and DM water.
3. **Coagulation/Precipitation, Flocculation and Settling**: Coagulation-flocculation; Coagulants and flocculating agents; Flash mixing tanks, flocculation tanks, clari-flocculators and settling tanks.

- 4. Filtration Systems:** Filtration theory and filter hydraulics; Slow sand filters; Rapid gravity filters; Pressure filters; and Multigrade roughing filters. Chlorination; Ozonation; Membrane processes for disinfection
- 5. Other Water Treatment Technologies:** Ion-exchange process; Adsorption process; membrane processes (nanofiltration and reverse osmosis); Defluoridation units and household level water purification systems.

### **Recommended Books**

1. *Metcalf and Eddy Inc., Tchobanglous G, Burton FL, Stensel HD, Wastewater Engineering – Treatment, Disposal and Reuse, Tata McGraw Hill (2007).*
2. *Eckenfelder WW Jr, Industrial Water Pollution Control, McGraw Hill 3rd ed (2003).*
3. *Weber WJ, Physico-chemical Processes for Water Quality Control, John-Wiley (1999).*
4. *Tebbutt THY, Principles of Water Quality Control, Butter Worth Heinemann (1998)*

## **CEE 505 ADVANCE WATER SUPPLY & WASTEWATER MANAGEMENT**

- 1 Wastewater Characteristics and Effluent Standards:** Physical, chemical and biological parameters of water pollution; Solids (volatile and non-volatile solids; suspended, dissolved and colloidal solids); Biodegradable and non-biodegradable organic matter (DO, COD, BOD and BOD kinetics); Nutrients (TKN, total nitrogen, and total and ortho-phosphorus); Sulfides, phenols, cyanides, heavy metals and recalcitrant/toxic organic compounds; Effluent standards.
- 2. Overview of Wastewater Treatment Technologies:** Preliminary, primary, secondary and tertiary treatment technologies; Overview of biological treatment technologies; Biological treatment technologies for the tertiary treatment.
- 3. Preliminary Treatment:** Screens; Grit removal facilities – grit channels, vortex degritters and cyclonic degritters, aerated grit chambers; Effluent sumps and pumps; Equalization tanks – flow and strength equalization, and online and offline equalization tanks.
- 4. Primary Treatment:** Neutralization and precipitation; Primary and secondary sedimentation tanks; Membrane filtration processes; Roughing filters.
- 5. Biological Treatment:** Activated sludge process and its modifications including SBR; Trickling filters and RBC units; SAF, FAB and MBBR technologies; UASB reactors and its modifications including anaerobic baffled reactor and anaerobic moving bed reactor; Waste stabilization pond systems

and its modifications including vegetated ponds and constructed wetlands.

**Other Treatment Technologies:** Advanced oxidation processes; Biological nutrient removal; Filtration and chlorination; Membrane processes for TDS reduction; Wet oxidation process.

### **Recommended Books**

1. Metcalf, Eddy, Tchobanoglous, G., Burton, F.L., Stensel, H.D., *Wastewater Engineering – Treatment, Disposal and Reuse*, Tata McGraw Hill (2002) 4th ed.
2. Eckenfelder WW Jr., *Industrial Water Pollution Control*, McGraw Hill (2003) 3rd ed.
3. *Biological Wastewater Treatment, Edited Volume Series*, IWA (2008).

## **CEE 507 HAZARDOUS WASTE MANAGEMENT**

**1.Solid and Hazardous Wastes:** Definition, sources and characteristics; Sampling and analysis techniques; Inventorying wastes; Strategies for waste minimization.

**2. Municipal Solid Waste Management:** Segregation and recycling and reuse of wastes; Collection, transportation and storage of municipal solid waste; Resource recovery from wastes; waste exchanges; Composting and vermicomposting of wastes; Municipal solid waste management programs; Disposal – siting and design.

**3. Hazardous Waste Treatment and Disposal:** Biological and chemical treatment of hazardous wastes; Solidification and stabilization of wastes; Incineration for the treatment and disposal of hazardous wastes;

**4. Land farming;** Landfill disposal of hazardous waste;

**5. Bioremediation** of hazardous waste disposal sites.

### **Recommended Books**

1. Pichtel J, *Waste Management Practices: Municipal, Industrial and Hazardous*, CRC Press (2005)
2. Kreith F and Tchobanoglous G, *Handbook of Solid Waste Management*, McGraw Hill (2002)
3. LaGrega M, Buckingham P and Evans J, *Hazardous Waste Management*, McGraw Hill (1994)
4. Freeman H, *Standard Handbook for Hazardous Waste Management*, McGraw Hill (1989)

5. Pollution Control Acts, Rules and Notifications Issued There under: Pollution Control Law Series, Central Pollution Control Board, New Delhi (1986)

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## **SEMESTER II**

### **CEE-502: WATER AND WASTEWATER TREATMENT PROCESS-II**

1. **Wastewater Characteristics and Effluent Standards:** Physical, chemical and biological parameters of water pollution; DO, BOD and BOD kinetics; Nutrients; Effluent standards.
2. **Overview of Wastewater Treatment Technologies:** Preliminary, primary, secondary and tertiary treatment technologies.
3. **Preliminary Treatment:** Screens; Grit removal facilities; Effluent sumps and pumps; and Equalization tanks.
4. **Primary Treatment:** Neutralization and precipitation; Primary and secondary sedimentation tanks; Membrane filtration processes; Roughing filters.
5. **Biological Treatment:** Activated sludge process and its modifications including
6. SBR; Trickling filters and RBC units; SAF, FAB and MBBR technologies; UASB reactors and its modifications; Waste stabilization pond systems and its modifications.

**Other Treatment Technologies:** Advanced oxidation processes; Biological nutrient removal; Filtration and chlorination; Membrane processes for TDS reduction.

.

#### **Recommended Books**

1. Metcalf, Eddy, Tchobanoglous, G., Burton, F.L., Stensel, H.D., *Wastewater Engineering – Treatment, Disposal and Reuse*, Tata McGrawHill 4th ed. (2002)
2. Eckenfelder WW Jr., *Industrial Water Pollution Control*, McGrawHill 3rd ed. (2003)
3. *Biological Wastewater Treatment, Edited Volume Series*, IWA (2008).

### **CEE-504 AIR POLLUTION AND CONTROL**

1. **Introduction:** Role and scope of air pollution control engineering, Principles of fluid flow, Boundary layer theory, Energy transfer in fluid flow, Fluid flow measurement, Dynamics of particles in fluid, Properties of particles, Collection efficiencies of particles, Source reduction (Fuel substitution, Fuel pretreatment, Process modifications), Emission standards.

2. **Design of Industrial Ventilation Systems:** Component of Ventilation systems, Air pollution control systems, Hood specifications and design, Duct specifications and design, Blowers, stacks.
3. **Particulate Emission Control:** Stoke's law, Basic principles, Design and operation of settling chambers (Both laminar and turbulent flow), Cyclone and multiclones, Scrubbers, Bag houses and Electrostatic precipitators, Collection efficiency and Pressure drop calculations across air pollution control devices.
4. **Gaseous Emissions Control:** Basic principles, Design and operation of scrubbers for gaseous pollutant removal, Adsorption columns and condensation devices.
5. **Control of Mobile Sources:** Control of crank case emissions, Evaporative emissions control, Air fuel ratio, Alternative fuels, Automobile emission control, Catalytic convertors, Gasoline and diesel powered vehicles. **Air Pollution Mitigation Measures:** Green belt design, Management strategies for air pollution abatement

#### **Recommended Books**

1. Flagan RC and Seinfeld JH, *Fundamentals of Air Pollution Engineering*, Prentice Hall (1988).
2. Boubel RW, Fox DL, Turner B and Stern AC, *Fundamental of Air Pollution*, Academic Press (1994). 3rd ed.
3. Perkins HC, *Air Pollution*, McGraw Hill (2004).
4. Rao CS, *Environmental Pollution Control Engineering*, New Age International (2006).
5. Rao MN and Rao HVN, *Air Pollution*, Tata McGraw Hill (2006). 2nd ed.

#### **CEE: 506 SOLID WASTE MANAGEMENT**

- 1 **Solid and Hazardous Wastes:** Definition, sources and characteristics; Sampling and analysis techniques; Inventorying wastes; Strategies for waste minimization.
- 2 **Municipal Solid Waste Management:** Segregation and recycling and reuse of wastes; Collection, transportation and storage of municipal solid waste; Resource recovery from wastes; waste exchanges; Composting and vermi-composting of wastes; Disposal – siting and design.

**3. Hazardous Waste Treatment and Disposal:** Biological and chemical treatment of hazardous wastes; Solidification and stabilization of wastes; Incineration for the treatment and disposal of hazardous wastes; Landfill disposal of hazardous waste; Bioremediation of hazardous waste disposal sites.

**4. Special Waste Management:** Biomedical wastes, E-waste.

**5. Legal Requirements:** Municipal solid waste rules; Hazardous waste rules; Biomedical waste rules; E-waste rules; Rules related to recycled plastics, used batteries, flyash, etc.

### ***Recommended Books***

1. *Pichtel J, Waste Management Practices: Municipal, Industrial and Hazardous, CRC Press (2005)*
2. *Kreith F and Tchobanoglous G, Handbook of Solid Waste Management, McGraw Hill (2002)*
3. *LaGrega M, Buckingham P and Evans J, Hazardous Waste Management, McGraw Hill (1994)*
4. *Freeman H, Standard Handbook for Hazardous Waste Management, McGraw Hill (1989)*
5. *Pollution Control Acts, Rules and Notifications Issued There under: Pollution Control Law Series, Central Pollution Control Board, New Delhi (1986)*

## **CE512: ENVIRONMENTAL SAFETY AND MANAGEMENT**

1. **Hazardous Materials:** Definition and classification; Material safety data sheets; Handling of hazardous materials.
2. **Regulations:** Rules and regulations pertaining to the management and handling of hazardous chemicals; Hazardous wastes; Biomedical wastes; Hazardous microorganisms; Genetically engineered organisms or cells; Municipal solid wastes; E-wastes; Batteries and plastics.
3. **Hazard Identification:** Assessment of risk; Risk management; OSHAS 18001 and Occupational health and safety management systems.
4. **Principles of Accident Prevention:** Accident recording; Analysis; Investigation and reporting; On-site and off-site emergency preparedness and response plans; Rules and regulations dealing with chemical accidents.
5. **Protection from Hazardous Materials:** Personal protective equipment and clothing; Fire safety; Noise and vibrations; Principles of noise control. **Safety Management:** Notification of sites; Safety reports; safety audits.

## **SEMESTER 3**

### **CEE-601 ENVIRONMENTAL IMPACT ASSESSMENT**

1. **Introduction:** The Need for EIA, Indian Policies Requiring EIA , The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.
2. **Identifying The Key Issues:** Key Elements of an Initial Project Description and Scoping, Project Location(s), Land Use Impacts, Consideration of Alternatives, Process selection: Construction Phase, Input Requirements, Wastes and Emissions, Air Emissions, Liquid Effluents, Solid Wastes, Risks to Environment and Human, Health, Socio-Economic Impacts, Ecological Impacts, Global Environmental Issues.
3. **EIA Methodologies:** Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods, Environmental index using factor analysis, Cost/benefit analysis, Predictive or Simulation methods. Rapid assessment of Pollution sources method, predictive models for impact assessment, Applications for RS and GIS.
4. **Reviewing The EIA Report:** Scope, Baseline Conditions, Site and Process alternatives, Public hearing. Construction Stage Impacts, Project Resource Requirements and Related Impacts, Prediction of Environmental Media Quality,
5. Socio-economic Impacts, Ecological Impacts, Occupational Health Impact, Major Hazard/ Risk Assessment, Impact on Transport System, Integrated Impact

## CEE -603 INDUSTRIAL IMPACT ASSESSMENTS

**1 Introduction:** Industrial systems; Resource consumption, waste generation and environmental pollution; Legal environmental requirements applicable to industrial facilities; Environmental functions of industrial facilities.

**2. Environmental Aspects:** Process mapping approach for the identification of environmental aspects of industrial activities; Core industrial activities and environmental aspects; Support industrial activities and environmental aspects; Significant environmental aspects.

**3. Management of Environmental Aspects:** Waste minimization through source reduction; Waste recycling and reuse; By-products and resources recovery from wastes; Waste treatment and disposal; Overview of waste treatment technologies; pollution prevention programs.

**4. Environmental Management System (EMS) Approach:** Basic concepts of EMS approach; Essential elements of an EMS and ISO 14001; ISO 14000 series of standards and their relevance to EMS and to the environmental performance improvement.

**5. Development; Implementation and Maintenance of EMS:** EMS development and implementation project and plan; ISO 14004 standard; Identification of significant environmental aspects; Formulation of environmental policy and setting of environmental



objectives and targets; Environmental management programs; Operational controls .**EMS Auditing:** EMS auditing; and audit program and procedures; ISO 19011 and environmental auditing; Audit activities and audit reports.

### **Recommended Books**

1. Freeman H, *Industrial Pollution Prevention Handbook*; McGraw-Hill Professional 1st Ed. (1994)
2. Edwards AJ, *ISO 14001: Environmental Certification Step by Step*; Butterworth-Heinemann (2004).
3. Stapleton PJ, Glover MA and Davis SP, *Environmental Management Systems: An Implementation Guide to Small and Medium-sized Industries*; NSF International 2nd ed. (2001)
4. ISO 14004: 2004 - *Environmental management systems – General guidelines on principles; systems and support techniques*.
5. ISO 19011: 2011- *Guidelines for auditing management systems*.
6. ISO 17021: 2011 - *Conformity assessment — Requirements for bodies providing audit and certification of management systems*.

## **CEE-605 ENVIRONMENTAL GEOTECHNIQUES**

1. Soil Formation, Composition and Structure: Introduction, Soil formation, Solids composition and characterization, Mineral composition, Different scales of soil structure, Structural variations due to consolidation and compaction, Pore sizes associated with soil structure, single particle arrangements, Role of Composition and soil structure in the engineering behavior of soils.
2. Mass Transport and Transfer in Soils: Introduction; Mass transport mechanisms, Mass transfer mechanisms, Governing equation for mass transport, Solutions for special cases of mass transport.
3. Non-aqueous – Phase Liquids in Soils: Introduction, Principles of NAPL entrapment in soils, Conceptualization of field-scale transport of NAPLs, phase diagram for soil – water – LNAPL – Air systems, Mobilization of residual NAPLs.
4. Site Investigation: Introduction, Site investigation approach, phase investigations, Geophysical techniques, Hydro-geological investigations, Hydro-geochemical investigations, Geochemical data collection and analysis.
5. Principles of Site and Geo-material Treatment Techniques: Treatment approaches, Basis for treatment technology selection, Pump and treat principles, In-situ soil flushing, In-situ vitrification principles, In-situ chemical treatment in reactive walls, Natural attenuation principles, In-situ phytoremediation and In-situ bioremediation principles, Ex-situ solidification/stabilization principles and Ex-situ chemical treatment principles.

Waste Containment System: Landfills, Slurry walls, Drainage trenches and wells,

Surface Impoundments, Grout curtains, Composite systems.

### **Recommended Books:**

1. Mitchell, J.K. and Soga, K., *Fundamentals of Soil Behaviour*, John Wiley & Sons, Inc., New Jersey., 2005

2. Reddy, L.N. and Inyang, H. I., Geoenvironmental Engineering –Principles and Applications, Marcel Dekker, Inc., New York., 2000
3. Mohamed, A.M.O. and Antia, H.E., Geoenvironmental Engineering, Elsevier, Netherlands., 1998
4. Hsai\_Yang Fang and Daniels, J.L. Introductory Geotechnical Engineering an Environmental Perspective, Taylor & Francis, Oxon., 2006
5. Yong, R. N., Geoenvironmental Engineering: Contaminated Soils, Pollutant Fate and Mitigation”, CRC press LLC, Florida., 2001

### **CEE-611: CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT**

1. **Earth’s Climate System:** Introduction-Climate in the spotlight - The Earth’s Climate Machine – Climate Classification - Global Wind Systems – Trade Winds and the Hadley Cell – The Westerlies - Cloud Formation and Monsoon Rains – Storms and Hurricanes – The Hydrological Cycle – Global Ocean Circulation – El Nino and its Effect - Solar Radiation –The Earth's Natural Green House Effect – Green House Gases and Global Warming – Carbon Cycle.
2. **Observed Changes** And Its Causes: Observation of Climate Change – Changes in patterns of temperature, precipitation and sea level rise – Observed effects of Climate Changes – Patterns of Large Scale Variability – Drivers of Climate Change – Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India – climate change modeling.
3. **Impacts Of Climate Change:** Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.
4. **Climate Change Adaptation** And Mitigation Measures: Adaptation Strategy/Options in various sectors – Water – Agriculture – Infrastructure and Settlement including coastal zones – Human Health – Tourism – Transport – Energy – Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry –
5. **Carbon sequestration** – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation.

### **Recommended Books:**

1. Anil Markandya , Climate Change and Sustainable Development: Prospects for Developing Countries, Routledge, 2002
2. Heal, G. M., Interpreting Sustainability, in Sustainability: Dynamics and Uncertainty, Kluwer Academic Publ., 1998
3. Jepma, C.J., and Munasinghe, M., Climate Change Policy – Facts, Issues and Analysis, Cambridge University Press, 1998

4. Munasinghe, M., Sustainable Energy Development: Issues and Policy in Energy, Environment and Economy: Asian Perspective, Kleindorfer P. R. et. al (ed.), Edward Elgar, 1996
5. Dash Sushil Kumar, “Climate Change – An Indian Perspective”, Cambridge University Press India Pvt. Ltd, 2007

## Guidelines for Dissertation work

### Preamble

These Guidelines are intended to give both students and teachers a set of procedures and expectations that will make the Dissertation evaluation process easier, more predictable, and more successful. These Guidelines should be interpreted as the minimum requirements of the degree awarded by Lingaya's Vidyapeeth, Faridabad. The Dissertation Committee assigned for various programmes offered by Lingaya's Vidyapeeth, Faridabad may add requirements or guidelines as deemed fit.

### 1.1 Dissertation Work

The Dissertation Work for M. Tech consists of Dissertation Work – I and Dissertation Work–II. ***Dissertation Work–I*** is to be undertaken during ***semester III*** and ***Dissertation Work–II***, which may be a continuation of Dissertation Work–I, is to be undertaken during ***semester IV***.

### 1.2 General Suggestions and Expectations

The Dissertation Work is by far the most important single piece of work in the post-graduate programme. It provides the opportunity for student to demonstrate

independence and originality, to plan and organize a large Dissertation over a long period and to put into practice some of the techniques student have been taught throughout the course. The students are advised to ***choose a Dissertation that involves a combination of sound background research, a solid implementation, or piece of theoretical work, and a thorough evaluation of the Dissertation's output in both absolute and relative terms.*** Interdisciplinary Dissertation proposals and innovative Dissertations are encouraged and more appreciable.

It is good to try to think of the Dissertation as a deliverable

- Postgraduate students are to decide on the Dissertation Work-I and Dissertation Work-II Dissertation with their proposal and Dissertation Teacher in the beginning of semester with a Synopsis consisting of **three chapters - *Introduction, Literature Review* and *Methodology, which*** should highlight the deliverables.
- In Case of re-reviews, any number of re-reviews can happen depending on the discretion of the committee and it should happen within the prescribed time.
- If the student fails to attend, the Teacher refuses to endorse the student's work. The committee can invite Head of the Department who is empowered to resolve among further matters.
- If the work of the candidate is found to *be insufficient and plagiarism*, the committee and Head of the Department will decide the further process.
- Head of the Department can initiate further steps to ensure the smooth implementation as deems appropriate of guidelines.
- Marks split-up
  - Committee - 60 Marks (Each 10 marks)
  - Teacher - 40 Marks
  - Total - 100 marks**

### **1.3 Choosing the Right Dissertation**

The idea for student's Dissertation may be a proposal from a faculty member or student's own, or perhaps a combination of the two. The Dissertations offered by faculty member may vary substantially in breadth, depth and degree of difficulty. The most important thing is to shortlist a set of Dissertations that are right for *student*.

Some students are better suited to well-defined and relatively safe Dissertations that provide scope for demonstrating proficiency with a low risk of failure. Other students are better advised to tackle harder, riskier Dissertations that require a high degree of original input and/or technical problem solving. The potential Teachers will be happy to offer advice on the suitability of a Dissertation, given student's individual background, strengths and ambitions. Remember that it is important to balance ambition and realism when making a choice. For better help of Dissertations student can search from websites like (*IEEE, ACM, Elsevier, Springer, NPTEL etc...*)

#### **1.4 Internal Assessment of the Dissertation Work**

- The assessment of Dissertation Work for I and II shall be done independently in the respective semesters and marks shall be allotted as per the weightages.
- There shall be **two** assessments (**Phase-1 and phase-II**), by a departmental review committee formed by the HOD concerned during each of the dissertation work semesters for M.Tech. programmes (each 100 marks). The student shall make presentation on the progress made before the committee - one during middle of the semester explaining the title and its implications and second presentation towards the end of the semester with spiral bound hard copy before the examination with enough time to incorporate the feedback after the presentation so that it can be finalized and submitted.
- The Dissertation Work shall be assessed for a maximum of 100 marks of which 30 marks will be through internal assessment. The Dissertation Work prepared according to approved Guidelines and duly signed by the Teacher(s) and the Head of the Department shall be submitted to the competent authorities.
- If the candidate fails to obtain 50% of the internal assessment marks in the Phase-I and Phase-II, he/she will not be permitted to submit the report for that particular semester. This applies to both Dissertation Work-I and Dissertation Work -II.
- Every candidate doing M.Tech. shall be encouraged to send a paper / patent for publication in a journal or a conference - preferably a concept paper related to their topic and a second paper highlighting their contribution and the results of their work. An acknowledgement from the Teacher for having communicated to

the journal or conference shall be attached to the report of the Dissertation Work.

- A copy of the approved Dissertation report after the successful completion of viva examinations shall be kept in the library of the department.

## **1.5 Student-Proposals**

If student has his/her own idea for an individual Dissertation, it is the student's responsibility to find a faculty member who both approves of the proposed programme of work and is willing to be the Teacher. Student should first get the permission of Dissertation Committee, and may proceed with the consistent consent of the Teacher.

## **1.6 Teacher**

The Teacher can suggest Dissertation titles focusing more on the current field of research and ensure the level of innovation. Also, Teachers are advised to check for the formatting of the presentation and Dissertation report.

## **1.7 Teacher to Check**

For Dissertations proposed by faculty member, student should discuss the Dissertation with the proposer as soon as possible so that student have plenty of time to think about the best choices for student. Note that every Dissertation is not suitable for every student; some may be specifically tailored to a particular degree and some may only suit students with a very specific set of interests. Each proposal will indicate these constraints in order to help student to make an informed choice.

- Advised to check for the formatting of the presentation and the documentation.
- Check for the attendance of the students (Regular meeting for the discussions)
- Advise the students to contribute some new techniques and publish a paper at the end of the Dissertation

## **1.8 Student's Meeting with Teacher**

Student must make sure that s/he arranges regular meetings with Teacher. The meetings may be brief once student's Dissertation is under way but student's Teacher need to know that student's work is progressing. If student need to talk to the Teacher and cannot locate him/her in office, contact him/her asking for a time when s/he will be

available. When a student goes to see the Teacher s/he should have prepared a written list of points s/he wish to discuss. Take notes during the meeting so that student does not forget the advice s/he was given or the conclusions that were reached.

## **1.9 Dissertation Committee**

The Dissertation committee is advised to conduct the Dissertation reviews for the students of various programmes within the stipulated period and review the marks to be sent the HOD at the month end. The Dissertation committee is also advised to make necessary arrangements required (Seminar hall availability and Dissertation or, etc...) for the smooth conduct of reviews.

- The committee is advised to find the enough complexity in the Dissertation.
- All the three panel members must be present during the review.
- The reviews to be conducted in the seminar hall and the available class rooms (in the department).

## **1.10 Dissertation Presentation / Demonstration**

The presentation is also a compulsory component of the Dissertation. The Dissertation committee will not allocate marks for a Dissertation unless there has been a formal presentation. One of the most important skills which the Dissertation aims to assess is student's ability to communicate his/her ideas and work. The objective of the presentation is to find out exactly what s/he seem to have done and to ensure that s/he get relevant marks that is consistent with other Dissertations. As part of the assessment, the student will be required to give a presentation and demonstration of his/her Dissertation to the Dissertation Committee. Each presentation will be for 30 minutes. Teachers will help him/her to structure the talk and be willing to go through it with student beforehand. Other PG students could be encouraged to attend the presentations as observers only, as the feedback by the committee will benefit everybody.

## **1.11 Dissertation Work-I Requirements: M.Tech.**

<b>First Review</b> Within 8 Weeks	<b>Second Review</b> Within 16 Weeks
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<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Introduction</li><li>• Literature Survey</li><li>• References</li></ul>	<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Introduction</li><li>• Literature Survey</li><li>• Methodology</li><li>• Modules Split-up and Gantt Chart</li><li>• Proposed System (Phase 1)</li><li>• Equations /Design and software to be used</li><li>• Algorithms / Techniques used</li><li>• Expected outcomes</li></ul>
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## M.Tech – DW-I

### III Semester

**Dissertation Title : FIRST REVIEW**

Candidate Details			
Sl. No	University Register/ Roll No.	Candidate Name	Teacher
Candidate Contribution and Performance			
Subject Matter		Marks	
Understanding background and topic			
Specifies Dissertation goals			
Literature Survey			
Dissertation Planning			
Question and Answer			
Presentation skills			
<b>Total</b>			
<b>C o m m e n t s</b>			

**Member 1**

**Member 2**

**Member 3**

**HOD**



# Dissertation Evaluation Form

## M.Tech – DW-I

### III Semester

**Dissertation Title : SECOND REVIEW**

Candidate Details			
Sl.No	University Registration / Roll No	Candidate Name	Teacher
Candidate Contribution and Performance			
Subject Matter			Marks
Abstract			
Specifies Dissertation goals			
Literature Survey			
Summaries algorithms and highlights the Dissertation features			
Specifies the testing platforms and benchmark systems			
Dissertation Planning			
Technical Design			
Summarises the ultimate findings of the Dissertation			
Implementation (60 Percentage)			
Question and Answer			
Presentation skills			
<b>Total</b>			
<b>C o m m e n t s</b>			

**Member 1**

**Member 2**

**Member 3**

**HOD**

## 1.12 Dissertation Work-II Requirements: M.Tech.

First Review Within 4 Weeks	Second Review Within 16 Weeks
<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Work completed for Phase I</li><li>• Expected outcomes</li><li>• Draft copy of conceptual paper</li><li>• References</li></ul>	<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Work completed for Phase II</li><li>• Detailed Design (if any deviation)</li><li>• Contribution of the candidate</li><li>• Experimental Results</li><li>• Performance Evaluation</li><li>• Comparison with Existing system</li><li>• Result Analysis and Conclusion</li><li>• References</li><li>• Draft copy of a dissertation for publishing</li></ul>

### Note:

- The presentation should have maximum of 30 slides
- Presentation will be for 30 minutes
- A draft copy of the conference paper to be prepared at the end based on the Dissertation Work.
- System to be tested using testing software's.



## Dissertation Evaluation Form M.Tech – DW-II

### IV Semester

**Dissertation Title: FIRST REVIEW**

Candidate Details			
Sl. No.	University	Candidate Name	Teacher

	<b>Registration/ Roll No</b>		

<b>Candidate Contribution and Performance</b>	
<b>Subject Matter</b>	<b>Marks</b>
Abstract	
Work to be completed in Phase 1	
Architecture /System Design – Phase 1 and 2	
Work to be completed in Phase 2	
Summaries the techniques implemented / to be implemented	
Contribution of the Candidate	
Results obtained and Summaries the ultimate findings of the Dissertation	
Implementation (60 Percentage)	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>C o m m e n t s</b>	

**Member 1**

**Member 2**

**Member 3**

**HOD**

# Dissertation Evaluation Form

## M.Tech – DW-II

### IV Semester

**Dissertation Title: SECOND REVIEW**

Candidate Details			
Sl. No.	University Registration No	Candidate Name	Teacher

Candidate Contribution and Performance	
Subject Matter	Marks
Abstract	
Architecture /System Design – Phase 2	
Overall Architecture /System Design – Phase 2	
Summarises the techniques implemented	
Contribution of the Candidate	
Results obtained and Performance Evaluation	
Summarises the ultimate findings of the Dissertation	
Implementation (100 Percentage)	
Pre-final draft of entire dissertation	
Draft of the paper to be published	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>Comments</b>	

**Member 1**

**Member 2**

**Member 3**

**HOD**

# Detailed Contents of Syllabus

## Semester First

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-501	Advanced Structural Analysis	3-1-0	4	60	40	100	3 hours

- 1. Stiffness Method (Systems Approach):** Basis of stiffness method, Degrees of freedom, Force-displacement relationships, Nodal stiffness.
- 2. Flexibility Method (Systems Approach):** Flexibility coefficients, Basis of the method, Application to various types of structures.
- 3. Introduction to Element Approach:** Member stiffness matrix, Local or Member co-ordinate system, Global or Structural co-ordinate system, Rotation of axes etc, Structure stiffness matrix.
- 4. Structural Stability Analysis:** Elastic Instability, Introduction to stability problem, Energy methods, buckling of axially loaded members for different end conditions, Concept of effective length, approximate techniques, Stability analysis of beam-column and frames.
- 5. Plastic Analysis:** Concept of Limit load analysis, Upper and lower bounds, Plastic analysis of beams and multi-storey frames using mechanism method.
- 6. Non Linear Analysis:** Introduction to geometric and material non-linearity.

### Books recommended:

1. Przemieniecki, J.S., 'Theory of Matrix Structure Analysis', Tata McGraw Hill Book Co.
2. Martin, H.C. 'Introduction to Matrix Methods of Structural Analysis' McGraw Hill Book Co.
3. Meghree & Deshmukh, 'Matrix Methods of Structural Analysis' Charotar Publishing House, Anand.
4. Pandit & Gupta, Matrix Analysis of Structures, Tata McGraw Hill Publications (2003). Iyengar, N.G.R., Elastic Stability of Structural Elements, Macmillan India Ltd (1980).
5. Gere, G. M. and Weaver, Jr. W., Matrix Analysis of Framed Structures, CBS Publishers (1987).
6. McCormac, J. C. & Nelson, J. K., Structural Analysis: A Classical and Matrix Approach, John Wiley and Sons (1997).

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-503	Advanced RCC Design	3-1-0	4	60	40	100	3 hours

- 1. Yield Line Theory:** Assumptions, location of yield lines, methods of analysis, analysis of one way and two way slabs.
- 2. Flat slab:** Limitations of Direct Design Method, shear in flat slabs, equivalent frame method, opening in flat slabs.
- 3. Redistribution of moments in beam:** conditions for moment redistribution, single span beams, multi-span beams and design of sections.
- 4. Deep Beam:** minimum thickness, design by IS-456. Design as per British and American practice, beam with holes.
- 5. Shear walls:** classification of shear wall, classification according to behavior and design of rectangular and flanged shear wall.
- 6. Cast-in-situ Beam-column joint,** Force acting on joints, strength requirement of column, anchorage, confinement of core, shear strength of joint, corner joint and procedure for design.
- 7. Computation of deflection and crack-width:** short term and long term deflection of beam and slab, calculation of deflection as per IS-456, Factors effecting crack width in beams, calculation of crack width in beams, calculation of crack width as per IS-456, shrinkage and thermal cracking.

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-505	Structural Dynamics	3-1-0	4	60	40	100	3 hours

1. **Introduction:** Objective, difference between static and dynamic analysis, loading, essential characteristics of a dynamic problem, principles of dynamics, formulation of equation of motion.
2. **Single Degree Of Freedom System:** analysis for free and forced vibration, Duhamels integral, Damping – types and evaluation, Response of SDOF system to harmonic excitation, Periodic excitation, Impulsive loading, arbitrary, step, pulse excitation, Response to General Dynamic loading, Numerical evaluation of dynamic response-superposition and step by step methods, generalized SDOF system.
3. **Multi degree of freedom:** equation of motion, equation of structural property matrices, problem statement and solution methods, free vibration, forced harmonic vibration, damped motion for MDOF, Generalized co-ordinates, principle of orthogonality of modes, Eigenvalue problem, model response, approximate methods: Stodalla-Vanaello, Modified Reyleigh's method, Holzer's Method, Holzer Myklested method, Matrix method, Energy method, Lagrange's equation, model analysis, stochastic response of linier SDOF and MDOF system to Gaussian inputs.

#### Books recommended:

1. Clough and Penzien, 'Dynamics of Structures' McGraw Hill Book co.
2. Chopra, A.K., Dynamics of Structures', Theory and Application to Earthquake Engineering', Prentice Hall of India, New Delhi. 1995.
3. Glen V. Berg, 'Element of Structural Dynamic', Prentice Hall, Engewood Cliffs, NJ.
4. Grover L. Rogers, 'Dynamics of Framed Structures', John Wiley and Sons Inc., New York.

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
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<b>CES-521</b>	<b>Advanced Material Testing Lab</b>	<b>0-0-4</b>	<b>2</b>	<b>30</b>	<b>20</b>	<b>50</b>	<b>3 hours</b>
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### **List of experiments/assignments**

1. Concrete Mix Design as per IS-10262 for various grades of concrete mixes.
2. Special concretes.
3. Durability studies on concrete.
4. Effect of super plasticizer on properties of concrete in fresh and hardened stages.
5. Measurement of air content of concrete.
6. Fineness of cement by Air Permeability method.
7. Non Destructive Testing of Concrete.
8. To determine the modulus of elasticity of concrete.
9. Effect of replacement of fly ash on properties of concrete.
10. Testing of structural steel reinforcement and steel sections.

## **Semester Second**

<b>Subject Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr</b>	<b>Theory</b>	<b>Sessional</b>	<b>Total</b>	<b>Duration</b>
<b>CES-502</b>	<b>Design of Bridges</b>	<b>3-1-0</b>	<b>4</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b>3 hours</b>

Books recommended:

- 1 Victor, D.J., 'Essential of bridge Engineering' Oxford & IBH Pub.Co
- 2 Rower, R.E., 'Concrete bridge Design' C.R. Books Ltd., London.
- 3 Krishna Raju, N., 'Design of bridges' Oxford & IBH Pub. Co., New Delhi.
- 4 Krishna Raju, N. 'Prestressed Concrete' Tata McGraw Hill, New Delhi.
- 5 Bakht, B and Jaeger, L.C., 'Bridge Analysis Simplified' McGraw Hill Int. Ed., New Delhi.

1. **Types of bridges super structure:** introduction and types, temporary bridge superstructures, military bridges, other temporary bridges, permanent bridges, R.C.C. bridges, Pre-stressed concrete bridges, steel bridges, movable steel bridges.
2. **Consideration of loads and stress in road bridges:** introduction, loads, forces and stresses, dead loads, bridge loading as per relevant IRC and IRS specifications, traffic lanes, foot way, kerb, railing and parapet loading, impact, wind load, longitudinal forces, Temperature effects, secondary stresses, erection stresses, earth pressure, effect of live load on backfill and on the abutment.
3. **Design OF R.C. Bridges:** Slab culvert, box culvert, pipe culvert, T-beam bridge superstructure, design examples, brief introduction to rigid frame, arch and bow string girder bridges.
4. **Design of prestressed concrete bridges:** Pre-tensioned and Post tensioned concrete bridges, analysis and design of multi lane pre stressed concrete T-beam bridge superstructure.
5. **Pier, Abutment and wing walls:** Introduction, types of piers, design of piers, forces  
On piers, stability, abutments, bridge code provisions for abutments, wing walls, design examples.
6. **Bearings:** Introduction, function of bearings, bearings for steel bridges and concrete bridges, bearings for continuous span bridges, I.R.C. provision for bearings, fixed bearings, expansion bearings, materials and specifications, permissible stresses in bearings, design consideration for rocker and roller-cum-rocker bearings, sliding bearings.

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-504	<b>Advanced Design of Steel Structures</b>	3-1-0	4	60	40	100	3 hours

- 1. Introduction to Limit States:** Introduction, standardization, allowable stress design limit state design, partial safety factors, concept of section classification: Plastic, compact, semi-compact & slender.
- 2. Columns:** Basic concepts, strength curve for an ideal strut, strength of column member in practice, effect of eccentricity of applied loading, effect of residual stresses, concept of effective lengths, no sway & sway columns, torsional and torsional flexural buckling of column, Robertson design curve, modification to Robertson approach, design of column using Robertson approach.
- 3. Laterally restrained beams:** Flexural & shear behavior, web buckling & web crippling, effect of local buckling in laterally restrained plastic or compact beam combined bending & shear, unsymmetrical bending.
- 4. Unrestrained beam:** Similarity of column buckling & lateral buckling of beams lateral torsional buckling of symmetric section, factor affecting lateral stability, buckling of real beam, design of cantilever beams, continuous beam.
- 5. Beam columns:** Short & long beam column, effect of slenderness ratio and axial force on modes of failure, beam column under biaxial bending, strength of beam column, local section failure & overall member failure.
- 6. Beam subjected to torsion and bending:** Introduction, pure torsion and warping, combined bending and torsion, capacity check, buckling check, design method for lateral torsional buckling.
- 7. Connection design:** Complexities of steel connections, type of connection, connection design philosophies, welded and bolted connection: truss connection, portal frame connection, beam & column splices, beam to beam and beam to column connections.

Books recommended:

- 1 Teaching resource for Structural Steel Design Vol. 1 to 3, Institute for steel development & growth (INS DAG), Calcutta.
- 2 Morsis L.J., Plum, D.R "Structural Steel Work Design".
- 3 Yu, W.W., "Cold Formed Steel Structures Design".
- 4 Arya A.S. and Ajmani, J.L., "Design of Steel Structures".
- 5 Sihna D.A. "Design of Steel Structures".

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-506	Finite Elements Method in Structural Engineering	3-1-0	4	60	40	100	3 hours

**Introduction to Finite Elements:** Introduction, Direct formulation of finite element characteristics, Energy approach, Convergence criteria, Displacement functions with discontinuity between elements, Solution bounds, Extension of variational approach.

**Plane Stress and Plane Strain:** Introduction, Element characteristics, Assessment of accuracy, Some practical applications.

**Axis-Symmetric Stress Analysis:** Introduction, Element characteristics, Practical applications, Non-symmetrical loading.

**Some Improved Elements in 2-D Problems:** Introduction, Quadrilateral element, Characteristics derived from triangular elements, Conforming shape functions for a rectangle, Conforming shape functions for an arbitrary quadrilateral, Triangular element with size nodes.

**Nodes Dimensional Stress Analysis:** Introduction, Tetrahedral element characteristics, Composite elements with eight nodes, Improved displacement functions an element with eight arbitrary nodes, Tetrahedral element with ten nodes, Introduction to rectangular elements, Quadrilateral elements, Conforming functions for quadrilateral elements, Plate-bending elements, Introduction to non-linear Analysis-Material non-linearity and Performance non-linearity.

## Semester Third

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-601	Earthquake Analysis & Design of Structures	3-1-0	4	60	40	100	3 hours

1. Analysis and design of Multi-storey building frames using STAAD. Pro., SAP, Ansys
2. Analysis and design of Elevated Water Tank using STAAD.Pro., SAP, Ansys
3. Analysis and design of bridge decks and other structures using STAAD.Pro., SAP, Ansys
4. Analysis and design of steel trusses using STAAD-Pro., SAP, Ansys
5. Dynamic response of structures using PULSE software.

#### Books recommended:

1. Software related manuals.
1. Geology vs. Engineering, Role of geology in planning, design and construction of major man-made structural features. Engineering properties of rocks.
2. Site investigation and characterization. Geological consideration for evaluation of dams and reservoirs sites; dam foundation problems; reservoir problems.
3. Geological conditions for tunnelling. Soft and hard rock tunnelling. Importance of lithology, structure and water in tunnelling. Foundation treatment; Grouting, Rock Bolting and other support mechanisms.
4. Landslides; Causes, Factors and corrective/Preventive measures.
5. Earthquakes; Causes, Factors and corrective/Preventive measures; seismic zones of India; aseismic design of building.

#### SUGGESTED READINGS:

1. Krynin, D.P. and Judd W.R. 1957. Principles of Engineering Geology and Geotechnique, McGraw Hill (CBS Publication).
2. Johnson, R.B. and De Graf, J.V. 1988. Principles of Engineering Geology, John Wiley.
3. Goodman, R.E., 1993. Engineering Geology: Rock in engineering constructions. John Wiley & Sons, N.Y.
4. Waltham, T., 2009. Foundations of Engineering Geology (third Edition.) Taylor & Francis.
5. Bell: F.G-, 2006. Basic Environmental and Engineering Geology Whittles Publishing.
6. Bell, .F.G, 2007. Engineering Geology, Butterworth-Heineman.



1. **Prestressing System and Losses of Prestress:** Introduction, various systems of prestressing, types of losses and their analysis.
2. **Working Stress Design of Simple Beams:** Critical load conditions; allowable stresses; Flexural design criteria; axially prestressed members; design of prestressing cable for a given cross-section; design procedure based on flexure, design by load balancing method and multiple stage prestressing.
3. **Continuous Beams:** Analysis of two span beam, analysis of two span beam with eccentricities at outer supports; continuous beams with variable section; design of continuous beam.
4. **Limit State Design of Beams:** Limit state of strength in flexure, shear and torsion; permissible stresses, Limit state of serviceability against deflection, cracking and durability; Design of simply supported and continuous beams. Limit State Design of partially pre-stressed Beams, Moment Capacity of rectangular and flanged section; design for shear and serviceability.
5. **Bond and Anchorage of prestressing cables:** bond in pre-tensioned and post-tensioned construction, prestressing cable at centroidal axis; symmetric multiple cables causing axial thrust; cable eccentricity; inclined prestressing cable, spalling stresses, end zone reinforcement.

Books recommended:

1. N. Krishna Raju, Prestressed Concrete, Tata-McGraw Hill, Delhi.
2. P. Dayaratnam, prestressed Concrete Structures, Oxford & IBH Co., Delhi.
3. Jain & Jai Krishna, Plain & Reinforced Concrete, Vol-II, Nem Chand & Co., Roorkee.
4. IS 1343-1980 code of Practice for Prestressed Concrete, Bureau of standards, New Delhi.

1. **Principles of Planning of Tall Buildings:** Technological Planning, Mechanical systems, Fire rating, local considerations, Structures elements, Types of structural systems for tall buildings, Shear Walls and their arrangement.
2. **Loads on Tall Buildings:** Gravity loads, Live loads, Wind loads and seismic loading, Code Provisions, Discussion of relevant codes of practices and loading standards.
3. **Analysis of Tall Buildings (With and Without Shear Walls):** Approximate analysis for gravity loads, Lateral loads, Analysis of tube-in-tube constructional and 3-Dimensional analysis of shear core buildings, Stability, Stiffness and fatigue, Factor of safety and load factor.
4. **Design of Tall Buildings:** Procedures of elastic design, Ultimate strength design and Limit state design of super structures including structural connections, soil structure interaction.

Books recommended:

1. Structural Analysis and design of Tall Buildings by Tara Nath Bungale
2. Advances in tall buildings by Beedle L.S.
3. Analysis of Shear walled buildings
4. Design of multistory reinforced concrete buildings for earthquake motion by J.A. Blume, N.M. Newmark.



**1. Fibre Reinforced Concrete:** Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fibre reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

**2. Fly Ash Concrete:** Classification of Indian Flyashes, Properties of Flyash, Reaction Mechanism, Proportioning of Flyash concretes, Properties of Flyash concrete in fresh and hardened state, Durability of flyash concrete.

**3. Polymer Concrete:** Terminology used in polymer concrete, Properties of constituent materials, Polymer impregnated concrete, Polymer modified concrete, Properties and applications of polymer concrete and polymer impregnated concrete.

**4. Ferro Cement:** Constituent materials and their properties, Mechanical properties of ferro cement, Construction techniques and application of ferro cement.

**5. High Performance Concrete:** Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.

**6. Sulphur Concrete And Sulphur Infiltrated Concrete:** Process technology, Mechanical properties, Durability and applications of sulphur concrete, Sulphur infiltrated concrete, Infiltration techniques, Mechanical properties, Durability and applications of sulphur infiltrated concrete.

**1. Plane Stress & Plane strain:** Plane stress, plane strain, stress and strain at a point. Differential equations of equilibrium, constitutive relations: anisotropic materials, yield criterion, flow rule, boundary conditions, compatibility equation, stress function.

**2. Two-Dimensional problems in rectangular coordinates:** Solutions by polynomials, Saint-Venant's Principle, determination of displacements, bending of beams, solution of two dimensional problem in Fourier series.

**3. Two-Dimensional problems in polar coordinates:** general equations in polar coordinates, pure bending of curved bars, displacements for symmetrical stress distributions, bending of curved bar, distribution in plates with circular holes, stress in a circular disc, general solution.

**4. Analysis of stress & strains in three Dimensions:** Principal stress and strain, shearing stresses and strains, elementary equations, compatibility conditions, problems of elasticity involving pure bending of prismatic bars.

**5. Buckling of columns:** Analysis of columns with various end conditions by differential equations, initially curved members, eccentrically loaded column, secant formulae, p-delta effect, energy methods applied to buckling, stability of columns, beam columns, tie rods with lateral bending.

**6. Torsion of Prismatic Bars:** Torsion of prismatic bars, membrane analogy, torsion of a bar of narrow rectangular cross section, torsion of rectangular bars, solution of torsional problems, torsion of rolled sections, torsion of hollow shaft and thin tubes, torsional buckling, torsional-flexural buckling.

**7. Buckling of frames:** Triangular frames, rigid jointed frames-Analysis of beams columns, method of moment equations, geometrical approach, Multistoreyed-multibay frames.

# Guidelines for Dissertation work

## Preamble

These Guidelines are intended to give both students and teachers a set of procedures and expectations that will make the Dissertation evaluation process easier, more predictable, and more successful. These Guidelines should be interpreted as the minimum requirements of the degree awarded by Lingaya's University, Faridabad. The Dissertation Committee assigned for various programmes offered by Lingaya's University, Faridabad may add requirements or guidelines as deemed fit.

## 1.1 Dissertation Work

The Dissertation Work for M. Tech consists of Dissertation Work – I and Dissertation Work–II. ***Dissertation Work–I*** is to be undertaken during ***semester III*** and ***Dissertation Work–II***, which may be a continuation of Dissertation Work–I, is to be undertaken during ***semester IV***.

## 1.2 General Suggestions and Expectations

The Dissertation Work is by far the most important single piece of work in the post-graduate programme. It provides the opportunity for student to demonstrate independence and originality, to plan and organize a large Dissertation over a long period and to put into practice some of the techniques student have been taught throughout the course. The students are advised to ***choose a Dissertation that involves a combination of sound background research, a solid implementation, or piece of theoretical work, and a thorough evaluation of the Dissertation's output in both absolute and relative terms.*** Interdisciplinary Dissertation proposals and innovative Dissertations are encouraged and more appreciable.

It is good to try to think of the Dissertation as a deliverable

- Postgraduate students are to decide on the Dissertation Work-I and Dissertation Work-II Dissertation with their proposal and Dissertation Teacher in the beginning of semester with a Synopsis consisting of **three chapters - Introduction, Literature Review and Methodology, which** should highlight the deliverables.

- In Case of re-reviews, any number of re-reviews can happen depending on the discretion of the committee and it should happen within the prescribed time.
- If the student fails to attend, the Teacher refuses to endorse the student's work. The committee can invite Head of the Department who is empowered to resolve among further matters.
- If the work of the candidate is found to *be insufficient and plagiarism*, the committee and Head of the Department will decide the further process.
- Head of the Department can initiate further steps to ensure the smooth implementation as deems appropriate of guidelines.
- Marks split-up  
 Committee - 60 Marks (Each 10 marks)  
 Teacher - 40 Marks  
**Total - 100 marks**

### 1.3 Choosing the Right Dissertation

The idea for student's Dissertation may be a proposal from a faculty member or student's own, or perhaps a combination of the two. The Dissertations offered by faculty member may vary substantially in breadth, depth and degree of difficulty. The most important thing is to shortlist a set of Dissertations that are right for *student*. Some students are better suited to well-defined and relatively safe Dissertations that provide scope for demonstrating proficiency with a low risk of failure. Other students are better advised to tackle harder, riskier Dissertations that require a high degree of original input and/or technical problem solving. The potential Teachers will be happy to offer advice on the suitability of a Dissertation, given student's individual background, strengths and ambitions. Remember that it is important to balance ambition and realism when making a choice. For better help of Dissertations student can search from websites like (*IEEE, ACM, Elsevier, Springer, NPTEL etc...*)

### 1.4 Internal Assessment of the Dissertation Work

- The assessment of Dissertation Work for I and II shall be done independently in the respective semesters and marks shall be allotted as per the weightages.
- There shall be **two** assessments (**Phase-1 and phase-II**), by a departmental review committee formed by the HOD concerned during each of the dissertation work semesters for M.Tech. programmes (each 100 marks). The student shall make presentation on the progress made before the committee - one

during middle of the semester explaining the title and its implications and second presentation towards the end of the semester with spiral bound hard copy before the examination with enough time to incorporate the feedback after the presentation so that it can be finalized and submitted.

- The Dissertation Work shall be assessed for a maximum of 100 marks of which 30 marks will be through internal assessment. The Dissertation Work prepared according to approved Guidelines and duly signed by the Teacher(s) and the Head of the Department shall be submitted to the competent authorities.
- If the candidate fails to obtain 50% of the internal assessment marks in the Phase–I and Phase–II, he/she will not be permitted to submit the report for that particular semester. This applies to both Dissertation Work–I and Dissertation Work –II.
- Every candidate doing M.Tech. shall be encouraged to send a paper / patent for publication in a journal or a conference - preferably a concept paper related to their topic and a second paper highlighting their contribution and the results of their work. An acknowledgement from the Teacher for having communicated to the journal or conference shall be attached to the report of the Dissertation Work.
- A copy of the approved Dissertation report after the successful completion of viva examinations shall be kept in the library of the department.

## **1.5 Student-Proposals**

If student has his/her own idea for an individual Dissertation, it is the student's responsibility to find a faculty member who both approves of the proposed programme of work and is willing to be the Teacher. Student should first get the permission of Dissertation Committee, and may proceed with the consistent consent of the Teacher.

## **1.6 Teacher**

The Teacher can suggest Dissertation titles focusing more on the current field of research and ensure the level of innovation. Also Teachers are advised to check for the formatting of the presentation and Dissertation report.

## **1.7 Teacher to Check**

For Dissertations proposed by faculty member, student should discuss the Dissertation with the proposer as soon as possible so that student

have plenty of time to think about the best choices for student. Note that every Dissertation is not suitable for every student; some may be specifically tailored to a particular degree and some may only suit students with a very specific set of interests. Each proposal will indicate these constraints in order to help student to make an informed choice.

- Advised to check for the formatting of the presentation and the documentation.
- Check for the attendance of the students (Regular meeting for the discussions)
- Advise the students to contribute some new techniques and publish a paper at the end of the Dissertation

## **1.8 Student's Meeting with Teacher**

Student must make sure that s/he arranges regular meetings with Teacher. The meetings may be brief once student's Dissertation is under way but student's Teacher need to know that student's work is progressing. If student need to talk to the Teacher and cannot locate him/her in office, contact him/her asking for a time when s/he will be available. When a student goes to see the Teacher s/he should have prepared a written list of points s/he wish to discuss. Take notes during the meeting so that student does not forget the advice s/he was given or the conclusions that were reached

## Dissertation Committee

The Dissertation committee is advised to conduct the Dissertation reviews for the students of various programmes within the stipulated period and review the marks to be sent the HOD at the month end. The Dissertation committee is also advised to make necessary arrangements required (Seminar hall availability and Dissertation or, etc...) for the smooth conduct of reviews.

- The committee is advised to find the enough complexity in the Dissertation.
- All the three panel members must be present during the review.
- The reviews to be conducted in the seminar hall and the available class rooms (in the department).

### 1.10 Dissertation Presentation / Demonstration

The presentation is also a compulsory component of the Dissertation. The Dissertation committee will not allocate marks for a Dissertation unless there has been a formal presentation. One of the most important skills which the Dissertation aims to assess is student's ability to communicate his/her ideas and work. The objective of the presentation is to find out exactly what s/he seem to have done and to ensure that s/he get relevant marks that is consistent with other Dissertations. As part of the assessment, the student will be required to give a presentation and demonstration of his/her Dissertation to the Dissertation Committee. Each presentation will be for 30 minutes. Teachers will help him/her to structure the talk and be willing to go through it with student beforehand. Other PG students could be encouraged to attend the presentations as observers only, as the feedback by the committee will benefit everybody.

### 1.11 Dissertation Work-I Requirements: M.Tech.

First Review Within 8 Weeks	Second Review Within 16 Weeks
<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Introduction</li><li>• Literature Survey</li><li>• References</li></ul>	<ul style="list-style-type: none"><li>• Title</li><li>• Abstract</li><li>• Introduction</li><li>• Literature Survey</li><li>• Methodology</li><li>• Modules Split-up and Gantt Chart</li><li>• Proposed System (Phase 1)</li><li>• Equations /Design and software to be used</li><li>• Algorithms / Techniques used</li><li>• Expected outcomes</li></ul>

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## Dissertation Evaluation Form

**M.Tech – DW-I**

**III Semester**

Dissertation Title : FIRST REVIEW

Candidate Details			
Sl. No	University Register/ Roll No.	Candidate Name	Teacher
Candidate Contribution and Performance			
Subject Matter		Marks	
Understanding background and topic			
Specifies Dissertation goals			
Literature Survey			
Dissertation Planning			
Question and Answer			
Presentation skills			
<b>Total</b>			
<b>C o m m e n t s</b>			

Member 1

Member 2

Member 3

HOD



# Dissertation Evaluation Form

## M.Tech – DW-I

### III Semester

Dissertation Title : SECOND REVIEW

Candidate Details			
Sl.No	University Registration / Roll No	Candidate Name	Teacher

Candidate Contribution and Performance	
Subject Matter	Marks
Abstract	
Specifies Dissertation goals	
Literature Survey	
Summaries algorithms and highlights the Dissertation features	
Specifies the testing platforms and benchmark systems	
Dissertation Planning	
Technical Design	
Summarises the ultimate findings of the Dissertation	
Implementation (60 Percentage)	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>C o m m e n t s</b>	

Member 1

Member 2

Member 3

HOD

### 1.12 Dissertation Work-II Requirements: M.Tech.

<b>First Review</b> Within 4 Weeks	<b>Second Review</b> Within 16 Weeks
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<ul style="list-style-type: none"> <li>• Title</li> <li>• Abstract</li> <li>• Work completed for Phase I</li> <li>• Expected outcomes</li> <li>• Draft copy of conceptual paper</li> <li>• References</li> </ul>	<ul style="list-style-type: none"> <li>• Title</li> <li>• Abstract</li> <li>• Work completed for Phase II</li> <li>• Detailed Design (if any deviation)</li> <li>• Contribution of the candidate</li> <li>• Experimental Results</li> <li>• Performance Evaluation</li> <li>• Comparison with Existing system</li> <li>• Result Analysis and Conclusion</li> <li>• References</li> <li>• Draft copy of a dissertation for publishing</li> </ul>
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**Note:**

- The presentation should have maximum of 30 slides
- Presentation will be for 30 minutes
- A draft copy of the conference paper to be prepared at the end based on the Dissertation Work.
- System to be tested using testing software's.

## Dissertation Evaluation Form

### M.Tech – DW-II

### IV Semester

Dissertation Title: FIRST REVIEW

Candidate Details			
Sl. No.	University Registration/ Roll No	Candidate Name	Teacher

Candidate Contribution and Performance	
Subject Matter	Marks
Abstract	
Work to be completed in Phase 1	
Architecture /System Design – Phase 1 and 2	
Work to be completed in Phase 2	
Summaries the techniques implemented / to be implemented	
Contribution of the Candidate	
Results obtained and Summaries the ultimate findings of the Dissertation	

Implementation (60 Percentage)	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>C o m m e n t s</b>	

**Member 1**

**Member 2**

**Member 3**

**HOD**

# Dissertation Evaluation Form

## M.Tech – DW-II

### IV Semester

Dissertation Title: SECOND REVIEW

Candidate Details			
Sl. No.	University Registration No	Candidate Name	Teacher

Candidate Contribution and Performance	
Subject Matter	Marks
Abstract	
Architecture /System Design – Phase 2	
Overall Architecture /System Design – Phase 2	
Summarises the techniques implemented	
Contribution of the Candidate	
Results obtained and Performance Evaluation	
Summarises the ultimate findings of the Dissertation	
Implementation (100 Percentage)	
Pre-final draft of entire dissertation	
Draft of the paper to be published	
Question and Answer	
Presentation skills	
<b>Total</b>	
<b>Comments</b>	

Member 1

Member 2

Member 3

HOD

## **UNIT –I**

Planning: Description of urban and regional transportation systems, Definition of a system; System analysis: scope and limitations, Transportation planning based upon system Analysis, Survey and analysis of existing conditions.

Highway Alignment: Requirements. Factors controlling alignment. Obligatory points. Engineering Surveys for highway location. Route selection. Steps in new project. Highway classifications.

## **UNIT –II**

Cross Sectional Element: Pavement surface characteristics. Factors affecting skid resistance. Pavement unevenness. Camber. Providing camber in the field. Width of carriageway. Design Vehicle, Medians, kerbs, road margins, right of way and typical cross-sections of roads.

## **UNIT –III**

Sight Distances: Introduction. Stopping sight distance. Reaction time. Analysis of stopping distance. Overtaking sight distance. Analysis of overtaking sight distance. Effect of grade on sight distances. Overtaking zone. Intermediate sight distance. Sight distance at intersections. Super elevation: Requirement of super elevation. Limits and attainment of super elevation in the field.

## **UNIT –IV**

Highway Alignment: General. Design speed. Horizontal curves. Super elevation. Analysis of super elevation. Super elevation design. Attainment of super elevation. Widening of pavement on horizontal curves. Methods of introducing extra widening. Horizontal Transition curves. Different types of transition curves. Length of transition curve. Setting out of transition curve. Set-back distance on horizontal curves. Curve resistance.

## **UNIT –V**

Vertical Alignment: General. Gradients. Compensation in gradient on horizontal curves. Vertical curves. Summit curve. Length of summit curve. Valley Curve. Length of valley curve and profile. Relevant IRC standards for urban and rural roads.

### **Suggested Reading;**

1. L.R. Kadiyalli, Traffic Engineering and Transport Planning, Khanna Publishers, 7th Edition, 2008
2. C. S. Papacostas, P. D. Prevedouros, Transportation Engineering and Planning, PHI Publication, 3rd edition, 2002
3. Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
4. Highway Engg. by S.K. Khanna & C.E.G. Justo, New Chand Bros., Roorkee.
5. Principles and Practice of Highway Engg. by L.R. Kadiyali, Khanna Publishers, Delhi.
6. Principles of Transportation and Highway Engineering by G.V. Rao, Tata McGraw-Hill Publishing Co. Ltd. N. Delhi.
7. MORTH Specifications for Road and Bridge Works, IRC Publication.

One and three dimensional consolidation theories and applications, immediate settlement, Methods of determination, Estimation of Pre-consolidation pressure, Secondary consolidation.

## **Unit II**

Shear strength parameters of cohesion less and saturated cohesive soils, Principles of Effective stress condition, Effect of rate of stress on shear parameters, Stress- Strain relationship, Skempton's Pore pressure coefficients, Hvorslev's true shear parameters, Effect of over consolidation on shear parameters.

## **Unit III**

Stability analysis of slope -effective vs. total stress analysis, Stability Analysis of Slope: Effective and total stress approach, shape of slip surface, methods of slices, graphic methods, location of critical slip circle, wedge analysis, Method, stability during critical conditions.

## **Unit IV**

Earth pressure – Rankine, Coulomb and Graphical Methods, Retaining walls structures, Gravity cantilever and counterfort retaining walls: Stability checks and design: Sheet Pile Structures: Cantilever sheet piling, Anchored sheet piling: Free and fixed earth support methods of Analysis

## **Unit V**

Braced excavations, Soil Anchors: Inclusions and Installation Techniques, Design of Soil Anchors, Application Criteria: Advantages and Limitations.

## **Suggested Readings:**

1. Das, B.M. (2008). Advanced Soil Mechanics. Taylor and Francis Group, London, Second edition.
2. Helwany, S. (2007). Applied Soil Mechanics with ABAQUS Applications, John Wiley & Sons, INC, New Jersey, USA.
3. Wood, D.W. (2004). Geotechnical Modelling. Spon Press, Taylor and Francis Group, London, First edition.
4. Powrie, W. (2002). Soil Mechanics concepts and applications. Spon Press, Taylor and Francis Group, London, Second edition.
5. Terzaghi, K., Peck, R.B.

## **Unit I**

Project Management: Basic forms of organization with emphasis on Project; Project life cycle, planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic-environmental impact analysis, project clearance procedures and necessary documentation for major works like dams, multi-storeyed structures, ports, tunnels, Qualities, role and responsibilities of project Manager, Role of Project Management Consultants, Web based project management.

## **Unit II**

Project Scheduling: Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT, techniques, Precedence Network Analysis.

## **Unit III**

Project Controlling: Monitoring and Control, Crashing, Resource Levelling, Updating. Work Study: Definition, Objectives, and basic procedure, and method study and work measurement.

## **Unit IV**

Work-study applications in Civil Engineering. Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams.

## **Unit V**

Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating.

### **Suggested Readings;**

- 1 Construction Planning & management By P S Gahlot & B M Dhir, New Age International Limited Publishers
2. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
- 3 Construction Project Management Theory & practice --- Kumar Neeraj Jha, Pearson, 2012
4. Construction management Fundamentals by Knutson, Schexnayder, Fiori, Mayo, Tata McGraw Hill, 2nd Edition.

- Penetration Ratio and Penetration Viscosity Number of Bituminous binders
- 10% Fines Test for aggregates
- Moisture sensitivity test for bitumen adhesion
- Viscosity-Temperature relationships for bituminous binders
- Rheological properties of bituminous binders
- Design of Bituminous mixes

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CE-513-T	<b>Concrete Lab</b>	0-0-2	2	30	20	50	3 hours

- Soundness of cement by Le-Chatelier's apparatus.
- Slump test
- Setting time of cement, initial and final.
- Compressive strength of cement.
- Measurement of specific gravity of cement.

Measurement of Heat of Hydration of cement

## Semester Second

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-502-T	<i>Highway &amp; Airport Pavement Materials</i>	3-1-0	4	60	40	100	3 hours

**UNIT – I** Subgrade: Significance of subgrade soil. Characteristics of soil. Desirable properties. Index properties of Soil. Soil classification based on grain size. Soil classification system. Evaluation of soil strength. Aggregates: Introduction. Desirable properties of road aggregates. Tests for road aggregates.

**UNIT – II** Bituminous Materials: Introduction. Types of bituminous materials. Tests on bitumen. Cutback and emulsions. Bituminous Paving Mixes: Design of bituminous mix. Marshal method of bituminous mix design. Road making aggregates – Classification, Properties of aggregates, design of aggregate gradation, texture, polishing and skid resistance.

**UNIT – III** Bituminous road binders – Straight- run bitumen, emulsions, Cutback and modified binders. Rheology of bituminous binders, modified binders – adhesion and stripping, penetration index, viscosity, temperature susceptibility of viscosity. Additives and their suitability, Fillers.

**UNIT – IV** Construction Methods: Bituminous and concrete pavements. Relevant IS and IRC codes.

**UNIT – V** Polymer and Rubber Modified Binders: Physical and chemical properties. Fly ash and its characterization. Performance based mix design Approaches. Visco elastic properties of



bitumen and bituminous mixture.

**Suggested Readings:**

- Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
- Highway Engg by S.K. Khanna & C.E.G. Justo, New Chand Bros., Roorkee.
- Principles and Practice of Highway Engg. By L.R. Kadiyali, Khanna Publishers, Delhi.
- Atkins & Harold, Highway Materials, Soils, and Concretes, Prentice Hall
- Relevant IRC, ASTM, AASHTO and other Codes, Manuals and Specifications
- P.G. Lavin, Asphalt Pavements, Taylor and Francis, 1st Ed. 2007.

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-504-T	<i>Analysis &amp; Structural Design of Pavement</i>	3-1-0	4	60	40	100	3 hours

**Unit 1:** General Consideration: Components of road pavement such as subgrade, Sub base, Base course and wearing course and their functions. Comparison of flexible and rigid pavements highway and airport pavements

**Unit 2.** Pavements Materials: Stabilizing base viz., Mechanical, Stabilized with admixture like cements, Bitumen lime and other chemicals. Factor Affecting the Pavements Design: Traffic factor, Moisture and climate factors, and Soil factor, Stress distribution factor Design of Flexible pavements:

**Unit 3.** General classification of various methods and their approach, Empirical methods using soil classification. Theoretical and semi theoretical methods. General observation and limitation of various methods.

**Unit 4.** Design Method of Rigid Pavements: Analysis of stresses in concrete pavements due to various wheel loads. Cyclic changes in temperature. Changes in moisture and volumetric change in subgrade and base course. Comparison of analysis of stress due to wheel loads on liquid and solids subgrade theorem. Thickness design methods such as P.C. A. design method F.A.A. methods etc. Design of distributed steel reinforcement, design of dowels, Design of spacing of joints.

**Unit 5. Pavement Evaluation and Strengthening:** Method of pavement evaluation including LCN method for airport, Design of various types of overlays for flexible and rigid pavements, Mechanics of pumping and blowing, Factor affecting pumping, preventive measures. Pavements Performance: Pavements performance, Road Mechanic and their applications, The AASHO road test. Evaluation of performance of the flexible and rigid pavements. Analysis of results from flexible and rigid pavements.

### Suggested Readings:

1. S.K.Khurana, Principles, Practice and Design of Highway Engineering,
2. E.J.Yodar and M.W.Witczac, Principles of Pavement Design, 2nd Edition, John Wiley and Sons, New York.
3. C.A. O'Flaherty, Highways, Butterworth Heinemann.
4. Khanna and Justo, Highway Engineering, Nem Chand & Bros. Roorkee.

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
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CE-506-T	<i>Mass Transit System</i>	3-1-0	4	60	40	100	3 hours
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**Unit-1** Transportation System Management: Travel Demand management, Traffic Management, The problems caused by turning traffic, Advantage and dis-advantage of one way street working, Tidal flow operation, Closing side streets advantages & dis-advantages, BRT (Bus Rapid Transit)

**Unit-2** Trip Interchanges: Graded-separated intersections with or without interchange, Three leg interchange, Four leg interchange, Multi-leg interchange, Trumpet interchange, Diamond interchange, Clover leaf interchange, Rotary interchange, Interchange ramp, Loop, outer connection, Direct connection, Design speed for ramps.

**Unit-3** Transport Planning Process: Scope, Interdependence of land use and Traffic, Stages in Transport planning, Survey and analysis of existing conditions, Fore-cast analysis of future condition, Evaluation, Program adoption and implementation, Continuing study, Trip Distribution, Opportunity Model

**Unit-4** Urban Transportation Problem: Growth of Towns, Growth of Traffic, Nature of present difficulties in urban traffic conditions, Measures to meet the problems, New Transportation study, Traffic restraint measures, Promotion of public transport, Pedestrianisation, Staggering of office Hours, Promotion of Bi-cycle traffic, Role of Public transport, Fare and subsidies.

**Unit-5** Intermediate Public Transport (IPT) vehicles: Types of IPT, Characteristics of IPT modes, Traffic & Environment: Introduction, Detrimental effects of Traffic on Environment, Safety, Noise, Air pollution, Visual Intrusion, Severance. Factors affecting Fuel consumption of Motor vehicles: vehicle, Drive, Road, Fuel characteristics and environmental conditions, Measures for economy of fuel in road transport. Public-private partnership in Transport Projects: Benefits from privatization, Forms of privatization, BOT, Annuity Project, Special Purpose Vehicle (SPV), Design Build finance & Operate (DBFO)

#### **Suggested Readings;**

**2. L.R.Kadiyali, Transport Engineering and Transport Planning, Eighth Edition 2013.**

**C.S. Papacostas, P.D.Prevedouros, Transport Engineering and Planning, PHI Publication, 3rd Edition 2002**

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-508-T	<i>Transportation &amp; Environment</i>	3-1-0	4	60	40	100	3 hours

**Unit :1** Functioning of Governing Bodies e.g. Ministry of Environment & Forest, Central Pollution Control Board, State Pollution Control Board in coordination with Public & Private Sectors (Industrial Units). Planning and Decision making, Setting of industries and Concept of Zoning Atlas, Different Norms & Pollution Standards for disposal of Pollutants.

**Unit:2** Industrial Pollution & Abatement, Water/Sewage Treatment, Planning and laying of Sewers for Domestic & Industrial Effluent, Rainwater. Collection of Sewage, Systems of sewerage, separate, combined and partially separate. Construction, testing and maintenance of sewer lines. Water Distribution Network, analysis of distribution network, leakage detection, Maintenance.

**Unit:3** Environmental & Atmospheric Conditions, Different sources (i.e. Natural, Domestic, Industrial and Transport related Activities) of Air Pollution and its effects on surroundings. Dispersion of Air Pollutants in the atmosphere, Vehicular Pollution, analysis and measurement of vehicular emissions.Noise Pollution Different Sources, Standards and Preventing Practices.

**Unit:4** Natural Resources (e.g. soil, rocks, minerals surface water and ground water etc.) and its effect on Environment, Utilization and disposal of waste materials (e.g. Fly ash, wastewater etc) for conservation of natural resources.

**Unit:5** Environmental Management, Solid Waste Management, Study of Environmental Hazard, Multidisciplinary environmental strategies, Environmental Audit (EA), Risk Assessment (RA), Mass Balance related to Production and Generation of waste.Environmental Impact Assessment (Industrial as well as different mode of Transportation e.g. Highways, Railways and Airports etc), Conceptual information and methodologies for assessment of Environmental Hazard, Collection of baseline data, initial environmental examination (IEE), Environmental Impact Assessment (EIA) Planning and Execution of Projects, Resettlement Plans (Short Term & Permanent Resettlement) during and after site selection for Roads, Railways and Airports. Activities related to Planning and Implications.

### **Suggested Readings;**

2. R.K. Sapru., “Environment Management in India”, APH Publishing Corporations, 1990.
3. Garg, S.K., “Sewage and Sewage Treatment”, Khanna **Publishers**, New Delhi, 1994.
4. B.C. Punmia., Ashok, Jain & Arun, Jain., “Water Supply Engineering”, Laxmi Publication, New Delhi , 1995
5. Environmental Protection Act 1986 (Air, Water, Wastewater, Noise, Soil and Industrial Effluent)
6. Bindu, N. Lohani., “Environmental Quality Management”, Publisher South Asian, 1984.
7. R.B. Singh., “Studies in Environment and Development” Commonwealth Publishers, 1988.
8. Larry W. Canter, Environmental Impact Assessment by Larry W. Canter.
9. Saxena, K.D., ”Environmental Planning Policies and Programmes in India,” Shipra Publication,1993.
10. Sharma, P. D., “Ecology and Environment”, Rastogi Publication, 2009.
11. Manual on Sewerage and Sewage Treatment: Ministry of Urban Dev., New Delhi.
12. Manual on Water Supply and Treatment: Ministry of Urban Dev., New Delhi.
13. E.W. Steel., “Water Supply and Sewerage”, McGraw Hill, New Delhi.

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CE-522-T	<i>Traffic &amp; Transportation Engineering Laboratory /</i>	3-1-0	4	30	20	50	3 hours

- Traffic volume studies
- Spot speed studies
- Accident and Parking studies
- Design of Traffic rotaries and Intersections
- Traffic simulation modelling
- Road safety audit
- Use of software for geometric design and alignment of highway

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-601-T	<i>Airport, Docks &amp; Harbour</i>	3-1-0	4	60	40	100	3 hours

## Semester III

**Unit 1:** Classification of Airports Development of Air Transportation in India, Airport site election. Modern aircraft's.

**Unit 2:** Airport obstructions: Zoning Laws, Imaginary surfaces, Approach and Turning zone, clear zone, vert. Clearance for Highway & Railway.

**Unit: 3** Runway and taxiway design: Windrose, cross wind component, Runway Orientation and configuration. Basic runway length and corrections, runway geometric design standards. Taxiway Layout and geometric design standards. Taxiway and other areas.

**Unit: 4** Air traffic control: Need, Network, control aids, Instrumental landing systems Ports and

**Unit: 5** Harbours: Importance of ports and harbours. Impact on Indian trade and economy, Plan of harbour, various components, jetty, dolphins, bollards, their design and functions.

Suggested Readings:

1. Airport Planning & Design, Goyal & Praveen Kumar, Galgotia Publication
2. Harbour, Dock And Tunnel Engineering, R. Srinivasan, Charoter publishing house.

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-603-T	<i>Advanced Railway Engineering</i>	3-1-0	4	60	40	100	3 hours

**Unit 1.** Railway Transportation and its development, Long-term operative plans for Indian Railways. Classification of Railway lines and their track standards, Railway terminology, Traction and tractive

**Unit 2.** Resistance, Hauling capacity and tractive effort of locomotives, different Types of Tractions.

**Unit 3.** Permanent Way: Alignment Surveys, Requirement, gauges, track section, Coning of wheels, Stresses in railway track, high-speed track. Geometric design of railway track, Gauge, Gradient, speed, super elevation, cant deficiency, Negative super elevation, curves, length of transition curves, grade compensations.

**Unit 4.** Railway track components: Important features, Railway curves, Super elevation, Gradients and grade compensation, Points and crossing and their design approaches. ; Construction and maintenance of railway track, Control of train movements; Signals and interlocking,

**Unit 5.** Modernisation of railways and future trends; Track standards and track rehabilitation.

### Suggested Readings:

1. J.S. Mundrey, Railway Track Engineering, Tata McGraw Hill Co. Ltd., 3rd Edition, 2000.
  2. M.M. Agarwal, Railway Track Engineering, Standard Publishers, 1st Ed. 2005.
- Supplementary Reading: 1. S. Chandra and Aqarwal, Railway Engineering, Oxford University Press, 1st Ed. Feb 2008.

2. A.D. Kerr, Fundamentals of Railway Track Engineering, Simmons Boardman Pub Co (December 30,

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CE-621-T	<i>Advanced Surveying</i>	3-1-0	4	30	20	50	3 hours

2003).

Use Total Station and Digital Theodolite in the following Practicals;

- Linear Measurement

- Angular Measurement
- Traversing
- Levelling
- Triangulation
- Map of field

## Detailed Syllabus of Departmental Electives

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-511-B	<i>Advanced Engineering Geology</i>	3-1-0	4	60	40	100	3 hours

### Unit I

Geology vs. Engineering, Role of geology in planning, design and construction of major man-made structural features. Engineering properties of rocks.

### Unit II

Site investigation and characterization. Geological consideration for evaluation of dams and reservoirs sites; dam foundation problems; reservoir problems.

### Unit III

Geological conditions for tunnelling. Soft and hard rock tunnelling. Importance of lithology, structure and water in tunnelling. Foundation treatment; Grouting, Rock Bolting and other support mechanisms.

### Unit IV

Landslides; Causes, Factors and corrective/Preventive measures.

### Unit V

Earthquakes; Causes, Factors and corrective/Preventive measures; seismic zones of India; seismic design of building.

### SUGGESTED READINGS:

1. Krynin, D.P. and Judd W.R. 1957. Principles of Engineering Geology and Geotechnique, McGraw Hill (CBS Publ).

2. Johnson, R.B. and De Graf, J.V. 1988. Principles of Engineering Geology, John Wiley.
3. Goodman, R.E., 1993. Engineering Geology: Rock in Engineering constructions. John Wiley & Sons, N.Y.
4. Waltham, T., 2009. Foundations of Engineering Geology (3rd Edn.) Taylor & Francis.
5. Bell: F.G-, 2006. Basic Environmental and Engineering Geology Whittles Publishing.
6. Bell, .F.G, 2007. Engineering Geology, Butterworth-Heineman



Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-512-T	<i>Construction Materials</i>	3-1-0	4	60	40	100	3 hours

**Unit :1.** Classification&Criteria for selection of building materials (e.g. Stones, Bricks – Concrete Blocks- Fly ash,Lime – Cement – Aggregates – Mortar) Tests on stones – Bricks — Tests on bricks – Compressive Strength – Water Absorption – Efflorescence –) Types and Grades,Compressive strength &Tensile strength – Properties of cement and Cement mortar – Hydration– Aggregates –Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading – Sand Bulking.

**Unit:2.**Concrete – Ingredients – RMC – Properties of fresh concrete – Slump – Flow and compaction Factor – Properties of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proportioning – BIS method – High Strength Concrete and – Behaviour of all types of concretes – Properties and Advantages of High Strength and HighPerformance Concrete, Applications of Fibre, Reinforced Concrete, Selfcompacting concrete, Alternate Materials to concrete.

**Unit:3.** Timber– Industrial timber– Plywood –Thermacole, paints for various uses,– Bitumens–Types and properties of Water Proofing Compounds – Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application.

**Unit.4** Types of Steels and Advantages of new alloy steels – Properties and advantages of aluminiumand its products – Types and applications of Coatings & Coatings to reinforcement

**Unit:5.** Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractory – Composite materials – Types &Applications of laminar composites – Fibre textiles – Geomembranes andGeo-textiles for earth reinforcement.Advantages of Reinforced polymers –Types of FRP its Applications.

#### **Suggested Readings:**

- Varghese.P.C, “Building Materials”, PHI Learning Pvt. Ltd, New Delhi, 2012.
- Rajput. R.K., “Engineering Materials”, S. Chand and Company Ltd., 2008.
- Shetty.M.S., “Concrete Technology (Theory and Practice)”, S. Chand and Company Ltd.,2008.
- Gambhir.M.L., “Concrete Technology”, 3rd Edition, Tata McGraw Hill Education, 2004
- Duggal.S.K., “Building Materials”, 4th Edition, New Age International , 2008.
- Jagadish K.S, “Alternative Building Materials Technology”, New Age International, 2007.
- IS456 – 2000: Indian Standard specification for plain and reinforced concrete, 2011
- IS4926–2003 : Indian Standard specification for ready–mixed concrete, 2012

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CE-611-T	<i>Departmental Elective III (Bridge Engineering)</i>	3-1-0	4	60	40	100	3 hours

### UNIT - I

**Types of Bridges:** Consideration of loads and stresses in bridges, bridge loading as per IRC and IRS specifications, traffic lanes, footway, kerbs, railing and parapet loading, impact, wind load, longitudinal forces, temp effects, secondary stresses, erection stresses, earth pressure, effect of live load on back fill and on the abutment.

### UNIT – II

**Design of RC Bridges:** Slab culvert, box culvert, pipe culvert, T-beam bridge, super structure, design examples, brief introduction to rigid frame, arch and bow string girder bridges. Design of pre-stressed concrete bridges, pre-tensioned and post tensioned concrete bridges, analysis and design of multi-lane prestressed concrete T-beam bridge super structure.

### UNIT – III

**Steel Bridges:** Types, economical span, loads, permissible stresses, fluctuation of stresses, secondary stresses, plate girder bridges, general arrangement, bridge floors, plate girder railway bridges, deck type plate girder bridges, design example. Truss bridges, types, wind force on lattice Girder Bridge, bracings, truss bridge for railway – through type truss bridge. Pier, abutment and wing walls, types of piers, forces on piers, stability, abutments, bridge code provisions for abutments, wing walls, design examples.

### UNIT – IV

**Bearings:** Functions, bearings for steel and concrete bridges, bearings for continuous span bridges, IRC provisions for bearings, fixed bearings, expansion bearings, materials and specifications, permissible stresses, design considerations for rocker and roller cum rocker bearings, sliding bearings.

### UNIT- V

Foundations, types, general design criterion, design of well and pile foundations for piers and Abutments.

### Suggested Readings:

- (i) Victor DJ, Essentials of Bridge Engineering, Oxford & IBH Pubb Co.
- (ii) Rowe RE, Concrete ridge Design.

## SCHOOL OF COMPUTER SCIENCE

### SCHEME FOR B. TECH.

B. TECH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101B	Applied Mathematics –II	3	1	0	4
2	PH-103 B	Applied Physics	3	1	0	4
3	CS-105 B	Computer Programming	3	0	0	3
4	EN-107B	Communication Skills-II	3	0	0	3
5	CE-109B	Environmental Science and Ecology	2	0	0	2
6	CH-113 B	Applied Chemistry	3	1	0	4
7	PH-151 B	Applied Physics Lab	0	0	2	1
8	EN-153 B	Communication Skills Lab-I	0	0	2	1
9	CS-155 B	Computer Programming Lab	0	0	2	1
10	CH-161 B	Applied Chemistry Lab	0	0	2	1
11	ME-163 B	Computer Based Engineering Graphics	0	0	4	2
Total			17	3	12	26

B. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102B	Advanced Mathematics & Numerical Methods	3	1	0	4
2	EN-104B	Communication Skills II	3	0	0	3
3	BA-106B	Engineering Economics and Industrial Management	3	0	0	3
4	EC-108B	Digital Electronics	3	1	0	4
5	CS-110B	Data Structures and Algorithm	3	0	0	3
6	CS-114B	Data Base Management System	3	0	0	3
7	MA- 150B	Applied Numerical Methods Lab	0	0	2	1
8	HD-101	Co-curricular Activities/ Hobby Club	0	0	2	2
9	EC-154B	Digital Electronics LAB	0	0	2	1
10	CS-156B	Data Structures and Algorithm LAB	0	0	2	1
11	CS-160B	Data Base Management System LAB	0	0	4	1
Total			18	2	12	26

## SCHEME FOR B. TECH.

B. TECH.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-201A	Data Structures and Algorithms	4	0	0	4
2	CS-202A	Programming Languages	3	0	0	3
3	CS-203A	Discrete Structure	3	0	0	3
4	CS-206A	Database Management Systems	3	0	0	3
5	EC-207A	Digital Electronics	4	0	0	4
6	MA-202 A	Applied Numerical Methods	3	0	0	3
7	CS-251A	Data Structures and Algorithms Lab	0	0	2	1
8	CS-256A	Database Management Systems Lab	0	0	2	1
9	MA-252 A	Applied Numerical Methods Lab	0	0	4	2
10	HOT-201A	Minor Project / Hands on training **	0	0	4	2
11		Co-curricular Activities	0	1	0	1*
Total			20	1	12	26+1*

B. TECH.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-204A	Computer Organization and Architecture	3	0	0	3
2	CS-205A	Analysis and Design of Algorithms	4	0	0	4
3	CS-207A	Operating System	3	0	0	3
4	IT-201A	Object Oriented Programming using C++	4	0	0	4
5	IT-202 A	Computer Networks	4	0	0	4
6	BA-273A	Engineering Economics and Industrial Management	3	0	0	3
7	CS-257A	Operating System Lab	0	0	2	1
8	IT-251A	Object Oriented Programming using C++ Lab	0	0	2	1
9	IT-252A	Computer Networks Lab	0	0	2	1
10	CS- 281 A	Minor Project	0	0	4	2
11	PD 293 A	INTERPERSONAL SKILLS	2	0	0	2
12		Co-curricular Activities	0	1	0	1*
Total			23	1	10	28+1*

### SCHEME FOR B. TECH.

B. TECH.			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-249	POM	3	0	0	3
2	CS-303	Computer Graphics	4	0	0	4
3	IT-202	Computer Networks	4	0	0	4
4	IT-304	Software Engineering	3	0	0	3
5	EC-208	Digital and Analog Communications	3	0	0	3
6	IT-308	Core Java	4	0	0	4
7	CS-353	Computer Graphics Lab	0	0	2	1
8	IT-358	Core Java Lab	0	0	2	1
9	IT-252	Computer Network Lab	0	0	4	2
10	CS-386	Minor Project	0	0	4	2
11		Co-curricular Activities	0	1	0	1*
Total			21	1	12	27+1*

B. TECH.			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-302	Microprocessor and Interfacing	4	0	0	4
2	IT-422	Computer Software Testing	3	0	0	3
3	IT-402	Advance Java	4	0	0	4
4	IT-309	Programming Using C#	4	0	0	4
5	IT-305	Data Mining & Data Warehousing	4	0	0	4
6	IT-341	Dept Elective -1(Network Security Management)	3	0	0	3
7	IT-359	Programming Using C# Lab	0	0	2	1
8	IT-452	Advance Java Lab	0	0	2	1
9	IT-355	Data Mining & Data Warehousing Lab	0	0	2	1
	EC-352	Microprocessor and Interfacing Lab	0	0	2	1
	PD 392	PROBLEM SOLVING SKILLS	2	0	0	2
10	CS-387	Minor Project	0	0	4	2
11		Co-curricular Activities	0	1	0	1*
Total			24	1	12	30+1*

## SCHEME FOR B. TECH.

B. TECH.			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-402	Artificial Intelligence	3	0	0	3
2	CS-403	Soft Computing Techniques	4	0	0	4
3	IT-422	Computer Software Testing	3	0	0	3
4	CS-432	Natural Language Processing	3	0	0	3
5	CS-447	Cloud Computing	3	0	0	3
6		Open Elective	3	0	0	3
7	CS-452	Artificial Intelligence Lab	0	0	2	1
8	CS-453	Soft Computing Techniques Lab	0	0	2	1
9	CS-486	Project	0	0	6	3
10	CS-487	Seminar based on Project *	0	0	2	1
11	PD-492	PROFESSIONAL Skills	0	0	2	1
12	PD-491	Co-curricular Activities	0	1	0	1*
		<b>Total</b>	<b>19</b>	<b>1</b>	<b>14</b>	<b>26+1*</b>

B. TECH.			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-483/484	Internship / Seminar based on Internship	0	0	34	17
2	IT-306	Software Project Management(Department Elective)	3	0	0	3
		<b>Total</b>	<b>3</b>	<b>0</b>	<b>34</b>	<b>20</b>

<b>MA-101B</b>	<b>APPLIED MATHEMATICS-I</b>	<b>L-T-P</b>	<b>Credits</b>
		<b>4-0-0</b>	<b>4</b>

**Unit-1: MATRICES AND ITS APPLICATIONS:** Elementary transformations; inverse of the matrix using elementary transformation; normal form of a matrix; rank of a matrix; solution of simultaneous linear equations; linear dependence and independence of vectors; linear and orthogonal transformations; eigen values, eigen vectors and properties; Cayley-Hamilton theorem and its applications; diagonalization of matrices.

**Unit-2:INFINITE SERIES:** Convergence and divergence; comparison test;D'Alembert's ratio test;Cauchy's root test;Raabe's test; logarithmic test;Gausstest;Cauchy's integral test;Leibnitz's alternate series test; absolutely convergent; conditionally convergent.

**Unit-3:CALCULUS OF SINGLE VARIABLE:** Successive Differentiation and Leibnitz theorem Taylor's series and Maclaurin's series; asymptotes; curvature.

**Unit-4: CALCULUS OF SEVERAL VARIABLES:**Functions of two or more variables; partial derivatives; total differential and differentiability; derivative of composite and implicit functions;Jacobians. Homogeneous functions and Euler's theorem;Taylor's series for functions of two variables; maxima-minima of function of two and three variables, Lagrange's method of undetermined multipliers; differentiation under integral sign.

**Unit-5: MULTIPLE INTEGRATIONS:** Double integral; change of order of integration; double integral in polar co-ordinates. Triple integration; change of variable. Application of double integral to find area enclosed by plane curves and volume of solids of revolution; volume of solid; beta & gamma functions and relationship between them.

#### **TEXT BOOK:**

Grewal, B.S., "Higher Engineering Mathematics", 41<sup>st</sup> Edition,2010,Khanna Publishers.

#### **REFERENCE BOOKS**

- 1.Kreyszig, E., "Advance Engineering Mathematics", 10<sup>th</sup> Edition, 2011,Wiley India Publishers, New Delhi
2. Weir, M. D., Hass, J. and Giordano, F. R., "Thomas Calculus", 11<sup>th</sup> Edition, 2012, Pearson Education.
3. Jain, R.K. and Iyengar, S.R.K., " Advance Engineering Mathematics" ,3<sup>rd</sup> Edition,2002, Narosa Publishing House New Delhi.
4. Dass, H.K., " Higher Engineering Mathematics",10<sup>th</sup> Edition, 2008, S. Chand & Company Ltd.
- 5 " Higher Engineering Mathematics" by H.C Taneja

<b>PH-103 B</b>	<b>APPLIED PHYSICS</b>	<b>L-T-P</b>	<b>Credits</b>
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### Unit-1: Wave Optics-I

**Interference:** Interference of light and its necessary conditions, path & Phase difference for reflected & transmitted rays, Interference in thin films (parallel and wedge shaped film), Newton's rings.

**Diffraction:** Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

### Unit-2: Wave Optics-II

**Polarization:** Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate (Quarter & Half).

**Laser:** Spontaneous and stimulated emission of radiation, population inversion, construction and working of Ruby, He-Ne lasers and laser applications.

**Fiber Optics:** Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Single and Multi Mode Fibers

### Unit-3: Dielectric

**Dielectric Properties:** Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability). Displacement vector (D), Magnetic susceptibility, Relation between D, E And P, ClaussiusMussoti Equation, Important applications of dielectric material.

### Unit-4: Magnetic & Superconducting properties of matter

**Magnetic Properties:** Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Applications of Magnetism.

**Superconductors:** Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type I and Type II superconductors. Applications of Superconductors.

### Unit-5: Relativistic Mechanics

Inertial & non-inertial frames, Michelson- Morley experiment, Einstein's postulates, Lorentz transformation equations, Length contraction & Time dilation, Addition of velocities; Variation of mass with velocity, Mass energy equivalence.



## TEXT BOOK

1. BrijLal and Subramanyam, “A Text Book of Optics” S. Chand & Co.
2. Modern Physics for Engineers – S.P.Taneja (R. Chand)
3. Engineering Physics – SatyaPrakash (PragatiPrakashan).

## REFERENCE BOOKS

1. Sears, F.W., “Electricity and Magnetism”, Narosa
2. Arthur Beiser, “Perspectives of Modern Physics”, Tata McGraw Hill
3. AjoyGhatak ‘Optics’ Tata McGraw-Hill Education, 2005.
4. David Halliday, Robert Resnick and Jearl Walker, “Fundamentals of physics”, 4th edition.
5. David J. Griffiths, ‘Introduction to electrodynamics’ 3<sup>rd</sup> edition, Prentice Hall.

CS-105B	COMPUTER PROGRAMMING	L-T-P	Cr
		3-0-0	3

**Unit-1: INTRODUCTION TO COMPUTER SYSTEM:** Computer Fundamentals: Definition, Block Diagram along with Computer components, Characteristics & classification of computers, hardware & software, types of software, Introduction to Compiler, Assembler, and Interpreter, Operating System, Definition, functions, data representation – bits and bytes and operations of data, radix number system – decimal, binary, octal, hexadecimal numbers and their inter conversions, representation of information inside the computers.

**Unit-2: BASICS OF PROGRAMMING AND OVERVIEW OF C PROGRAMMING:** Programming Fundamental, Problem definition, Algorithm, Flow charts and their symbols Types of programming languages, Translators, Introduction to C, Structure of C program, C character set, Identifier and Keywords, Data types, constants, variables, Declaration, expressions, statements, Symbolic constants, type conversion, Types of operators, Input and output functions in C, header files, common programming errors, Control Statements, Sequencing, Selection, Condition and iteration.

**Unit-3: COMPOSITE DATA TYPES:** Declaring, Referencing and initializing arrays, array subscript, using for loop for sequential access, multi-dimensional array, String basics string library functions, assignment and substring, concatenation, string comparison. Declaration and Initialization of structure, structure within structure, Array of structure

**Unit-4: FUNCTIONS AND POINTERS:** Definition of function, function prototype, Purpose of main function, passing parameters, Scope of function, recursion, Call by value and reference, Types of storage classes, Scope of variable: Global and local, static variables, Recursion.. Pointer variables, initializing pointers, pointer operators, pointer expressions, pointers and arrays, pointer and functions,

**Unit-5: DYNAMIC MEMORY ALLOCATION AND FILE PROCESSING:** C's dynamic allocation functions.Streams and file types, opening and closing a data file, input and output operations, text mode versus binary mode, formatted input output operations with files, random access to files.

### Reference Books :-

1. Programming in C by Schaum Series, McGraw Hills Publishers, New Delhi.
2. Let Us C by YashwantKanetkar; BPB Publication, New Delhi.
3. Exploring C by YashwantKanetkar; BPB Publications, New Delhi.

4. Application Programming in C by RS Salaria, Khanna Book Publishing Co. (P) Ltd., New Delhi.
5. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.
6. Programming with C Language by C Balaguruswami, Tata McGraw Hill, New Delhi.
7. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi

ENA-107B	COMMUNICATION SKILLS-1	L T P	Cr
		3-0-0	3

**UNIT 1: Communication and its elements:** An introduction to the need of communication competency; Role of vocabulary in effective communication; Word formation; A set of selected 50 synonyms, antonyms, homonyms & homophones; suffixes & prefixes

**UNIT 2: Listening and Reading Skills:** Listening comprehension & reading comprehension; Listening to recorded speeches, TV News and other audio materials to test listening comprehension with given exercises.

**UNIT 3: Writing Skills:** Ad Creation; Slogan making; Picture composition; Expanding hints, proverbs; Movie review.

**UNIT 4: Letter writing:** Types of letter writing; Structure & Lay out; Leave application; Letter of enquiry & response with respect to educational & official matters; Informal letter expressing or discussing social or educational issues.

**UNIT5: Spoken Skills:** Introduction to oral communication; Importance of Pronunciation; Importance of phonetics; Usage of Phonetics; Types of Conversation; Strategies for effective conversation for social and official interaction; Developing conversation on topics of current importance. Soft Skills Non-verbal Importance of Body Language and its usage to communicate better.

CE-109B	ENVIRONMETAL SCIENCE AND ECOLOGY	L T P	Cr
		2 -0 -0	2

**Unit-1:THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

**Unit-2:NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy,

nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**Unit-3:ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

**Unit-4:BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

**Unit-5:ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management –floods, earthquake, cyclone and landslides.

#### **TEXT BOOK**

Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition, New Age International Publishers, 2004

#### **REFERENCE BOOKS**

1. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
2. BharuchaErach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
3. Brunner R. C., “Hazardous Waste Incineration”, 1st Edition McGraw Hill Inc., 1989.
4. Clark R.S., “Marine Pollution”, 1st Edition Clanderson Press Oxford,1989

<b>EL-111B</b>	<b>BASICS OF ELECTRICAL &amp; ELECTRONICS ENGG.</b>	<b>L T P</b>	<b>Cr</b>
		<b>2-0-0</b>	<b>2</b>

**Unit-1:DC NETWORK THEOREMS:** Ohm’s law; Voltage and current sources; Series parallel Circuits; Network Terminology; Kirchoff’s laws; Network Simplification by using Loop method and Nodal method; Superposition Theorem; Thevenin’s theorem; Norton’s theorem, Maximum Power Transfer theorem; Star to Delta and Delta to Star transformation.

**Unit-2:SINGLE PHASE &THREE PHASE AC CIRCUITS:** AC Terminology; Derivation of RMS and maximum value of alternating current and voltage; Form factor and peak factor; Behavior of pure R, L & C components in ac circuits; single phase series R-L, R-C, R-L-C circuit; Introduction to resonance; Merits & Demerits of three phase system over single phase system;Three phases interconnection using star and Delta arrangement;Measurement of power using 2-wattmeter method.

**Unit-3:BASICS OF ELECTRICAL MACHINES:** Construction and operation of dc machines (both dc generator and motor); emf equation of dc generator; starting and speed control of dc motor; Necessity of starters in dc motors; Transformers- basic principle, its emf

equation, operation of ideal & non-ideal transformer with Phasor diagrams, power losses, efficiency; introduction to auto-transformer.

**Unit-4: DIODES & TRANSISTORS:** Depletion layer; Barrier potential; Forward and reverse biasing of pn junction diode; switching Characteristics of p-n junction diode; zener diode; basic theory of operation of PNP and NPN transistor-VI characteristics; CB; CE and CC configuration; different biasing techniques.

**Unit-5: FIELD EFFECT TRANSISTOR AND THYRISTOR FAMILY:** Introduction of FET ; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction; theory of operation; MOSFET parameters; application, different biasing techniques of FET. Introductory idea of multistage and feedback amplifiers; Introduction to Thyristor Family (SCR).

### TEXT BOOK

1. Gupta, J.B. "Electrical Technology", 2nd Edition, Katson Publication, 2007
2. Boylestad and Nashelsky, "Electronic Devices and Circuits", 4th Edition, Pearson Education, 1999.

### REFERENCE BOOKS

1. Leonard S. Bobrow, "Fundamentals of Electrical Engineering", 2nd Edition, Oxford University Press, 2005
2. Kothari and Nagrath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill
3. Malvino, "Electronic Principles", 5th Edition, Tata McGraw Hill, 2004.
4. Millman and Halkias, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2000.

<b>CH-113 B</b>	<b>APPLIED CHEMISTRY</b>	<b>L T P</b> <b>3-1-0</b>	<b>Cr</b> <b>4</b>
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**Unit-1: Phase Rule:** Terminology, Definition of phase rule, Derivation of phase rule equation, One component system ( $H_2O$  system and  $CO_2$  system ), two components system, Simple eutectic system ( Pb – Ag), Pattinson's Process, congruent system ( Zn – Mg ), incongruent system (Na-K system), Merits and demerits of phase rule.

**Unit-2: Thermodynamics:** Second law of thermodynamics, entropy change for reversible & irreversible processes, entropy change for ideal gas, variation of free energy with temperature & pressure, Gibbs-Helmholtz equation, Clapeyron- Clausius equation & its integrated form

**Unit-3: Corrosion and its prevention:** Definition, Types of corrosion: Dry, wet corrosion (rusting of iron), galvanic corrosion, differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, sacrificial protection and barrier protection), Soil Corrosion.

**Unit-4: Lubrication and Lubricants:** Introduction, mechanism of lubrication, Classification of lubricants, (Solid, semi-solid, liquid , emulsion & synthetic lubricants), Properties of lubricants (Flash & Fire point, Saponification number, Iodine value , Viscosity and Viscosity index Aniline point, Cloud point and pour point, corrosive tendency, decomposition stability).

**Unit-5: Qualitative aspects of water:** Sources of water, hardness of water and its Determination, (EDTA method), alkalinity of water and its determination, Related numerical problems, scale and sludge formation, Boiler corrosion & caustic embrittlement.

Desalination: RO method & electrodialysis. Softening of water: Zeolite method. Ion exchange method: Demineralized and mixed bed demineralized method.

<b>PH-151B</b>	<b>APPLIED PHYSICS LAB</b>	<b>L-T-P</b>	<b>Credits</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF EXPERIMENTS**

1. To find the wavelength of sodium light by Newton's rings experiment.
2. To find the wavelength of various colors of white light with the help of a plane transmission diffraction grating.
3. To find the refractive index of a prism by using spectrometer.
4. To determine the Cauchy's constant (A & B) of a prism by using spectrometer.
5. To find the resolving power of a telescope.
6. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
7. To find the specific rotation of sugar solution by using a Polarimeter.
8. To find the frequency of A.C. mains by using electric vibrator.
9. To find the wavelength of sodium light by Fresnel's bi-prism experiment.
10. To verify inverse square law.
11. To determine the capacity of a capacitor (unknown) by using flashing & quenching method.

### **TEXT BOOK**

1. Worshnop, B. L. and Flint, H. T. "Advanced Practical Physics", KPH

### **REFERENCE BOOKS**

1. Gupta, S. L. & Kumar, V. "Practical Physics", Pragati Prakashan
2. Chauhan & Singh, "Advanced Practical Physics Vol. I & II", Pragati Prakashan.
3. Advanced Practical Physics; Worsnop and Flint, Methuen & Co., London,

<b>EN-153 B</b>	<b>COMMUNICATION SKILLS LAB-1</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF EXPERIMENTS**

1. English Edge Self Learning Basics – Each module should be cleared systematically and start the intermediate as time permits as time permits. Students are free to go at their pace with the module even away from the campus.
2. Conversation ability to converse in given situations
3. Listening comprehension (Speeches, Dialogues, Narrations)
4. Discussion on the various topics- Group Discussion
5. Oral presentation of views / ideas based on the given picture/ hint
6. Role Play to develop a co-ordination between action and dialogue.
7. JAM
8. Extempore Speeches
9. Turncoat Speeches
10. Building a Story from a given beginning/ starting line.

<b>CS-155B</b>	<b>COMPUTER PROGRAMMING LAB</b>	<b>L-T-P 0-0-2</b>	<b>CR 1</b>
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### **LIST OF EXPERIMENTS**

#### **SEQUENTIAL CONTROL STATEMENTS**

- 1 Write a program to Print HELLO
- 2 Write a program to add two numbers
- 3 Write a program to calculate simple interest
- 4 Write a program to calculate average of three numbers
- 5 Write a program to swap two numbers
- 6 Write a program to illustrate mixed data types
- 7 Write a program to calculate area and circumference of circle
- 8 Write a program to evaluate a polynomial expression
- 9 Write a program to add digits of a four digit number
- 10 Write a program to check whether the person is eligible for voting or not

#### **CONDITIONAL CONTROL STATEMENTS**

- 11 Write a program to find greatest of two numbers
- 12 Write a program to find out which type of triangle it is
- 13 Write a program to find out greatest of three numbers
- 14 Write a program to evaluate performance of the student
- 15 Write a program to make a basic calculator

#### **LOOP CONTROL STATEMENTS**

- 16 Write a program to print fibonacci to the given limit
- 17 Write a program to find the sum of digits of a number
- 18 Write a program to find factorial of a number
- 19 Write a program to print table of any number

#### **ARRAYS AND STRINGS**

- 20 Write a program to enter the elements in a one dimensional array
- 21 Write a program to find the sum and average of five numbers
- 22 Write a program to sort the array elements
- 23 Write a program to enter the marks of 50 students and calculate the average
- 24 Write a program to add 2 matrix
- 25 Write a program to multiply 2 matrices
- 26 Write a program to calculate the length of string
- 27 Write a program to concatenate 2 strings
- 28 Write a program to reverse the string
- 29 Write a program to count the numbers of characters in a string
- 30 Write a program that converts lower case characters to upper case
- 31 Write a program without using predefined functions to check whether the string is palindrome or not

#### **FUNCTIONS**

- 32 Write a program using function to find the largest of three numbers
- 33 Write a program using function to swap two numbers using call by value
- 34 Write a program using function to swap two numbers using call by reference

- 35 Write a program using function to sum the digits of a number
- 36 Write a program to calculate factorial of a number using recursive function
- 37 Write a program to print first n fibonacci using recursive function

#### **POINTERS**

- 38 Write a program to illustrate the concept of chain of pointers
- 39 Write a program to calculate the area and perimeter of circle using pointers
- 40 Write a program to find largest of three numbers

#### **STRUCTURES**

- 41 Write a program to read an employee record using structure and print it
- 42 Write a program to prepare salary chart of employee using array of structures

#### **FILE HANDLING**

- 43 Write a program to Create a file and store text and display the contents

<b>EL-157B</b>	<b>BASICS OF ELECTRICAL &amp; ELECTRONICS ENGG. LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

#### **LIST OF PRACTICALS**

1. To verify KCL and KVL in a given DC circuit.
2. To verify Thevenin's and Norton's Theorems.
3. To verify maximum power transfer theorem in D.C Circuit.
4. To verify Reciprocity and Superposition theorems on Dc circuit.
5. To study frequency response of a series & parallel R-L-C circuit and determine its resonant frequency.
6. To perform direct load test of a transformer and plot its efficiency Vs load characteristic.
7. To study V-I characteristics of diode; and its use as a capacitance.
8. Study of the characteristics of transistor in Common Base configuration.
9. Study of the characteristics of transistor in Common Emitter configuration.
10. Study of V-I characteristics of a photo-voltaic cell.

#### **REFERENCE BOOKS**

1. Theraja, B.L. "Electrical Technology Vol I & II", S. Chand Publications, 2005
2. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill, 2002
3. Del Torro Vincent, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall of India, 1994.
4. Cathey, J.J. and Naser, S.A. "Basic Electrical Engg.", 2nd Edition, Schaum

<b>ME-159 B</b>	<b>WORKSHOP PRACTICE – I</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>2</b>

#### **1.MACHINE SHOP**

Step turning & Taper turning Operation

Exercise 1. To obtain required diameters (steps) on a cylindrical work piece with the given lengths.

Shoulder Turning

Exercise 2. To obtain required diameters on a cylindrical work piece with the given dimensions.

## 2. CARPENTRY SHOP. Dove Tail Lap Joint

Exercise 3.To make a dovetail lap joint Cross Half Lap Joint

Exercise 4.To make a Cross Half Lap Joint

## 3. SHEET METAL SHOP

Exercise 5. To make a funnel using G.I Sheet as per dimensions provided.

Exercise 6.To make a Square box using G.I Sheet as per the dimension.

## 4. WELDING SHOP

Exercise 7. To make a single v-butt joint, using the given mild steel pieces of and by arc welding.

Exercise 8 To make a T- joint using the given mild steel pieces and by arc welding.

## 5. FOUNDRY SHOP

### MOULD FOR A SOLID

Exercise 9 To prepare a sand mould, using the given Single piece pattern.

Exercise 10.To prepare a sand mould, using the given Split piece pattern.

<b>CH-161 B</b>	<b>APPLIED CHEMISTRY LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### LIST OF PRACTICALS

- (i) Determination of  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  hardness of water using EDTA solution
- (ii) Determination of alkalinity of water sample using phenolphthalein & methyl orange.
- (iii) To find out the melting point & eutectic point for a two component system by using method of cooling curve.
- (iv) Determination of viscosity of lubricating oil by Redwood Viscosity ( No. 1).
- (v) To Prepare Phenol – formaldehyde and Urea formaldehyde resin.
- (vi) To find out saponification value of given oil.
- (vii) To determine TDS of Water samples of different sources.
- (viii) To determine of concentration of given  $\text{KMnO}_4$  solution using spectrophotometer.
- (ix) To determine the strength of HCl solution by titrating against NaOH Solution conductometrically .
- (x) To determine the  $\text{Na}^+$  and  $\text{K}^+$  ions with the help of flame photometry

<b>ME-163 B</b>	<b>COMPUTER BASED ENGINEERING GRAPHICS</b>	<b>L-T-P</b>	<b>Credits</b>
		<b>0-0-4</b>	<b>2</b>

**Unit-1:Geometrical construction of simple plane figure:** Bisecting the line, draw perpendicular, parallel line, bisect angle, trisect angle, construct equatorial triangle, square, polygon, inscribed circle ,Free hand sketching, prerequisites for freehand sketching, sketching of regular and irregular figures, Drawing scales, Engineering scale, graphical scale, plane



scale, diagonal scale, comparative scale, scale of chord .

**Unit-2:Projection of points, lines and plane, Orthographic Projection** ,Principle of projection, method of projection, orthographic projection, plane of projection, first angle of projection, third angle of projection, reference line A point is situated in the first quadrant, point is situated in the second quadrant, point is situated in the third quadrant, point is situated in the fourth quadrant, projection of line parallel to both the plane, line contained by one or both the plane, line perpendicular to one of the plane, line inclined to one plane and parallel to other, line inclined to both the plane, true length of line, Missing views.

**Unit-3:Orthographic projection of simple solid:** Introduction, types of solid, projection of solid when axis perpendicular to HP, axis perpendicular to VP, axis parallel to both HP and VP, axis inclined to both HP and VP, Missing views.

**Unit-4:Development of Solids and Isometric projection:** Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes, Principles of isometric projection – isometric scale – Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems

**Unit-5:Introduction to computer-aided drafting (CAD):** Cartesian and Polar Co-ordinate system, Absolute and Relative Coordinates systems: Basic Commands: Line, Point, Rectangle, Polygon, Circle, Arc, Elipse, Polyline : Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror : Display Commands : Zoom, Pan, Redraw, and Regenerate : Simple dimensioning and text, simple exercises.

**Text and Reference books:**

B. Agrawal and CM Agrawal, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited, 2008.

D. A. Jolhe, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited, 2006.

K Venugopal, Engineering Drawing and Graphics, 2nd ed, New Age International, 1994.

**Lingaya's Vidyapeeth, Faridabad**

Scheme of Studies  
B Tech Degree Programme (Regular)  
(Common to all Disciplines)  
1<sup>st</sup> Year (**EVEN SEMESTER**)

Sr. No.	Course No.	Course Name	L-T-P	Cr.	Remarks
1	MA-102B	Advanced Mathematics and Numerical methods	3-1-0	4	Common for all branches
2	EN-104 B	Communication Skills-II	3-0-0	3	Common for all branches
3	BA-106 B	Engineering Economics and Industrial Management	3-0-0	3	Common for all branches
4	EC-108 B	Digital Electronics	3-1-0	4	Common for CSE/ECE/EEE
5	ME-108 B	Engineering Mechanics	3-1-0	4	Common ME/CE/AE
5	CS-110 B	Data Structures and Algorithm	3-0-0	3	Common for CSE/ECE/EEE
6	CE-110 B	Surveying	3-0-0	3	CE
7	EL-111 B	Basics of Electrical and Electronics Engg.	3-1-0	4	Common ME/CE/AE
8	EC-112 B	Electrical Engineering Materials and Semi-Conductor Devices	3-0-0	3	Only for ECE/EEE
9	ME- 112 B	Machine Drawing	0-0-4	2	ME/AE
10	CS-114 B	Data Base Management systems	3-0-0	3	Only for CSE
11	MA-150 B	Applied Numerical Methods Lab	0-0-2	1	Common for all branches
12	PD-152 B	Co-curricular Activities / Hobby club	0-0-2	2	Common for all branches
13	EC-154 B	Digital Electronics Lab	0-0-2	1	Common for CSE/ECE/EEE
14	CS-156 B	Data Structures and Algorithm Lab	0-0-2	1	Common for CSE/ECE/EEE
15	EL-157 B	Basics of Electrical and Electronics Engg Lab	0-0-2	1	Common ME/CE/AE
16	EC-158 B	Electrical Engineering Materials and Semi-Conductor Devices Lab	0-0-2	1	Only for ECE/EEE
17	ME-159 B	Workshop Practice-I	0-0-4	2	ME/AE/CE
18	CS-160 B	Data Base Management systems Lab	0-0-2	1	Only For CSE
19	CE- 162 B	Surveying Lab	0-0-2	1	CE

<b>MA-102B</b>	<b>ADVANCE MATHEMATICS &amp;</b>	<b>L-T-P</b>	<b>Credits</b>
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	<b>APPLIED NUMERICAL METHODS</b>	<b>3-1-0</b>	<b>4</b>
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### **OBJECTIVE:**

To acquaint the students with the various concepts and tools of applied mathematics which will be very basic and the very soul and guide of various engineering subject.

**Unit-I: SOLUTION OF NONLINEAR EQUATIONS :** Introduction to numbers and their accuracy; absolute, relative and percentage errors and their analysis; Bisection method ; Regula- falsi method; secant method; Newton- Raphson method.

### **Unit-II: SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS**

**&INTERPOLATION :** Gauss elimination method; Gauss-Jordan method; Jacobi's iteration method; Gauss-Seidal iteration method; : Introduction to interpolation; Newton's forward and backward interpolation formulae; Stirling formula; Lagrange interpolation; Newton's divided difference formula.

**Unit-III: NUMERICAL DIFFERENTIATION AND INTEGRATION & SOLUTION OF ORDINARY DIFFERENTIAL EQUATION:** Numerical differentiation formulae: differentiation by using forward interpolation formula; backward interpolation formula; Stirling formula; Newton-Cotes formula for numerical integration: Trapezoidal rule; Simpson's rules. Taylor series method; Euler method; Euler modified method; Rungekutta method.

**Unit-IV: LAPLACE TRANSFORMS AND ITS APPLICATIONS:** Laplace transform (LT) of elementary functions; properties of LT; existence conditions of LT; LT of derivatives; LT of integrals; LT of the function multiplication by t; LT of the function division by t; inverse LT's; LT of convolution of two functions.

**Unit V: FOURIER SERIES:** Euler's formula; conditions for a Fourier expansion; change of interval; Fourier expansion of odd and even function; Fourier expansion of square wave, rectangular wave.

### **TEXT BOOK**

Grewal, B. S., "Numerical methods in Engineering and Science", 9<sup>th</sup> Edition, 2010, Khanna publishers. And Higher Engineering Mathematics: B. S. Grewal

### **REFERENCE BOOKS**

1. Jain, R.K. and Iyengar, S.R.K., "Numerical Methods for Scientific and Engg. Computations", 5<sup>th</sup> Edition, 2007, New Age International publishers.
2. Sastry, S.S., "Introductory Methods of Numerical Analysis", 3<sup>rd</sup> Edition, 1999, Prentice Hall of India.
3. Advanced Engg Mathematics: Michael D. Greenberg
4. Advanced Engineering Mathematics: E. Kreyszig

<b>ENA-104 B</b>	<b>COMMUNICATION SKILLS-II</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

**Unit 1: Vocabulary:-**One word substitution, words often confused, Phrasal verbs & idioms & foreign words & phrases (30 each) and their usage in sentences.

**Unit 2: Applied Grammar:-** Parts of speech – conversion and usage; Rules of concord: grammatical and notional Concord, Types of sentences, conditional sentences, Sentence correction with respect to Parts of speech, tenses & types of sentences, principle of subject & verb.

**Unit3:- Technical Writing:-**Resume Writing (interview skills), Report writing, Types of report including press report by individual – students.

**Unit 4:-Reading Comprehension:-**Comprehending selected prose & poem, unseen passages and preparing précis, Note making, Frankenstein - Mary Shelley

**Unit 5: Business correspondence:-**Format of Business letter writing, Strategies for effective letter writing; Letter of business enquiry, complaint, adjustment and placing order.

**Prescribed Text book**

1. Technical Communication Principles & Practice (2<sup>nd</sup> Ed.) by Meenakshi Raman & Sangeeta Sharma published by Oxford University
2. The Functional Aspects of Communication Skills by Dr. Prajapati Prasad published by S.K. Kataria & Sons
3. Business Communication by K. Sundar & A. Kumara Raj published by Vijay Nicole Imprints Pvt Ltd. Chennai

**SUGGESTED READING:**

1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press
2. Common Errors in English, Abul Hashem, Ramesh Publishing House, New Delhi.
3. Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
4. Spoken English for India, R.K. Bansal & J.B. Harrison, Orient Longman, Delhi.
5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.
6. English Phonetics & Phonology, P. Roach, Cambridge University Press, London.

BA-106 B	Engineering Economics and Industrial Management	L T P	Cr
		3-0-0	3

**UNIT 1**

Meaning and definition of Economics, Central Problem of an economy, Demand, Law of Demand, Elasticity of Demand, Meaning of production, production function, law of variable proportion, cost concept, fixed cost, variable cost, average cost, marginal cost and opportunity cost.

**Unit 2**

Meaning of market and main features of Perfect Competition, Monopoly, Oligopoly and Monopolistic Competition. National Income: GDP and GNP

**Unit 3**

Definition of management, Nature and scope of management, Functions of management: Planning, Organizing, Staffing, Directing and Controlling

#### Unit 4

Meaning of marketing management, Concept of marketing, Functions of marketing, Marketing Mix

#### Unit 5

Meaning, Nature and scope of financial management, Functions of Financial Management, Objectives of FM, Sources of finance: Short term finance, Medium term finance and Long term finance. Stock exchange: NSE, BSE and NIFTY

Reference Books for Economics:

1. P.N. Chopra, Principles of economics, Kalyani Publishers
2. H.L. Ahuja, Modern Economic theory, S. Chand
3. S. K. Mishra, Modern Micro Economics, Pragati Publications

Reference books for management

1. T.N. Chabra, Principles of Management, Dhanpat Rai Publishers
2. L.M. Prasad, Principles & Practices of management, Sultan Chand & Sons 2005
3. Harold Koontz & O' Doneell Cyril Management, McGraw Hill, 1968.

EC-108 B	DIGITAL ELECTRONICS	L T P	CR
		3 1 0	4

**OBJECTIVE** Modern world deals with digital conditioning of various signals. Digitally manipulating signals or using digital circuits have a lot of advantages in terms of accuracy etc. This subject introduces concept of basic digital electronics: gates; combinational and sequential circuits and their designing

#### 1- INTRODUCTION OF GATES, COMBINATIONAL DESIGN BY USING GATES AND SIMPLIFICATION

Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess- 3; Gray; EBCDIC; ASCII; Error detection and correction codes; Design using gates; Karnaugh map and QuineMccluskey methods of simplification.

#### 2 COMBINATIONAL DESIGN USING MSI DEVICES:

Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers for display devices.

3 **SEQUENTIAL CIRCUITS:** Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.

4. **DIGITAL LOGIC Families:** Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

#### 5. A/D AND D/A CONVERTERS & PLD:

Sample and hold circuit; weighted resistor and R -2 R ladder D/A Converters; specifications for D/A converters. A/D converters : successive approximation; counting type;ROM; PLA; PAL; FPGA and CPLDs.

**TEXT BOOK**

Jain, R.P., “Modern Digital Electronics”, 4th Ed.; Tata McGraw Hill, 2003

**REFERENCE BOOKS**

1. Taub and Schilling, ”Digital Integrated Electronics” Tata McGraw Hill, 1997
2. Malvino and Leach; ”Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006
3. Mano, Morris, “Digital Design”, 3rd Edition, Prentice Hall of India, 1994
4. Gupta and Singhal, “Digital Electronics”, 2nd Edition, Dhanpat Rai and Sons, 2000.
5. Wakerly, John F, ”Digital Design Principles and Practices”, 4th Edition, Prentice Hall of India, 2005

ME - 108 B	ENGINEERING MECHANICS	L T P	Cr
		3 1 0	4

**OBJECTIVE**

Engineering Mechanics is one of the core subjects that introduces the student to analysis of forces and motion and prepares the student for studying strength of materials and theory of machines.

- 1 **FORCE SYSTEMS:** Basic concepts of space, time, mass, force, particle and rigid body; scalars and vectors; principle of transmissibility; force classification; Representation of force in vector form; rectangular components of two dimensional force systems; resultant of two dimensional and concurrent force systems; moment about a point; Varignon’s theorem; Representation of moment in vector form; couple. Numerical.
- 2 **EQUILIBRIUM:** Equilibrium in two dimensions; Lame’s Theorem; system isolation and the free-body-diagram; modeling the action of forces; equilibrium conditions; Numerical.
- 3 **PROPERTIES OF SURFACES/CROSS SECTIONS:** Centre of mass; determining the centre of gravity; centre of gravity of areas including composite sections; moments of inertia; MI of plane figures; parallel axis & perpendicular axis theorem;; MI of composite figures. Numerical.
- 4 **RECTILINEAR AND CURVILINEAR MOTION :** Types of motion ,definitions of displacement , distance, velocity , speed , acceleration Newton’s laws of motion , Uniform and non uniform motion equations of motion , motion under gravity. Numerical.
- 5 **PROJECTILES :** Angle of projection , Trajectory , Range of projectile , Duration of flight , Path of projectile , Greatest height attained by a projectile. Numerical.

**TEXT BOOK**

Meriam, J. L. “Engineering Mechanics”, John Wiley & Sons.

**REFERENCE BOOKS**

1. Beer, F.P. and Johnston, E.R. “Mechanics of Materials”, Tata McGraw Hill
2. Shames, I.H. “Engineering Mechanics”, 4th Edition, Pearson Education, 2003
3. Pytel, A and Kiusalaas, J. Thomsom, “Mechanics of Materials”, Brooks & Cole, 2003

## WEB REFERENCES

[www.eCourses.ou.edu](http://www.eCourses.ou.edu)

CS-110B	DATA STRUCTURE AND ALGORITHMS	L T P	Cr
		4 0 0	4

**OBJECTIVE:** To relay the theoretical and practical fundamental knowledge of most commonly used algorithms.

**PRE-REQUISITES:** Knowledge of basic computer programming

1. **INTRODUCTION TO DATA STRUCTURES AND RUNNING TIME:** Definition of data structures and abstract data types; linear vs. non-linear data structure; primitive vs. non-primitive data structure; static and dynamic implementations; arrays, 1,2-dimensional arrays, insertion & deletion in 1-D array; examples and real life applications. Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion.
2. **STACKS AND QUEUES:** Stacks: definition, array based implementation of stacks,; examples: infix, postfix, prefix representation; conversions, applications; definition of queues, circular queue; array based implementation of queues.
3. **LINKED LISTS:** Lists; different type of linked Lists; implementation of singly linked list, linked list implementation of stacks and queues; implementation of circular linked list; implementation of doubly linked list, applications.
4. **TREES AND GRAPHS:** Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees: searching, insertion & deletion. Definition of undirected and directed graphs; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; graph traversal: breadth first traversal, depth first traversal; implementations and applications.
5. **SORTING AND SEARCHING ALGORITHMS:** Introduction, selection, insertions, bubble sort, efficiency of above algorithms; merge sort, merging of sorted arrays and algorithms; quick sort algorithm analysis, heap sort, searching algorithms: straight sequential search, binary search (recursive & non-recursive algorithms)

## TEXT BOOK

1. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++||, Prentice Hall of India, 2009.
2. R. S.Salariya, Data Structure and Algorithm, Khanna Publications.

## REFERENCE BOOKS

1. Aho A. V., Hopcroft J. E. and Ullman T. D., —Data Structures and Algorithms||, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
2. Horowitz Ellis and Sahni S artaj, —Fundamentals of Data Structures||, Addison-Wesley Pub, 1984.
3. Horowitz, Sahni and Rajasekaran, —Fundamentals of Computer Algorithms|| 2007.
4. Kruse Robert, —Data Structures and Program Design in C||, Prentice Hall of India, 1994

5. Lipschetz Jr. Seymour, —Theory & Problems of Data Structures, Schaum's Outline, Tata McGraw Hill
6. Weiss Mark Allen, —Data Structures and Algorithms Analysis in C, Pearson Education, 2000
7. Cormen T.H. et al., —Introduction to Algorithms, 2nd Edition, Prentice Hall of India, 2001.
8. Dasgupta Sanjay, Christos P. and Vazirani Umesh, —Algorithms, Tata McGraw Hill, 2008

CE-110 B	Surveying	L T P	Cr
		3 0 0	3

1. **FUNDAMENTALS & LINEAR MEASUREMENTS:** Compass and chain traversing: Principles of Surveying; Definition, objects, classification, fundamental; principles, methods of fixing stations. Measurement; Direct measurement, instruments for measuring distance, instruments for making stations, chaining of line. Errors in chaining, tape corrections example. Methods of traversing, instruments for measurement of angles: prismatic and surveyor's compass, bearing of lines, local attraction, examples.

2. **LEVELLING:** Definition of terms used in leveling; types of levels and staff; temporary adjustment of levels; principles of levelling; reduction of levels; booking of staff readings, examples. Contouring: characteristics of contour lines; locating contours, interpolation of contours.

3. **THEODOLITE AND PLANE TABLE SURVEYING:** Traversing; Theodolite: temporary adjustment of theodolite, measurement of angles, repetition and reiteration method. Traverse surveying with theodolite; checks in traversing, adjustment of closed traverse, examples. Plane table: methods of plane table surveying: radiation, intersection, traversing and resection. Two point and three point problems.

4. **TACHEOMETRY:** Uses of tacheometry, principle of tacheometric surveying, instruments used in tacheometry, systems of tacheometric surveying: stadia system, fixed hair method, determination of tacheometric constants, tangential systems, examples.

5. **CURVES:** Classification of Curves, elements of simple circular curve, location of tangent points; Chain & Tape methods, instrumental methods, examples of simple curves, Transition curves; Length & type of transition curves, length of combined curves, examples. Vertical curves: Necessity & types of vertical curves. **TEXT BOOK** Punmia, B.C., Jain Ashok Kumar, Jain. Arun Kumar., "SURVEY –I", Laxmi Publication Pvt Limited, New Delhi, 2005 **REFERENCE BOOKS** 1.Kanitkar T.P., "SURVEY –I", Standard Publication, New Delhi, 2008 2.Subramania.R., "Surveying and leveling, second Edition, Oxford University Press, India, 2012 3. Duggal, S.K., "Surveying Volume –I" Tata McGraw Hill, July 2004 4. Bannister., "Surveying", 7th Edition, Pearson Education, 2009 5. William, Irvine., Finlay, MacLennan., "Survey for Construction", McGraw-Hill, 5th Edition, 2006.



<b>EL-111B</b>	<b>BASICS OF ELECTRICAL &amp; ELECTRONICS ENGG.</b>	<b>L T</b> <b>P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

**Unit-1:DC NETWORK THEOREMS:** Ohm's law; Voltage and current sources; Series parallel Circuits; Network Terminology; Kirchhoff's laws; Network Simplification by using Loop method and Nodal method; Superposition Theorem; Thevenin's theorem; Norton's theorem, Maximum Power Transfer theorem; Star to Delta and Delta to Star transformation.

**Unit-2:SINGLE PHASE &THREE PHASE AC CIRCUITS:** AC Terminology; Derivation of RMS and maximum value of alternating current and voltage; Form factor and peak factor; Behavior of pure R, L & C components in ac circuits; single phase series R-L, R-C, R-L-C circuit; Introduction to resonance; Merits & Demerits of three phase system over single phase system;Three phases interconnection using star and Delta arrangement;Measurement of power using 2-wattmeter method.

**Unit-3:BASICS OF ELECTRICAL MACHINES:** Construction and operation of dc machines (both dc generator and motor); emf equation of dc generator; starting and speed control of dc motor; Necessity of starters in dc motors; Transformers- basic principle, its emf equation, operation of ideal & non-ideal transformer with Phasor diagrams, power losses, efficiency; introduction to auto-transformer.

**Unit-4:DIODES & TRANSISTORS:** Depletion layer; Barrier potential; Forward and reverse biasing of pn junction diode; switching Characteristics of p-n junction diode; zener diode; basic theory of operation of PNP and NPN transistor-VI characteristics; CB; CE and CC configuration; different biasing techniques.

**Unit-5:FIELD EFFECT TRANSISTOR AND THYRISTOR FAMILY:** Introduction of FET ; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction;theory of operation; MOSFET parameters; application, different biasing techniques of FET. Introductory idea of multistage and feedback amplifiers; Introduction to Thyristor Family (SCR).

### TEXT BOOK

1. Gupta, J.B. "Electrical Technology", 2nd Edition, Katson Publication, 2007
2. Boylestad and Nashelsky, "Electronic Devices and Circuits", 4th Edition, Pearson Education, 1999.

### REFERENCE BOOKS

1. Leonard S. Bobrow, "Fundamentals of Electrical Engineering", 2nd Edition, Oxford University Press, 2005
2. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill
3. Malvino, "Electronic Principles", 5th Edition, Tata McGraw Hill, 2004.
4. Millman and Halkias, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2000

<b>ME-112B</b>	<b>Machine Drawing</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>2</b>

Objective: This course makes the student to learn the representation of components and assemblies into various views and vice versa. This will enable the student to learn to conceive an object and go for its production.

## **1. INTRODUCTION**

Introduction to Graphic language, Sectional views, Types of sectional views, Hatching, Isometric scale, Isometric drawing of Circles; Conversion of isometric to orthographic and vice versa.

## **2. TOLERANCE AND MACHINE COMPONENTS**

Standard abbreviation – Limits , Fits and Tolerance, Surface finish; Gear terminology, types of gear; Draw the gear profile; Springs, Belts & Pulleys, Bearings.

## **3. KEYS AND COTTERS**

Various types of keys and cotters, Spigot and socket joint, Gib and cotter joint, Knuckle joint

## **4. JOINTS AND COUPLINGS**

Rivets and Riveted Joints, Caulking and fullering of riveted joints, Types of riveted joints, Bolts and nuts, Welded Joint, Flange coupling (Protected and non-protected), muff coupling and half-lap muff Coupling.

## **5. ASSEMBLY DRAWING**

Assembly of Lathe Tail stock, Machine vice; Cylinder, Piston, rings and Connecting rod; Steam stop valve, Stuffing box, Drill jigs and Milling fixture, Screw Jack.

Text Books:

1. Machine Drawing - N D Bhatt and V M Panchal, Charotar Publishing House.
2. A Text Book of Machine Drawing - P S Gill Pub.: S K Kataria & Sons.

Reference Books:

1. A Text Book of Machine Drawing Laxmi Narayana and Mathur, M/s. Jain Brothers, New Delhi.
2. Machine drawing by N Sidheshwar, Kannaiah, V S Sastry, TMH., New Delhi.

<b>EC-112-B</b>	<b>ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES</b>	<b>L T P</b>	<b>CR</b>
		<b>3 0 0</b>	<b>3</b>

**OBJECTIVE** The objective of this course is to introduce the student to basic concept of semiconductor device operation based on energy bands and carrier statistics. It also provides the operation of p-n junctions and metal-semiconductor junctions. It extends this knowledge to descriptions of bipolar and field effect transistors, and other microelectronic basic devices. This course is intended for students who plan to study in the area of microelectronics or just have an interest in that area. This course emphasizes the fundamentals of materials and device operation. It is expected that the students taking this course will include ECE and non-EE majors. In this course, one will study semiconductor devices from a fundamental point of view emphasizing a thorough understanding of the mechanisms of device operation. It is expected that students who successfully complete the course will have an understanding of basic semiconductor devices sufficient to design transistors and diodes to particular specifications.

**1 CONDUCTING MATERIALS:** Drift velocity, collision time; Mean free path; mobility; conductivity; relaxation time; factors affecting conductivity of materials; types of thermal conductivity; Wiedemann-Franz law; Super conductivity; applications.

**2. DIELECTRIC MATERIALS:** Behavior of dielectric materials in static electric field; Dipole moments; Polarization; Dielectric constant; Polarizability, Susceptibility; mechanisms of polarization; behavior in alternating field; dielectric loss; loss tangent types of dielectric and insulating materials; electrostriction; Piezo-electricity.

**MAGNETIC MATERIALS:** Permeability; Magnetic susceptibility; magnetic moment; origin of magnetic dipole moment; angular momentum; Magnetization; Classification of magnetic materials-Para; Dia, ferro, antiferro; and ferri; Langevin's theory of dia; Curie-Weiss law; spontaneous magnetism; domain theory; Magnetosriction; eddy current and hysteresis losses; applications.

**3. SEMICONDUCTORS:** Review of Si and Ge as semi-conducting materials; Continuity Equation; P-N junction; Drift and Diffusion; Diffusion and Transition capacitances of P-N junction; breakdown mechanisms; ZENER diode.

**4 OPTICAL PROPERTIES OF MATERIALS:** Optical properties of metals; semiconductors and insulators; Phosphorescence; Luminiscense; Phosphors for CRO; display material for LCD; LED; solar cells and photo-detectors.

**5 SEMICONDUCTOR DEVICES:** Brief introduction to Planar Technology for device fabrication; BJT; JFET; MOSFETS.

**POWER DEVICES:** Thyristor; IGBT; VMOS; UJT; GTO; their working principles and characteristics.

**TEXT BOOK** Dekker, A.J., —Electrical Engineering Materials, 3rd Ed. Pentice Hall of India; 2009

#### REFERENCE BOOKS

1. Boylested and Nashelsky, —Electronic Devices and Circuit Theory, Pearson. Education, 2009
2. Dutta Alok, —Semiconductor Devices and Circuits, Oxford University Press, 2008
3. Streetman and Banerjee, —Solid State Electronic Devices, Pearson, 2010
4. Millman and Halkias, —Electronic Devices and Circuits, McGraw Hill, 1996
5. Gupta, J.B., —Electrical Engineering Materials and Semiconductor Devices, Katsons, 2006

<b>MA-150B</b>	<b>Applied Numerical Methods Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>2</b>

List of Practical (Using C++ software)

- (1) Find the root of the equation by using Bisection Method.
- (2) Find the root of the equation by using Newton Raphson Method.
- (3) Find the root of the equation by using Secant Method.
- (4) Find the root of the equation by using RegulaiFalsi Method.
- (5) Solve the system of linear equation by Gauss Elimination Method.
- (6) Solve the system of linear equation by Gauss-Jacobi Method.
- (7) Solve the system of linear equation by Gauss-Siedel Method.
- (8) Lagrange Interpolation or Newton Interpolation.
- (9) Simpson's rule.
- (10) Trapezoidal Rule

<b>EC-154B</b>	<b>Digital Electronics Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

#### LIST OF EXPERIMENTS

1. Study of TTL gates – AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR.
2. Design and realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer and Demultiplexer.
4. To verify the operation of comparator.

5. To verify the truth tables of S-R; J-K; T and D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design and verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
10. To design and realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND and NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

<b>CE-162 B</b>	<b>Surveying Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

- LIST OF EXPERIMENTS**
1. Chain surveying : chaining and chain traversing
  2. Compass Traversing
  3. Plane Tabling : methods of plane table surveying ,Two point Problem
  4. Plane Tabling :Three point problem
  5. Leveling : profile leveling and plotting of longitudinal section and cross sections , Fly leveling
  6. Use of tangent clinometers.
  7. Contours; Block and radial contours. Practice of reading contour maps
  8. Traversing : different poles and alignment
  9. Tacheometry; Tacheometric constants, calculating horizontal distance and elevation with the help of tacheometer
  10. Study and use of Theodolite in making horizontal and vertical angles

<b>CS-156 B</b>	<b>DATA STRUCTURE AND ALGORITHMS LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

## **LIST OF EXPERIMENTS**

### **ARRAY OPERATIONS**

1. Write a program to insert an element at given position in linear array
2. Write a program to insert an element in sorted array.
3. Write a program to delete an element from given position in linear array
4. Perform following operations on matrices using functions only
  - a) Addition b) Subtraction c) Multiplication d) Transpose

### **SEARCHING**

5. Search an element in a linear array using linear search.

- Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method

### **RECURSION**

- Write a program to compute factorial of given number using recursion
- Write a program to solve Tower of Hanoi problem using recursion
- Write a program to find power of given number using recursion

### **STACK & QUEUE**

- Write a program for static implementation of stack
- Write a program for dynamic implementation of queue
- Write a program for static implementation of circular queue
- Write a program for dynamic implementation of queue
- Write a program to evaluate a postfix operation

### **LINKED LIST**

- Create a linear linked list & perform operations such as insert, delete at end, at beg & reverse the link list
- Create a circular linked list & perform search, insertion & delete operation
- Create a doubly linked list & perform search, insertion & delete operation

### **TREE & GRAPH**

- Write program to implement binary search tree. (Insertion and Deletion in Binary Search Tree)
- Write program to simulate the various tree traversal algorithms
- Write program to simulate various graph traversing algorithms.

### **SORTING ALGORITHMS**

- Write program to implement Bubble, Insertion & selection sort.
- Write program to implement quick sort
- Write program to implement merge sort
- Write a program to implement heap sort

### **TEXT BOOK**

- A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
- Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++, Prentice Hall of India, 2009.

### **REFERENCE BOOKS**

- R. S. Salaria -Data Structure Using C
- Kruse Robert, —Data Structures and Program Design in C, Prentice Hall of India, 1994
- Lipschitz Jr. Seymour, —Theory & Problems of Data Structures, Schaum's Outline, 2nd Edition, Tata McGraw Hill

<b>EL-157B</b>	<b>BASICS OF ELECTRICAL &amp; ELECTRONICS ENGG. LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF PRACTICALS**

- To verify KCL and KVL in a given DC circuit.

- 2.To verify Thevenin's and Norton's Theorems.
- 3.To verify maximum power transfer theorem in D.C Circuit.
- 4.To verify Superposition theorems on Dc circuit.
- 5.To study frequency response of a series & parallel R-L-C circuit and determine its resonant frequency.
6. To perform direct load test of a transformer and plot its efficiency Vs load characteristic.
- 7.. To study V-I characteristics of diode; and its use as a capacitance.
8. Study of the characteristics of transistor in Common Base configuration.
9. Study of the characteristics of transistor in Common Emitter configuration.
10. Study of V-I characteristics of a photo-voltaic cell.

### **REFERENCE BOOKS**

1. Theraja, B.L. "Electrical Technology Vol I & II", S. Chand Publications, 2005
2. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill, 2002
3. Del Torro Vincent, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall of India, 1994.
4. Cathey, J.J. and Naser, S.A. "Basic Electrical Engg.", 2nd Edition, Schaum

<b>EC-158 B</b>	<b>ELECTRICAL ENGINEERING MATERIALS AND SEMI-CONDUCTOR DEVICES LAB</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

### **LIST OF EXPERIMENTS**

1. To study V-I characteristics of diode, and its use as a capacitance.
2. Study of the characteristics of transistor in Common Base configuration.
3. Study of the characteristics of transistor in Common Emitter configuration.
4. Study of V-I characteristics of a photo-voltaic cell.
5. Study of characteristics of MOSFET/JFET in CS configuration.
6. To plot characteristics of thyristor.
7. To plot characteristics of UJT.
8. To plot characteristics of diac&Triac.
9. Study of loss factor in a dielectric by an impedance bridge.
10. Study of photo-resist in metal pattern for planar technology.

<b>CS-114B</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

### **OBJECTIVE**

To provide knowledge about various organizations and management information systems, keeping in view the aspects of share ability, availability, evolvability and integrity

## PRE-REQUISITES

Knowledge of data structures, discrete mathematical structures

1. **INTRODUCTION:** What is database, Purpose of database system; advantages of using DBMS; database concept and architecture; data abstraction; data models; instances and schema; data independence; schema architecture; database languages; database administrator; database users
2. **DATA MODELING:** Entity sets attributes and keys, relationships (ER); database modeling using entity; type role and structural constraints, weak and strong entity types; enhanced entity-relationship (EER), ER diagram design of an E-R database schema; specialization and generalization
3. **RELATIONAL MODEL:** Relational model: relational model -basic concepts, enforcing data integrity constraints, Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators; extended relational algebra operations, Calculus: Tuple relational calculus, Domain relational Calculus; Codd's rules.
4. **DATABASE DESIGN AND SQL:** Database design process; relational database design, anomalies in a database; functional dependencies membership and minimal covers normal forms, multi-valued dependencies, join dependencies, inclusion dependencies; reduction of an E-R schema to tables; effect of de-normalization on database performance, Query-by-example (QBE), Introduction to SQL, basic queries in SQL, advanced queries in SQL, functions in SQL; basic data retrieval, aggregation, categorization, updates in SQLs; views in SQL.
5. **TRANSACTION PROCESSING:** Desirable properties of transactions, implementation of atomicity and durability; reconsistent model, read only and write only model; concurrent executions, schedules and recoverability; serializability of schedules concurrency control; serializability algorithms; testing for serializability; precedence graph; concurrency control, deadlock handling - detection and resolution.

## TEXT BOOK

1. Silberschatz A., Korth H. F. and Sudarshan S., "Database System Concepts", 6th edition, McGraw-Hill, International Edition, 2010
2. [Steven Feuerstein, Bill Pribyl](#) , "Oracle PL/SQL", O'Reilly Media , 4th Edition, 2005

## REFERENCE BOOKS:

1. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
2. Elmasri R. and Navathe S. B., "Fundamentals of Database Systems", 6th edition, Addison-Wesley, Low Priced Edition, 2010
3. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition, 2003
4. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
5. Hansen G. W. and Hansen J. V., "Database Management and Design", 2nd edition, Prentice- Hall of India, Eastern Economy Edition, 1999



6. Majumdar A. K. and Bhattacharyya P., “Database Management Systems”, 5th edition, Tata McGraw- Hill Publishing, 1999
7. Looms, “Data Management & File Structure”, Prentice Hall of India, 1989.

CS-160 B	DATABASE MANAGEMENT SYSTEMS LAB	L T P	Cr
		0 0 2	1

1. Introduction to PL/SQL
2. Write a program to carry out
  - a. Creation of table
  - b. Insertion of data into table
  - c. Viewing of data into table: All rows and all columns, Selected columns and all rows, Selected rows and all columns, Selected rows and selected columns, Elimination of duplicates from selected statements, Sorting of data into a table.
  - d. Deletion of data from given table: Removal of all rows, Removal of selected rows
  - e. Updating of table contents: Updating all rows, Updating of record conditionally
  - f. Modifying the structure of table: Adding new column, Modifying existing column
  - g. Renaming tables
  - h. Destroying tables
  - i. Examining objects created by user: Finding tables created by user, Finding column details of table created
  - j. Computation on table data: Arithmetic operators, Logical operators ( AND, OR, NOT), Range searching ( BETWEEN, NOT BETWEEN), Pattern matching (LIKE, IN, NOT IN)
3. Oracle set functions (Scalar, Group & Pattern Matching Operator): AVG, SUM, MIN, MAX, COUNT, COUNT(\*), ABS, ROUND, LENGTH, SUBSTR, POWER, SQRT, LOWER, UPPER, LPAD, RPAD, LTRIM, RTRIM
4. Data constraints at column level and at table level: NULL value concept, UNIQUE constraints, Primary key constraint, Foreign key constraint, Check constraint.
5. VIEWS: Creation of views, Renaming of columns in view, Selection, Updation, Destroy
6. Grouping Data from tables in SQL
7. INDEXES
8. SEQUENCES
9. Granting and Revoking Permissions in SQL
10. CURSORS & its Applications
11. Create Function and use Cursor in Function
12. TRIGGERS
13. Hands on Exercises

## REFERENCE BOOKS

1. SQL, PL/SQL the Programming Language of Oracle, Ivan Bayross
2. Date C. J. and Darwen H., “A Guide to the SQL Standard”, 4th edition, Addison-Wesley, 2003
3. Desai Bipin, “Introduction to Database Management System”, Galgotia Publications, 1991

4. Date C. J., “An Introduction to Database Systems”, 8th edition, Addison-Wesley, Low Priced Edition

# B. Tech 2nd Year

## School of Computer Science

### Scheme of studies & Syllabus-

### 2017

**B. Tech (CSE) 2<sup>nd</sup> Yr ( 3<sup>rd</sup> Semester)**

Code	Course No.	Course Name	L-T-P	Cr.
	CS-201B	Object Oriented Programming using C++	4-0-0	4
	CS-203B	Discrete Structure	3-0-0	3
	CS-205B	Analysis and Design of Algorithms	4-0-0	4
	CS-207B	Data Mining & Data Warehousing	4-0-0	4
	CS-209B	Computer Architecture & Organization	3-0-0	3
	CS-211B	Web Technologies	3-0-0	3
	CS-251B	Object Oriented Programming using C++ Lab	0-0-2	1
	CS-257B	Data Mining & Data Warehousing Lab	0-0-2	1
	CS-261B	Web Technologies Lab	0-0-2	1
	HOT-201B	Minor Project/Hands on training	0-0-4	2
	PD-291	Co-curricular Activities		1*
			<b>21-0-10</b>	<b>26+1*</b>

<b>CS-201 B</b>	<b>OBJECT ORIENTED PROGRAMMING USING C++</b>	<b>L T P</b>	<b>Cr</b>
		<b>4 0 0</b>	<b>4</b>

**OBJECTIVE:** Providing a sound conceptual understanding of the fundamental concepts of computing hardware, software, networking and services; build programming logic and thereby developing skills in problem solving using C++ programming language; Introduce the concept of object orientation and on how to handle data in different forms; Emphasize the concepts and constructs rather than on language features.

- 1. OBJECT ORIENTED CONCEPTS& INTRODUCTION TO C++:** Introduction to objects and object oriented programming, difference between procedure oriented & Object oriented programming; main feature of Object oriented programming: Class,

Object, encapsulation (information hiding); Polymorphism: overloading, inheritance, overriding methods, abstract classes, access modifiers: controlling access to a class; method, or variable (public, protected, private, package); other modifiers; Basics of C++, Simple C++ Programs, preprocessors directives, Namespace, Memory management operators in C++, Inline function, default arguments, & reference types

2. **CLASSES AND DATA ABSTRACTION:** Introduction; structure definitions; accessing members of structures; class scope and accessing class members; separating interface from implementation; controlling access function and utility functions, initializing class objects: constructors, using default arguments with constructors; using destructors; classes : const(constant) object and const member functions, object as member of classes, friend function and friend classes; using this pointer, dynamic memory allocation with new and delete; static class members & function; container classes and integrators;.
3. **OPERATOR OVERLOADING, TEMPLATE & EXCEPTION HANDLING:** Introduction; fundamentals of operator overloading; restrictions on operators overloading; operator functions as class members vs. as friend functions; overloading, <<, >> overloading unary operators; overloading binary operators. Function templates; overloading template functions; class template; class templates and non-type parameters; basics of C++ exception handling: try, throw, catch, throwing an exception, catching an exception, re-throwing an exception
4. **INHERITANCE, VIRTUAL FUNCTIONS AND POLYMORPHISM:** Introduction, inheritance: base classes and derived classes, protected members; casting base-class pointers to derived-class pointers; using member functions; overriding base-class members in a derived class; public, protected and private inheritance; using constructors and destructors in derived classes; implicit derived-class object to base-class object conversion; composition vs. inheritance; virtual functions; abstract base classes and concrete classes; polymorphism; new classes and dynamic binding; virtual destructors; polymorphism; dynamic binding.
5. **FILES AND I/O STREAMS:** Files and streams; creating a sequential access file; reading data from a sequential access file; updating sequential access files, random access files; creating a random access file; writing data randomly to a random access file; reading data sequentially from a random access file; stream input/output classes and objects; stream output; stream input; unformatted I/O (with read and write); stream manipulators; stream format states; stream error states.

## TEXT BOOK

1. Balagurusamy, E., —Object Oriented Programming with C++, Prentice Hall of India, 2008
2. Scheldt, Herbert —C++: The Complete Reference, Tata McGraw Hill, 3rd Ed, 2008

## REFERENCE BOOKS

3. Kamthane, —Object Oriented Programming with ANSI and Turbo C++, Pearson Education
4. Lafore, Robert, —Object Oriented Programming in Turbo C++, The WAITE Group Press, 1994
5. Balagurusamy, E., —Object Oriented Programming with C++, Prentice Hall of India, 2008
6. Bhave, —Object Oriented Programming with C++, Pearson Education.

CS-203 B	DISCRETE STRUCTURE	L T P	Cr
		3 0 0	3

**OBJECTIVE:** To lay mathematical foundation for the fundamentals of various computational structures such as Boolean algebra, propositional logic, graph and trees.

**PRE-REQUISITES:** Knowledge of Data Structure

1. **SET THEORY:** Introduction to set theory; set operations; algebra of sets: duality, finite and infinite sets, classes of sets, power sets, multi sets, Cartesian product, representation of relations, types of relation, equivalence relations and partitions, partial ordering relations and lattices; function and its types, composition of function and relations; cardinality and inverse relations.
2. **PROPOSITIONAL CALCULUS AND TECHNIQUES OF COUNTING:** Basic operations: AND ( $\wedge$ ), OR ( $\vee$ ), NOT ( $\sim$ ), truth value of a compound statement, propositions, tautologies, contradictions, Permutations with and without repetition, combination.
3. **RECURSION AND RECURRENCE RELATION:** Polynomials and their evaluation; sequences, introduction to AP, GP and AG series, partial fractions; linear recurrence relation with constant coefficients; homogeneous solutions, particular solutions, total solution of a recurrence relation using generating functions.
4. **ALGEBRIC STRUCTURES:** Definition and examples of a monoid, semigroup, groups and rings; homomorphism, isomorphism and auto morphism; subgroups and normal subgroups; cyclic groups, integral domain and fields; co-sets; Lag range's theorem
5. **GRAPHS:** Introduction to graphs, directed and undirected graphs; homomorphic and isomorphic graphs; subgraphs; cut points and bridges; multigraph and weighted graph; paths and circuits, shortest path in weighted graphs; Eulerian path and circuits, Hamilton paths and circuits; planar graphs; Euler's formula.

#### TEXT BOOK

Liu C. L., —Elements of Discrete Mathematics, McGraw Hill, 1989

#### REFERENCE BOOKS

1. Johnson Bough R., —Discrete Mathematics, 5th Edition, Pearson Education, 2001
2. Graham Ronald, Knuth Donald E. and Patashik Oren, —Concrete Mathematics: A Foundation for Computer Science, Addison-Wesley, 1989
3. Gersting Judith L., —Mathematical Structures for Computer Science, Computer Science Press, 1993
4. Chtewynd A. and Diggle P., Discrete Mathematics, Modular Mathematics Series, Edward Arnold, London, 1995
5. Lipshutz S., —S chaums Outline series: Theory and problems of Probability, McGraw Hill Singapore, 1982
6. Kolm an B. and Busby R. C., —Discrete Mathematical Structures, Prentice Hall of India, 1996
7. Trembley and Manohar, —Discrete Mathematical Structures with Applications to Com

putersl, McGraw Hill, 1995

CS- 205 B	ANALYSIS & DESIGN OF ALGORITHM	L T P	Cr
		4-0-0	4

## OBJECTIVE

To relay the theoretical and practical aspects of design of algorithms

## PRE-REQUISITES

Knowledge of fundamentals of basic computer programming for implementing algorithms

1. **BRIEF REVIEW:** Growth of functions, Asymptotic Notations, Representation of Graphs, Breadth First Search, Depth First Search and Data Structures for Disjoint Sets.
2. **DIVIDE AND CONQUER:** General method; binary search; merge sort; quick sort; selection sort; Strassen's matrix multiplication algorithms and analysis of algorithms for these problems.
3. **GREEDY METHOD:** General method; knapsack problem, job sequencing with deadlines; minimum spanning trees Algorithm of Kruskal's and Prim's; single source paths and analysis of these problems.
4. **DYNAMIC PROGRAMMING AND BACK TRACKING:** General method; optimal binary search trees; O/I knapsack; the traveling salesperson problem, 8 queens 'problem; graph coloring; Hamiltonian cycles
5. **NP HARD AND NP COMPLETE PROBLEMS:** Basic concepts; Cook's theorem; NP hard graph and NP scheduling problems; some simplified NP hard problems.

## TEXT BOOK :-

1. Horowitz Ellis and SahniSartaj, —Fundamental of Computer Algorithmsl, Galgotia Publications, 1978

## REFERENCE BOOKS:

1. Cormen Thomas H., Leiserson Charles E. and Rivest Ronald L., —Introduction to Algorithmsl, Tata McGraw Hill, 1990
2. Aho A. V. and Hopcroft J. E., —The Design and Analysis of Computer Algorithml, Addison Wesley, 1974
3. Berlion P., and Bizard P., Algorithms – The Construction, Proof and Analysis of Programs, John Wiley & Sons, 1986.
4. Bentley J. L., —Writing Efficient Programsl, Prentice Hall of India, June 1982.
5. Goodman S. E. and Hedetnieni, —Introduction to Design and Analysis of Algorithml, McGraw Hill, 1997
6. Trembley Jean Paul and Bunt Richard B., —Introduction to Computers Science - An Algorithms Approachl, Tata McGraw Hill, 2002

7. Knuth Donald E., —Fundamentals of Algorithms: The Art of Computer ProgrammingI, Vol. 1, Naresh Publications, 1985
8. Goodrich Michael T. and Roberto Tamassia, —Algorithm Design: Foundations, Analysis & Internet ExamplesI, Wiley Student Ed., 2002

<b>CS-207B</b>	<b>Data Mining and Data Warehousing</b>	<b>L T P</b>	<b>Cr</b>
		<b>4 0 0</b>	<b>4</b>

Prerequisite; Student can have knowledge of Database Management System and Query Language like sql Etc.

### **OBJECTIVE**

This course introduces basic concepts, tasks, methods, and techniques in data mining. The emphasis is on various data mining problems and their solutions. Students will develop an understanding of the data mining process and issues, learn various techniques for data mining, and apply the techniques in solving data mining problems using data mining tools and systems. Students will also be exposed to a sample of data mining applications.

### **SYLLABUS:**

1. **DATA WAREHOUSING:** Definition, usage and trends. DBMS vs data warehouse, data marts, metadata, multidimensional data mode, data cubes, schemas for multidimensional database: stars, snowflakes and fact constellations.
2. **DATA WAREHOUSE ARCHITECTUREANDIMPLEMENTATION:** OLTP vs. OLAP, ROLAP vs MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager, Computation of data cubes, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse.
3. **DATA MINING &ITS CURRENT TRENDS:** Definition and task, KDD versus data mining, data mining techniques, Spatial databases, multimedia databases, time series and sequence data, mining text databases and mining Word Wide Web tools and applications, Strategy and business model current trends in data mining, open research area should be added in the course.
4. **DATA MINING QUERY LANGUAGES:** Data specification, specifying knowledge, hierarchy specification, pattern presentation and visualization specification, data mining languages and standardization of data mining.
5. **DATA MINING TECHNIQUES:** Association rules, clustering techniques and implementation, decision tree knowledge discovery through neural networks and genetic algorithm, rough sets, support vector machines and fuzzy techniques.

**Text Book :**



1. ArjunPujri,,” Data Mining Techbniques “ PHI Publication

**References:**

1. Berson, “Data Warehousing, Data-Mining & OLAP”, TMH
2. Mallach, “Decision Support and Data Warehousing System”, TMH
3. BhavaniThura-is-ingham, “Data-Mining Technologies, Techniques Tools & Trends”, CRC Press
4. Navathe, “Fundamental of Database System”, Pearson Education
5. Margaret H. Dunham, “Data-Mining. Introductory & Advanced Topics”, Pearson Education
6. Pieter Adriaans, DolfZantinge, “Data-Mining”, Pearson Education

CS-209B	COMPUTER ORGANIZATION & ARCHITECTURE	L T P	Cr
		3 0 0	3

**OBJECTIVE:** To provide basic knowledge of internals of computer, its architecture, components,terminologies, etc. at minute level and ultimately about the working of a digital computer hardware as a whole

**PRE-REQUISITES:** Knowledge of data structures, microprocessors and interfacing

**1. GENERAL SYSTEM ARCHITECTURE & DIGITAL LOGIC:** Functions and block diagram of computer, store program control concept,Flynn’s classification of computers (SISD, MISD, MIMD); CPU, caches, main memory, secondary memory units & I/O; Computer registers; combinational logic blocks (adders, multiplexers, encoders, de-coder), sequential logic blocks (latches, flip-flops, registers, counters). Designing of counters.

**2. INSTRUCTION SET ARCHITECTURE:** Instruction codes, instruction set formats(fixed, variable, hybrid), types of instructions, memory reference, register reference, I/O reference; addressing modes: register, immediate, direct, indirect, indexed; operations in the instruction set; arithmetic and logical, data transfer, control flow; types of interrupts; timing and control; instruction set based classification of processors (RISC, CISC, and their comparison).

**3. BASIC NON PIPELINED CPU ARCHITECTURE:** CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, fetch-decode-execute cycle (typically 3 to 5 stage); micro-instruction formats, implementation of control unit: hardwired and micro-programmed, control memory, microinstruction sequencing.

**4. MEMORY HIERARCHY & I/O TECHNIQUES:** Need for a memory hierarchy (Locality of ReferencePrinciple, memory hierarchy in practice: cache, main memory and secondary memory, memory parameters: access cycle time, cost per bit); main memory (semiconductor RAXM& ROM organization, memory expansion, static & dynamic memory types); cache memory: associative & direct mapped cache organizations.

•  
**5. INTRODUCTION TO PARALLELISM:** Goals of parallelism (exploitation of concurrency, throughput enhancement); Amdahl's law; instruction level parallelism (pipelining, super scaling-basic features); processor level parallelism (multiprocessor systems overview).

### TEXT BOOK

1. John P.Hayes, 'Computer architecture and Organisation', Tata McGraw-Hill, Third edition, 1998.
2. V.CarlHamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", V edition, McGraw-Hill Inc, 1996.
3. Carpinelli, —Computer Organization & Architecture Tata McGraw Hill, 2001

### REFERENCE BOOKS

1. Stallings. W, —Computer Organization & Architecture: Designing For Performancell, 6<sup>th</sup> Edition, Prentice Hall of India, 2002/ Pearson Education Asia, 2003
2. Mano M Morris, —Computer System Architecture, 3rd Edition, Prentice Hall of India Publication, 2001 / Pearson Education Asia, 2003
3. Jotwani, —Computer System Org anisation, T ata McGraw Hill, 2000.
4. Rajaraman V. and Radhakrishnan T, —Introduction to Digital Computer Design, 4th Edition, Prentice Hall of India 2004.
5. Stalling William, —Computer Organization and Architecture, 7th Edition, Prentice Hall of India, 2005.
6. Brey Barry, —Intel Micro Processors, Pearson US Imports & PHIPes, 1998
7. Paraami, "Computer Architecture", BEH R002, Oxford Press.

CS-211B	WEB TECHNOLOGIES	L T P	Cr
		3 0 0	3

### OBJECTIVE:

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice Markup Language.
- To understand and practice Embedded Dynamic Scripting on Client-side Internet Programming.
- To understand and practice Web Development Techniques on client-side.

**PRE-REQUISITES: Basic HTML:** Basics of programming, Structure and HTML Tags, Images, List, Tables, Anchors and Form Elements

### 1Unit I: Introduction to WWW –

Introduction to Computer networks - Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages.

## **Unit II: UI Design:**

HTML5: What is HTML5 - Features of HTML5 – Semantic Tags – New Input Elements and tags - Media tags (audio and video tags) – Designing Graphics using Canvas API - Drag and Drop features – Geolocation API - Web storage (Session and local storage).

CSS3: What is CSS3 – Features of CSS3 – Implementation of border radius, box shadow, image border, custom web font, backgrounds - Advanced text effects(shadow) - 2D and 3D Transformations - Transitions to elements - Animations to text and elements

## **Unit III: Responsive Web Design (RWD):**

Responsive Design: What is RWD – Introduction to RWD Techniques – Fluid Layout, Fluid Images and Media queries - Introduction to RWD Framework

Twitter Bootstrap – Bootstrap Background and Features - Getting Started with Bootstrap - Demystifying Grids – OffCanvas - Bootstrap Components - JS Plugins - Customization

## **Unit IV: Introduction to JavaScript :**

Introduction - Core features - Data types and Variables - Operators, Expressions and Statements - Functions & Scope - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling – Browser Object Model - Windows and Documents - Form handling and validations.

Object-Oriented Techniques in JavaScript - Classes – Constructors and Prototyping (Sub classes and Super classes) – JSON – Introduction to AJAX.

## **Unit V: Introduction to jQuery :**

Introduction – jQuery Selectors – jQuery HTML - Animations – Effects – Event Handling – DOM – jQuery DOM Traversing, DOM Manipulation – jQuery AJAX

## **TEXT & REFERENCE BOOK:**

1. Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, “Internet and World Wide Web - How To Program”, Fifth Edition, Pearson Education, 2011.
2. Achyut S Godbole and AtulKahate, “Web Technologies”, Second Edition, Tata McGraw Hill, 2012.
3. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013.
4. David Flanagan, “JavaScript: The Definitive Guide, Sixth Edition”, O'Reilly Media, 2011
5. Bear Bibeault and Yehuda Katz, “jQuery in Action”, January 2008
6. Web link for Responsive Web Design - <https://bradfrost.github.io/this-is-responsive/>
7. Ebook link for JavaScript - [https://github.com/jasonzhuang/tech\\_books/tree/master/js](https://github.com/jasonzhuang/tech_books/tree/master/js)

<b>CS-251 B</b>	<b>OBJECT ORIENTED PROGRAMMING USING C++LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

## **LIST OF EXPERIMENTS:**

### **BASIC CONCEPT OF C++**

1. Write a program to show the concept reference type, call by reference & return by reference in C++
2. Write a program to show the concept of default arguments in C++
3. Write a program to show the concept of inline function
4. Write a program to show the concept of dynamic memory management in C++
5. Write a program to show the concept of function overloading

### **CLASS & OBJECTS**

6. Write a C++ program to show the concept of class & object
7. Write A C++ program showing function taking objects as a arguments and function returning objects
8. Write C++ programs to show the concept of static data member & static member function
9. Write C++ program to show the concept of friend function
10. Write C++ program to show the concept of different type of constructor
11. Write C++ program to show the concept of destructor

### **OPERATOR OVERLOADING**

12. Write a C++ program showing overloading of unary operator using member function & friend function
13. Write a C++ program showing overloading of binary operator using member function & friend function
14. Write a C++ program showing overloading of << and >> operators

### **INHERITANCE**

15. Write a C++ program to show the concept of multilevel inheritance
16. Write a program to show the concept of multiple inheritance
17. Write a C++ program to show the concept of hybrid inheritance
18. Write a program to show the concept of virtual base class

### **DYNAMIC BINDING & VIRTUAL FUNCTION**

19. Write a C++ to show the concept of virtual function to implement dynamic binding
20. Write a C++ program to show the concept of pure virtual function & abstract class

### **FILES HANDLING**

21. Write C++ programs for creating, reading& writing sequential access file
22. Write C++ programs for creating, reading & writing random access file

### **TEMPLATES**

23. Write a C++ program to show the concept of class template
24. Write a C++ program to show the concept of function template

### **TEXT BOOK**

7. Balagurusamy, E., —Object Oriented Programming with C++, Prentice Hall of India, 2008
8. Schildt, Herbert —C++: The Complete Reference, Tata McGraw Hill, 3rd Ed, 2008

## REFERENCE BOOKS

9. Kamthane, —Object Oriented Programming with ANSI and Turbo C++, Pearson Education
10. Lafore, Robert, —Object Oriented Programming in Turbo C++, The WAITE Group Press, 1994
11. Balagurusamy, E., —Object Oriented Programming with C++, Prentice Hall of India, 2008
12. Bhawe, —Object Oriented Programming with C++, Pearson Education.
- 13.

CS-257B	Data Mining & Data Warehousing Lab	L T P	Cr
		0-0-2	1

## List of Experiment

- 1 Study Of Tanagra As A Data-Mining Tool :
- 2 Study Of Weka As A Data-Mining Tool:
- 3 Importing and viewing data in TANAGRA:
- 4 Defining status of data using Tanagra
- 5 Program to apply instance selection on given data using Tanagra.
- 6 Program to apply clustering algorithms on given data by using Tanagra tool.
- 7 Program to apply A Priori algorithms on given data using Tanagra:
- 8 Program to generate decision tree using Weka tool:
- 9 Program to use Weka tool to perform clustering:
- 10 Program to visualize all attributes of Preprocess using Weka
- 11 Program for processing the data using Weka
- 12 Program for Classification of Data using Neural Network
- 13 Program for Classification of Data using Bayesian Network
- 14 What attributes do you think might be crucial in making the analysis of diabetes?  
Come up with some simple rules in plain English using your selected attributes using diabetes. arff database
- 15 What attributes do you think might be crucial in making the analysis of contact-lenses? Come up with some simple rules in plain English using your selected attributes using contact Lenses. arff

CS-261B	Web Technology Lab	L T P	Cr
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		<b>0 0 4</b>	<b>2</b>
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### **List of Experiment**

- 1 Design a web page using Physical and Logical tags of HTML.
- 2 Design a web page using
  - 3.1 Ordered List
  - 3.2 Unordered Lists
  - 3.3 Nested Lists
- 3 Design a web page to show the use of image as a hyperlink
- 4 Design a web-page using frames and linking
- 5 Design a class Time Table using tables in HTML.
- 6 Code to create a bookmark.
- 7 Design a web-page showing the use of forms using HTML 4.01 and HTML 5 Tags.
- 8 Design a page using basic tags of HTML 5.0.
- 9 Design a web-page using style sheets (External, Internal and Inline)
- 10 Write a Program to print if the no is even or odd using JavaScript
- 11 Input a number and find the difference of the sum of factors and non-factors.
- 12 WAP in JavaScript to print the pattern
 

```

12345
1234
123
12
1
      
```
- 13 WAP to Accept an Array of 10 numbers and display the sum of elements.
- 14 WAP to find greatest of all elements of an array
- 15 Design a web-page to show different validation checking using Java Script
- 16 WAP in PHP code for calculating S.I
- 17 WAP to Calculate factorial of a number
- 18 WAP to print the table of 10.
- 19 WAP to print the sum of diagonal elements
- 20 WAP to enter 5 elements each from Array1 and Array2 and print these elements using third array.
- 21 WAP to show database connectivity using PHP and Mysql.

**Lingaya'sVidyapeeth, Faridabad**

Scheme of studies

B. Tech (CSE) 2<sup>nd</sup>Yr, 4<sup>th</sup> Semester

**SEMESTER – IV**

Code	Course No.	Course Name	L-T-P	Cr.
	CS-202B	Computer Network	4-0-0	4
	CS-204B	Operating System	3-0-0	3
	CS-206B	Computer Graphics	4-0-0	4
	CS-208 B	Core Java	4-0-0	4
	CS-210 B	Software Engineering	4-0-0	4
	EC-214 B	Digital and Analog Communications	3-0-0	3
	CS-252B	Computer Network Lab	0-0-2	1
	CS-256B	Computer Graphics Lab	0-0-2	1
	CS-258B	Core Java Lab	0-0-2	1
	CS-254	Operating system Lab	0-0-2	1
	CS-282B	Minor Project	0-0-4	2
	PDP Course		2-0-0	2
PD-291		Co-curricular Activities		1*
			<b>24-0-12</b>	<b>30+1*</b>

CS-202B	COMPUTER NETWORKS	L T P	Cr
		<b>4 0 0</b>	<b>4</b>

### **OBJECTIVE**

To have a fundamental understanding of the design, performance and state of the art of wireless communication systems, Topics covered include state of the art wireless standards and research and thus changes substantially form one offering of this course to the next

**PRE-REQUISITES:** Knowledge of computers hardware and software

- 1. OVERVIEW OF DATA COMMUNICATION AND NETWORKING:**  
Introduction; Data communications: components, data, direction of data flow,

Protocols, Networks: type of connection, topology: Star, Bus, Ring, Mesh, Tree, categories of network: LAN, MAN, WAN: Internet: brief history, Layered architecture of networks, OSI reference model, Functions of each layer, services and protocols of each layer, TCP / IP reference model.

2. **PHYSICAL AND DATA LINK LAYER:** Transmission media: Guided media, Unguided media Switching: Circuit switching, packet switching, datagram switching. Error Detection and Correction: Types of errors, detection vs correction, cyclic codes, checksum. Framing: Flow and Error Control, Protocols: Stop & wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ.
3. **MEDIUM ACCESS SUBLAYER** Random access: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Controlled Access: Reservation, Polling, Channelization: FDMA, TDMA, CDMA, IEEE Standards, Standard Ethernet, Changes in the standard, Fast Ethernet, Gigabit Ethernet
4. **NETWORK LAYER:** Network Devices: Active and Passive Hubs, Repeaters, Bridges, Two and Three layer switch, Gateway. Internet Protocol, Transmission Control Protocol, User Datagram Protocol; IP Addressing, IP address classes, subnet addressing, DNS, Internet control protocols: ARP, RARP, ICMP.
5. **TRANSPORT LAYER :** Process to process delivery, user datagram protocol, TCP services, features, TCP Connection, flow control, error control and congestion control; Congestion control, Quality of Service, WAN Technologies: Synchronous Digital Hierarchy (SDH) / Synchronous Optical Network (SONET); Asynchronous Transfer Mode (ATM) Frame Relay.

## TEXT BOOK

Tanenbaum Andrew S, —Computer Networks, 4th Edition, Pearson Education/Prentice Hall of India, 2003.

## REFERENCE BOOKS

1. Forouzan Behrouz A., —Data Communications and Networking, Tata McGraw Hill 2006.
2. Stallings William, —Data and Computer Communication, 5th Edition, Prentice Hall of India, 1997.
3. Fred Halsall, —Data Communications, Computer Networks and Open Systems, 4th edition, Addison Wesley, Low Price Edition, 2000
4. Fitzgerald Jerry, —Business Data Communications, Wiley, 2009.
5. Peterson Larry L. and Davie Bruce S., —Computer Networks – A System Approach, 3rd Edition, Morgan Kaufmann, 2003.
6. Tittel E. D., —Computer Networking, Tata McGraw Hill, 2002
7. Kurose James F. and Ross Keith W., —Computer Networking: A Top-Down Approach Featuring the Internet, 2nd Edition, Pearson Education, 2003.
8. Keshav S., —An Engineering Approach to Computer Networking, Addison-Wesley, 1997.
9. Comer D. E., —Internetworking with TCP/IP, Volume 1, 3rd Edition, Prentice Hall of India, 1995.

CS-204B	OPERATING SYSTEMS	L T P	Cr
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## **OBJECTIVE**

To provide the knowledge of internals, different types and purpose of operating systems

## **PRE-REQUISITES**

Knowledge of computer organization and architecture programming skills

1. **INTRODUCTION:** Introduction to operating system concepts (including multitasking, multiprogramming, multi user, multithreading, etc)., types of operating systems: batch operating system, time-sharing systems, distributed OS, network OS, real time OS, embedded and smart card OS, various operating system services, architecture, system programs and calls.
2. **PROCESS MANAGEMENT:** Process concept, Life cycle and implementation of process, Thread usage and implementation in user space and in kernel, process scheduling, operation on processes, CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), priority scheduling, Round Robin (RR), multilevel feedback queue scheduling. Deadlocks, Deadlock characteristics, prevention, avoidance using banker's algorithm, detection and recovery; Critical section problems, mutual exclusion with busy waiting, Process synchronization, semaphores: binary and counting semaphores, Classical IPC problems: dining philosophers' problem, readers-writers problem.
3. **MEMORY MANAGEMENT:** Logical & physical address space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging, virtual memory management - demand paging & page-replacement algorithms, demand segmentation.
4. **I/O AND FILE SYSTEMS:** I/O hardware, device controllers, interrupt handlers, device drivers, application I/O interface, kernel, transforming I/O requests, performance issues, Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, introduction to distributed file system.
5. **LINUX/UNIX SYSTEM:** LINUX/UNIX architecture, UNIX system calls for processes and file system management, basic commands of LINUX/UNIX, shell interpreter, shell scripts.

## **TEXT BOOK**

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014, ISBN10: 0133805913 • ISBN13: 9780133805918
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons ,Inc., 9th Edition, 2012, ISBN 9781118063330
3. Maurice J. Bach, "Design of UNIX Operating System", PHI
4. T1: Silberchatz et al, "Operating System Concepts", 5<sup>th</sup> edition, Addison-Wesley, 1998

## **REFERENCE BOOKS**

1. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, Inc., 1st Edition, 2007.ISBN10: 0596009526 | ISBN13: 9780596009526
2. Harvey M. Deitel, Operating Systems, Prentice Hall, 3rd Edition,2003, ISBN10: 0131828274 | ISBN13: 9780131828278
3. Andrew S. Tanenbaum, Modern Operating System, Prentice Hall, 3rd Edition, 2007,ISBN10: 0136006639 | ISBN13: 9780136006633
4. Operating System in depth by Thomson
5. Tanenbaum A., “Modern Operating Systems”, Prentice-Hall, 1992
6. Stallings William, “Operating Systems Internals and Design Principles”, 4th edition, Prentice-Hall, 2001
7. Dhamdhare D. M., “Operating System”, 2<sup>nd</sup> Edition, Tata McGraw Hill, 1999
8. Kernighan Brian and Pike Rob, “The Unix Programming Environment”, Prentice Hall of India, 1984
9. Bach Maurich, “Design of the Unix Operating System”, Prentice Hall of India, 1986
10. Muster John, “Introduction to UNIX and LINUX”, Tata McGraw Hill, 2003
11. Ritchie Colin, “Operating System Incorporating Unix & Windows”, Tata McGraw Hill, 1974
12. Madnick Stuart and Donovan John, “Operating Systems”, Tata McGraw Hill, 2001
13. Deitel, “Operating Systems”, Addison-Wesley, 1990
14. SinghalMukesh and Shivaratri N.G., “Operating Systems”, Tata McGraw Hill, 2003

<b>CS-206B</b>	<b>COMPUTER GRAPHICS</b>	<b>L T P</b>	<b>Cr</b>
		<b>4 0 0</b>	<b>4</b>

## OBJECTIVE

Students completing this course are expected to be able to:

- Write programs that utilize the OpenGL graphics environment.
- Use polygonal and other modeling methods to describe scenes.
- Understand and be able to apply geometric transformations.
- Create basic animations.
- Understand scan-line, ray-tracing, and radiosity rendering methods

## PRE-REQUISITES

Knowledge of computer programming, 2D and 3D geometry

1. **INTRODUCTION:** What is computer graphics, computer graphics applications, Basics of computer graphics hardware and software, two dimensional graphics primitives: points and lines, line drawing algorithms: DDA, Bresenham's; circle drawing algorithms: using polar coordinates, Bresenham's circle drawing, midpoint circle drawing algorithm; polygon filling algorithm, boundary filled algorithm, scan-line algorithm, flood fill algorithm.
2. **TWO DIMENSIONAL VIEWING & 2D TRANSFORMATION:** The 2-D viewing pipeline, windows, viewports, window to view port mapping; homogeneous

coordinates system, two dimensional transformations: transformations, translation, scaling, rotation, reflection, shearing, transformation, composite transformation.

3. **LINE & POLYGON CLIPPING ALGORITHM:** clipping: point, clipping line (algorithms): 4 bit code algorithm, Sutherland- Cohen algorithm, parametric line clipping algorithm (Cyrus Beck). Sutherland Hodgeman polygon clipping algorithm,
4. **THREE DIMENSIONAL GRAPHICS:** Three dimensional graphics concept, matrix representation of 3-D transformations, composition of 3-D transformation; viewing in 3D: projections, types of projections; the mathematics of planner geometric projections; coordinate systems.
5. **HIDDEN SURFACE REMOVAL & CURVES AND SURFACES:** Introduction to hidden surface removal; the Z- buffer algorithm, scan-line algorithm, area sub-division algorithm. Parametric representation of curves: Bezier curves, B-Spline curves; parametric representation of surfaces; interpolation method

## TEXT BOOK

Foley James D., van Dam Andeies, FeinerStevan K. and Hughes J ohb F., —Computer Graphics Principles and P racticesl, 2nd Edition, Addison Wesley, 2000

## REFERENCE BOOKS

1. Hearn Donald and Baker M. Pauline, —Computer Graphicsl, 2nd Edition, Prentice Hall of India, 1999
2. Rogers David F., —Procedural Elements for Computer Graphicsl , 2nd Edition, Tata McGraw Hill, 2001
3. Watt Alan, —Fundamentals of 3-Dimensional Computer Graphicsl, Addison Wesley, 1999
4. John Corrig n, —Computer Graphics: Secrets and Solutionsl, BP B Publications, 1994
5. Krishanmurthy N., —Introduction to Computer Graphicsl, Tata McGraw Hill, 2002

CS-208B	CORE JAVA	L T P	Cr
		4 0 0	4

**OBJECTIVE** To relay the theoretical and practical knowledge of Core Java programming language

**PRE-REQUISITES** Basic Knowledge of programming language and object oriented programming

1. **INTRODUCTION TO JAVA, DATA TYPE, VARIABLES, ARRAY :** Basic Concepts of OOP and its Benefits; Application of OOP; Features of Java; Different types of data types, Literals, Variables, Type conversion and casting :Java's automatic type conversion, Casting incompatible types; Automatic type promotion in expression; Arrays: One-Dimensional Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax
2. **STRINGS, OPERATORS, EXPRESSION, CONTROL STATEMENTS:** String handling: String class, Different string operations, String comparison ,Searching and modifying a string, Using string buffer class, Vector & Wrapper classes Different types of operators: arithmetic, bitwise, logical, relational, Boolean, assignment, conditional, special; Operator precedence and associatively; Using parentheses; Expression; Solving

an expression; Control statements: if-else, nested if-else switch; Iteration statements: while, do-while, for, nested loops Jump Statements: using break, using continue, return

3. **INHERITANCE, INTERFACES, PACKAGE** : Inheritance: Different types of Inheritance, super keyword, Method overriding, Different types of access specifiers Defining Interface, Extending & Implementing interfaces, implementing multiple inheritance, Package: Java API Packages, Using System Package, Naming Conventions, Creating package, Accessing a package, using your own package
4. **MULTITHREADING, EXCEPTION HANDLING & APplet PROGRAMMING**: Multithreading: The Java Thread Model, Creating a Thread: extending Thread class and implementing Runnable interface, life cycle of a thread, using Thread methods, Thread exception Thread priority, Synchronization Exception: Exception Handling mechanism , Multiple catch statements , Using finally statements , throwing our own exception; Applet: Local & Remote Applets ,Steps to write & running Applets, Applet life cycle, Passing parameters, Displaying numerical values, getting input from the user
5. **GRAPHICS PROGRAMMING & FILE HANDLING**: Graphics class: Lines & Rectangle, Circles & Ellipses, Arcs, Polygons, Line Graphs, Bar Charts; File Handling: Stream Classes: Character & Byte Stream Class, I/O Exceptions, Reading /Writing character, Reading /Writing bytes, Concatenating & buffering files, Random Access Files

**TEXT BOOK** Herbert Schildt , “The Complete Reference Java 2 fifth edition, McGraw Hill.

## REFERENCE BOOKS

1. Balaguruswamy , E., ““Programming with Java”, Tata Mcgraw Hill.
2. Horetmann Cay and Cornell Gary, “Core Java Volume – I”, Pearson Education.
3. Horetmann Cay and Cornell Gary, “Core Java™ 2, Volume II – Advanced Features”, 7th Edition, Pearson Publisher.
4. Kathy Sierra and Bert Bates, “Head First Java” by O'REILLY publications.

CS-210B	SOFTWARE ENGINEERING	L T P	Cr
		3 0 0	3

To provide basic knowledge of properties of software and its development processes, software quality, CASE tools, etc.

**PRE-REQUISITES:** Knowledge of computer programming, principles of management

1. **INTRODUCTION:** Definition and Emergence of Software Engineering, Evolving Role of Software, Software Life Cycle Models, Software Characteristics, Applications, Software Product, Software Process, Software Crisis, Software Myths.
2. **SOFTWARE PROJECT MANAGEMENT:** Project management concepts, software process and project metrics project planning, project size estimation metrics, project estimation techniques, empirical estimation techniques, COCOMO- a heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking.
3. **REQUIREMENTS ANALYSIS AND SPECIFICATION:** Requirements engineering, system modeling and simulation, analysis principles: modeling, partitioning, software, prototyping: methods and tools; specification principles, representation, the software requirements specification and reviews analysis modeling: data modeling, functional modeling and information flow: data flow diagrams, behavioral modeling; the mechanics of structured analysis: creating entity/ relationship diagram, data flow model, control flow model, the control and process specification
4. **SYSTEM DESIGN AND COMPUTERAIDEDSOFTWARE ENGINEERING:** Design Process: design and software quality, design principles; design concepts: abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, software procedure, information hiding; functional independence, cohesion, coupling; design heuristics for effective modularity; design model; design documentation, architectural design: software architecture, CASE, building blocks; integrated case environments and architecture, repository
5. **TESTING AND MAINTENANCE:** Software testing techniques, software testing fundamentals: objectives, principles, testability; test case design, white box testing, basis path testing: control structure testing: black box testing, testing for specialized environments, architectures and applications. software testing strategies: verification and validation, unit testing, integration testing, validation testing, alpha and beta testing; system testing, acceptance testing debugging approaches; software re engineering, reverse engineering, restructuring, forward engineering, Software maintenance, Adaptive ,

corrective and perfective, software reliability: measures of reliability and availability, software safety.

## **TEXT BOOK**

Pressman Roger S., —Software Engineering – A Practitioner's Approach II, McGraw Hill, 2004

## **REFERENCE BOOKS**

1. Jalote Pankaj, —An Integrated Approach to Software Engineering II, 3<sup>rd</sup> edition, Narosa Book Distributors Private Ltd, 2005
2. Mall Rajib, —Fundamentals of Software Engineering II, Prentice Hall of India, 2003
3. Sommerville Ian, —Software Engineering II, 8th edition, Addison Wesley, 2007
4. Gustafson David, —Software Engineering II, Tata McGraw Hill, 2002
5. Behforooz Ali and Hudson Frederick J., —Software Engineering Fundamentals II, Oxford University press, John Wiley & Sons, 2005

EC-214B	DIGITAL AND ANALOG COMMUNICATIONS	L T P	Cr
		3 0 0	3

## OBJECTIVE

To acquaint the students with the knowledge of different modes of communication techniques as well as equipment and standard guiding such communication.

- 1. COMMUNICATION SYSTEM COMPONENTS:** Introduction to Communication: definition & means of communications; digital and analog signals: sign waves, square waves; properties of signals: amplitude, frequency, phase; theoretical basis for data communication: Fourier analysis: Fourier series and Fourier Transform (property, ESD, PSD and Raleigh) effect of limited bandwidth on digital signal.  
**DATA ENCODING SCHEMES:** Physical connections: modulation, amplitude-, frequency-, phase- modulation; Data encoding: binary encoding (NRZ), Manchester encoding, differential Manchester encoding.
- 2. DATA TRANSMISSION:** Transmission Media: Twisted pair-, co-axial-, fiber optic-cables, wireless media; transmission impairments: attenuation, limited bandwidth of the channels, delay distortion, noise, data rate of the channels (Nyquist theorem, Shannon limit)
- 3. DATA COMMUNICATION INTERFACES:** Physical layer interfaces: RS 232, X.21; parallel interfaces: the telephone network: DDD network; private- line service; the telephone circuit; data modems: synchronous modems; asynchronous modems; modem synchronization
- 4. STANDARDS IN DATA COMMUNICATIONS:** Communication modes: simplex, half duplex, full duplex; transmission modes: serial-, parallel-transmission; synchronizations: asynchronous-, synchronous-transmission; type of services: connection oriented-, connectionless-services; flow control: unrestricted simplex protocol, simplex stop- and -wait protocol, sliding window protocol.  
**SWITCHING SYSTEMS:** Introduction: circuit switching; packet switching: data gram, virtual circuits, and permanent virtual circuits. Telephone Systems: PSTN, ISDN, asynchronous digital subscriber line, Multiplexing: frequency division-, time-, wave- division multiplexing
- 5. SECURITY IN DATA COMMUNICATIONS:** Transmission errors: feedback-, forward-error control approaches; error detection: parity check, block sum check, frame check sequences; error correction: hamming codes, cyclic redundancy check. data encryption: secret key cryptography, public key cryptograph; data compression: run length encoding, Huffman encoding.

## TEXT BOOK

Simon Haykin, Communication Systems, 3rd edition, Wiley, 1995.

## REFERENCE BOOKS

1. Sanjay Sharma, Communication Systems, Kataria& Sons.
2. HSU. HWei P, Analog and Digital Communications, Schaum's outline series, Tata McGraw Hill, 2003
3. Singh, R.P. and Sapre, S.D., Communication Systems, Analog and Digital, Tata McGraw Hill, 2002.
4. P Chakraborty, Analog communication systems, Dhanapatirai& Sons, 2008
5. Sam Shanmugam.K.; Digital and Analog Communication Systems, Wiley, 1998.
6. Taub and Shilling, Principles of Communication Systems, 2nd edition, Tata McGraw Hill, 2003.

CS-252 B	COMPUTER NETWORKS LAB	L T P	Cr
		0 0 2	1

## LIST OF EXPERIMENTS



S. No.	Experiment/Exercise
PART -1	Basics of Computer Networks
1	Study of computer Networks and different types of Computer Networks.
2	Study of Types of Network Topology with help of diagram.
3	Study about Different types of Communication medium.
4	Study of different type of connectors used in Computer Networks.
5	Study of Diff types of devices using Computer Networks.
PART-2	Basics of IP Addressing and LAN Setup equipments
6	IP Addressing and Subnet Concepts
7	Basic LAN setup
8	How to make RJ 45 connector.
9	How to make Straight cable.
10	How to make cross- over cable.
PART-3	Paket Tracer
10	Write the steps to connection two computer using crossover cable
11	Create a peer to peer network in Packet tracer.
12	Write the steps to create a LAN in Packet tracer with the help of Hubs.
13	Write the steps to create a LAN in Packet tracer with the help of switches.
14	Write the steps to create a LAN in Packet tracer with the help of Hubs and switches both.
PART-4	Wireless and Networking Commands
15	Study of (a) Wireless Connectivity and (b) Different networking commands
16	Study of Ethernet Switch configuration (Simulator to be decided)
PART-5	Protocol Configuration
17	Configuring IPv4 Protocol
18	IPv6 addresses Protocol

<b>CS-256B</b>	<b>COMPUTER GRAPHICS LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

## LIST OF EXPERIMENTS

1. 2D line as raster graphics display using Bresenham line drawing algorithm
2. 2D line drawing as raster graphics display using DDA line drawing algorithm
3. Circle drawing as raster graphics display using midpoint circle drawing algorithm
4. Polygon filling as raster graphics display using Boundary fill algorithm and Flood fill algorithm
5. Line clipping
6. Polygon clipping
7. Display 3D object as 2D raster graphics display using perspective transformation
8. Rotation for 3D object about arbitrary axis
9. Hidden surface removal from a 3D object
10. 2D transformations of a given object (triangle, rectangle, pentagon) for translating, scaling, rotating, reflecting, shearing
11. Create a screen saver using inbuilt functions of graphics
12. Zoom an object
13. Reverse zooming
14. Create a Bezier Curve

## REFERENCE BOOKS

1. Hearn Donald and Baker M. Pauline, —Computer Graphics, 2nd Edition, Prentice Hall of India, 1999
2. Rogers David F., —Procedural Elements for Computer Graphics, 2nd Edition, Tata McGraw Hill, 2001

CS-258 B	CORE JAVA LAB	L T P	Cr
		0 0 2	1

The following programs on different topic are to be done in this lab.

### 1. Sample Program

- (a) Write a Java program to print “Hello Java”

### 2. Operators and Expressions

- (a) Write a java program to find the area of a rectangle.
  - (b) To write a java program to find the result of the following expressions
    - (i)  $(a < 2) + (b > 2)$
    - (ii)  $(b > 0)$
    - (iii)  $(a + b * 100) / 10$
    - (iv)  $a \& b$
- Assume  $a=10$ ,  $b=5$

- (c) To write a java program to print the individual digits of a 3 digit number using Command line arguments.

### 3. Decision making statements

- (a) Write a java program to read two integers and print the larger number. followed by the words “is larger”. If the numbers are equal print the message “These numbers are equal”
- (b) Write a java program to read an integer and find whether the number is odd or even.
- (c) Write a java program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by 7.

### 4. Looping Statements

- (a) Write a Java program to find the sum of digits of a given number.
- (b) Write a java program to find the first 15 terms of Fibonacci sequence.
- (c) Write a java program to print the Armstrong numbers.
- (d) Given a number, write a program using while loop to reverse the digits of the number.

For example, the number

12345

should be written as 54321.

### 5. Array & Strings

- (a) Write a java program to find the largest and smallest number in an array.
- (b) Write a java program to multiply two matrices.
- (c) Write a java program to sort the following numbers in descending order.  
{55, 40, 80, 65, 71}
- (d) Write a java program that creates a string object and initializes it with your name and performs the following operations
  - (i) To find the length of the string object using appropriate String method.

- (ii) To find whether the character 'a' is present in the string. If yes find the number of times 'a' appear in the name and the location where it appears.
- (e) Write a java program to arrange the following word in alphabetical order  
{Madras, Delhi, Ahmadabad, Calcutta, Bombay}
- (f) Write a java program to create a StringBuffer object and illustrate how to append characters and to display the capacity and length of the StringBuffer.

#### **6. Classes & Objects**

- (a) Write a java program to display total marks of 5 students using student class. Given the following attributes: Regno(int), Name(string), Marks in subjects(Integer Array), Total (int).
- (b) Write a java program to find the area of a room using constructor.
- (c) Write a java program to implement method overloading.
- (d) Write a java program to show the use of "static" members.
- (e) Write a java program to implement the nesting of methods.

#### **7. Inheritance**

- (a) Write a java program to implement single inheritance using "super" keyword.
- (b) Write a java program to implement method overriding.
- (c) Write a java program to implement multiple inheritances.

#### **8. Package & Multithreading**

- (a) Write a program to create your own package and use that package in another program to print "Hello package".
- (b) Write a program to implement multithreading using the system function like yield(), stop(), sleep().

#### **9. Exception Handling and Applet programming**

- (a) Write a java program to implement multiple try/catch statements.
- (b) Write a java program to print "Hello applets" using applets.

#### **10. File handling**

- (a) Write a program to copy the content of one file into another using character stream classes.
- (b) Write a program to copy the content of one file into another using byte stream classes.

**TEXT BOOK** Herbert Schildt , "The Complete Reference Java 2 fifth edition, McGraw Hill.

#### **REFERENCE BOOKS**

1. Balaguruswamy , E., ""Programming with Java", Tata Mcgraw Hill.
2. Horetmann Cay and Cornell Gary, "Core Java Volume – I", Pearson Education.

<b>CS-254B</b>	<b>OPERATING SYSTEMS LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

1. Study of Windows 2003 Operating System, Various services available in Windows 2003 Server and Internal/system commands for network and system monitoring in Windows 2003 Server,
2. Difference between the Windows 2003 Server and Windows 2003 Client software.
3. Study of Linux Operating System (Linux kernel, shell, basic commands like make, pipe and filter and Simple programs to display process group Ids: PID, PPID, GID), Internal/system commands for network and system monitoring in Linux.
4. Display "Linux Programming Lab" N times using library function calls and system calls.
5. Programs using system calls that provides error checking
6. Programs using Processes.
7. Administration of Linux Operating System (connecting users, connectivity across LAN and WAN; Mounting and un-mounting of devices, taking backups, restoring data from backups.
8.
  - a. Writing of Shell Scripts
  - b. AWK programming
  - c. Study of MacOS features, Internal/system commands for network and system monitoring in MacOS.
9.
  - a. Study of differences between Windows 2003 Server, Linux and MacOS.
  - b. Programs using Command Line Arguments.
  - c. Programs for Simple Shell and Complex Shell with cd command, editor command, etc.
10.
  - a. Programs for Primitive Communications.
  - b. Programs using Pipes: Unnamed Pipes, Names Pipes.
  - c. Programs using Message Queues.

#### REFERENCE BOOKS

1. Bach Maurich, "Design of the Unix Operating System", Prentice Hall of India, 1986
2. Prato Stephen, "Advanced Unix Programmer's Guide", BPB Publications, 2006
3. Das Sumitabha, "Unix- Concept and Applications", Tata McGraw Hill, 2002.

# 3<sup>rd</sup> Year

## School of Computer Science

### Scheme of studies and syllabus-2017

<b>CS-301B</b>	<b>ADVANCE JAVA</b>	<b>L T P</b>	<b>Cr</b>
		<b>4 0 0</b>	<b>4</b>

#### **OBJECTIVE**

To relay the theoretical and practical knowledge of Advanced Java programming language

#### **PRE-REQUISITES**

Basic knowledge of programming language and object oriented programming

1. **INTRODUCTION TO CORE JAVA:** Overview of Core Java: Data types; variables; operators; Arrays; Control Statements; Classes & Methods; Inheritance; Package, Multithreading; Exception Handling Applet Programming, I/O Handling
2. **AWT , SWING, COLLETION:** Introduction to AWT: Working with windows, Text, Controls, Layout Mangers, Menus; Swing: JApplet, Icons and Labels, Text Fields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Tables; Collection overview: collection interfaces: Collection, List, Set , Sorted Set; Collection classes Array List, Linked List, Hash Set, Linked Hash Set, Tree Set
3. **JAVA DATA BASE CONNECTIVITY (JDBC):** Introduction; JDBC architecture; Different types of JDBC drivers; JDBC API; Steps for using JDBC: Loading a driver, Connecting to a database, creating and executing JDBC statements, Handling SQL exceptions; Executing DDL & DML commands; Accessing the result sets; creating a JDBC application to query a database; Creating application using advanced features of JDBC: Using the Prepared Statement, Managing database transactions, Creating stored procedures, Using meta data
4. **SERVLETS:** Introduction; The life cycle of a thread; Using Tomcat for servlet development; Simple servlet example; The servlet API; javax.servlet package; reading servlet parameter; javax. servet. http package; handling HTTP requests and responses; Using cookies; Session Tracking; Security issues
5. **JSP:** JSP overview: How JSP works, Basic example; JSP Syntax & Semantics; JSP development model: Components of a JSP page, A complete example; Expressions, Scriptlets and declarations page, Request dispatching, Session and Thread management: Session Tracking, Session API, Thread Management , Servlet Thread Model; JSP Custom; Expressions Language; JSP database access with JDBC

#### **TEXT BOOK**

1. Herbert Schildt , “The Complete Reference Java 2 fifth edition”, McGraw Hill.

#### **REFERENCE BOOKS**

1. Phil Hanna ,” The Complete Reference JSP 2.0” Tata McGraw-Hill
2. James Homes,” The Complete Reference Struts ” Tata McGraw-Hill
3. Balaguruswamy , E., ““Programming with Java”, Tata Mcgraw Hill
4. Horetmann Cay and Cornell Gary, “Core Java™ 2, Volume II – Advanced Features”, 7th Edition, Pearson Publisher.
5. “Complete reference JDBC”, Tata Mcgraw Hill
6. JDBC Study Material by NIIT

CS-303B	ARTIFICIAL INTELLIGENCE	L T P	Cr
		3 0 0	3

**OBJECTIVE:** To introduce about artificial intelligence approaches to problem solving, various issues involved and application areas

**PRE-REQUISITES:** Knowledge of neural networks, data structures

1. **INTRODUCTION TO AI AND SEARCH TECHNIQUES:** Foundation and history of AI; data, information and knowledge; AI problems and techniques – AI programming languages, problem space representation with examples; blind search strategies, breadth first search, depth first search, heuristic search techniques: hill climbing: best first search, A \* algorithm AO\* algorithm, Minimax search procedure

for Game Playing.

2. **KNOWLEDGE REPRESENTATION ISSUES AND TECHNIQUES:** predicate logic; representing knowledge using rules. Semantic nets, partitioned nets, parallel implementation of semantic nets; frames, forward and backward chaining; frame based systems
3. **REASONING UNDER UNCERTAINTY:** Reasoning under uncertainty, non monotonic reasoning; Review of probability; Baye's probabilistic interferences and Dumpster Shafer theory; statistical reasoning, fuzzy reasoning.
4. **PLANNING & LEARNING:** goal stack planning; non linear planning, hierarchical planning representation for planning; partial order planning algorithm. Basic concepts of Learning ; rote learning, learning by taking advices, learning by problem solving, learning from examples, discovery as learning, learning by analogy; explanation based learning; neural nets; genetic algorithms.
5. **EXPERT SYSTEM AND APPLICATIONS OF ARTIFICIAL INTELLIGENCE:** expert systems: rule based systems architecture: Principles of natural language processing: knowledge acquisition concepts; AI application to robotics, and current trends in intelligent systems; parallel and distributed AI.

## TEXT BOOK

Rich Elaine and Knight Kevin, —Artificial Intelligence‖ 3rd Edition, Tata McGraw Hill, 1991

## REFERENCE BOOKS

1. Nilson Nils J., —Artificial Intelligence‖, McGraw-Hill, New York 1971
2. Russell Stuart and Norvig Peter, —Artificial Intelligence: A Modern Approach‖, Prentice Hall of India, 1998
3. Negnevitsky, —Artificial Intelligence: A Guide to Intelligent System ‖, Pearson Education, 2004.
4. Patterson O. W., —Introduction to Artificial Intelligence & Expert Systems‖, Prentice Hall of India, 1996.
5. Winston Patrick Henry, —Artificial Intelligence‖, 3rd Edition, Addition Wesley, 1992
6. Clockson&Mellish, —Programming PROLOG‖, 3rd Edition, Narosa Publications, 2002.

CS-305B	Python Programming	L-T-P	Cr
		4-0-0	4

## OBJECTIVE

To build programming logic and thereby developing skills in problem solving using Python programming language; To be able to do testing and debugging of code written in Python Emphasize the concepts and constructs rather than on language features.

**UNIT 1: Planning the Computer Program and Problem solving techniques:** Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. Flow charting, decision table, algorithms, structured programming concepts, Programming methodologies viz. Top-down and bottom-up programming.

**UNIT 2: Overview of Programming & Introduction to Python:** Structure of a Python Program, Elements of Python. Python Interpreter, Using Python as calculator, Python shell,

Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic Operator, Relation a l operator, Logical or Boolean operator, Assignment, Operator, Ternary operator ,Bit wise operator, Increment or Decrement operator).

**UNIT 3: Creating Python Programs:** Input and Output Statements, Control Statements(Looping-while Loop, for Loop ,Loop Control ,Conditional Statement-if...else, Difference between break ,continue and pass).

**UNIT4: Structures& Functions:** Numbers, Strings, Lists, Tuples, Dictionary, Date &Time, Modules, Defining Functions, Exit function, default arguments.

**UNIT 5: Classes, Object-oriented Programming and Exception:** Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding, Handling exceptions

**TextBooks:**

1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India

**Reference Books:**

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation [www.python.org](http://www.python.org)2010
3. Allen Downey, Jeffrey Elkner, Chris Meyers ,How to think like a computer scientist :Learning with Python,Freelyavailableonline.2012
4. <http://docs.python.org/3/tutorial/index.html>
5. <http://interactivepython.org/courselib/static/pythonds>
6. <http://www.ibiblio.org/g2swap/byteofpython/read/>



<b>CS-307B</b>	<b>SOFT COMPUTING TECHNIQUES</b>	<b>L T P</b>	<b>Cr</b>
		<b>4 0 0</b>	<b>4</b>

**OBJECTIVE** : To introduce about incorporating more mathematical approach (beyond conventional logic system) into the artificial intelligence approaches for problem solving such as fuzzy logic, genetic algorithms, etc.

**PRE-REQUISITES** : Knowledge of mathematics, statistics and probability

- 1. NEURAL NETWORKS INTRODUCTION AND ARCHITECTURE:** Comparison of soft computing methods: neural networks, fuzzy logic, and genetic algorithm with conventional artificial intelligence (hard computing).Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta. Associative Memories, Kohonenselforganizing networks, Hebbian learning, Hopfield network.
- 2. MULTILAYER PERCEPTRON** : Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule coefficient ;back propagation algorithm, factors affecting backpropagation training, applications.Radial basis function networks.
- 3. FUZZY SET THEORY:** Basic definition and terminology; basic concepts of fuzzy logic; set theoretic operators; membership functions: formulation and parameterization; fuzzy union, intersection and complement; fuzzy rules and fuzzy reasoning; fuzzy inference systems: Mamdani and Sugeno fuzzy models, fuzzy associative memories.
- 4. NEURO-FUZZY MODELLING:** Adaptive neuro-fuzzy inference systems; neuro-fuzzy controller-feedback control; expert control; back propagation through time and real-time recurrent learning; reinforcement learning control; gradient-free optimization.NEURO-FUZZY CONTROLLER IN ENGINEERING APPLICATIONS: Fuzzy logic in control engineering- Mamdani and Sugeno architecture for fuzzy control
- 5. GENETIC ALGORITHMS:** Basics of genetic algorithms; design issues in genetic algorithm; genetic modeling; hybrid approach; GA based fuzzy model identification; fuzzy logic controlled genetic algorithm.Genetic algorithm, Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Applications & advances in GA, Differences & similarities between GA & other traditional method

TEXT BOOK

Introduction to Soft Computing – S.N.Sivanandan and Deepa – Wiley Publications

## REFERENCE BOOKS

1. Rajasekharan S. and VijayalakshmiPai S. A., “Neural Networks, Fuzzy Logic & Genetic Algorithms”, Prentice-Hall of India, 2003
2. Kecman Vojislav, “Learning and Soft Computing”, MIT Press, 2001
3. Introduction to soft computing –Sivanandam and Deepa..

4. Konar Amit, "Artificial Intelligence and Soft Computing – Behavioural and Cognitive Modeling of the Human Brain", Special Indian Edition, CRC Press, 2008
5. Goldberg David E., "Genetic Algorithms", Pearson Education, 2003.
6. Sivanandam, "Introduction to Neural Networks with MATLAB 6.0", Tata McGraw Hill
7. Kumar Satish, "Neural Networks: Classroom Approach", Tata McGraw Hill
8. Yen John and Langari Reza, "Fuzzy Logic, Intelligence, Control, and Information", Pearson Education, 2003.
9. Zurada Jack N., "Introduction to Neural Networks", Jaico Publishers.
10. Haykin Simon, "Neural Networks", Prentice Hall, 1993/Pearson Education, 1999.
11. Koza J., "Genetic Programming", MIT Press, 1993

<b>CS- 309B</b>	<b>Formal Languages and Automata Theory</b>	<b>L T P</b>	<b>Cr</b>
		<b>4-0-0</b>	<b>4</b>

### PRE-REQUISITES

Knowledge of mathematics and Programming Languages

### OBJECTIVE:

To understand the theory and practice of compiler implementation. To learn finite state machines and lexical scanning. To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees , push down Automata and Turing Machine.

1. **FINITE AUTOMATA AND REGULAR EXPRESSIONS:** Finite state systems; basic definitions non-deterministic finite automata (NFA), deterministic finite automata (DFA), equivalence of DFA and NFA finite automata with  $\epsilon$ -moves; limitations of FSM, Moore and Mealy Machines; Equivalence of Moore and Mealy Machines., Minimization of Finite Automata. Concept of basic machine; properties
2. **PROPERTIES OF REGULAR SETS:** regular expressions; equivalence of finite automata and regular expressions, regular expression conversion and vice versa, Arden's theorem; The Pumping Lemma for regular sets; applications of the pumping lemma; closure properties of regular sets.
3. **CONTEXT FREE GRAMMARS & PDA:** Definition, Context free and context sensitive grammar; ambiguity regular grammar; reduced forms; removal of useless symbols and unit production; Chomsky Normal Form (CNF), Greibach Normal Form (GNF). Introduction to pushdown machines; design of PDA; conversion of PDA to CFG and vice versa, application of pushdown machines.
4. **TURING MACHINES:** Basic concepts, Deterministic and non-deterministic Turing machines; design of Turing machines; halting problem of Turing machines.
5. **Introduction to Compiler Design and Parsing :** Introduction to translators and its need, structure of Compilers and its different phases. : Introduction to Parser and role of Parser (Syntax analyzer), Types of parsers: Bottom up and Top down Parser.

### TEXT BOOK

Hopcroft, Ullman O. D. and Mothwani R., “Introduction to Automata Theory, Language & Computations”, Addison Wesley, 2001

## REFERENCE BOOKS

1. Mishra K. L. P. and Chandrasekaran N., “Theory of Computer Science - Automata, Languages and Computations”, Prentice Hall of India, 2000
2. Linz Peter, “Introduction to Formal Languages & Automata”, Narosa Publications, 2001
3. Greenlaw Ramond and Hoover H. James, “Fundamentals of the Theory of Computation - Principles and Practice”, Harcourt India Pvt. Ltd., 1998
4. Lewis H. R. and Papaditriou C. H., “Elements of Theory of Computation”, Prentice Hall of India, 1998
5. Martin John C., “Introduction to Languages and Theory of Computations”, Tata McGraw Hill, 2003

EC-303B	Microprocessors and Interfacing	L T P	Cr
		3 1 0	4

**OBJECTIVE** This subject introduces the concept of Microprocessors to the students. It covers 8 bit (8085) and 16-bit (8086) Microprocessors: their architecture, assembly language programming and interfacing with peripheral devices

**PRE-REQUISITES** Knowledge of Boolean algebra, number systems and basic digital circuitry

1. **THE 8085 PROCESSOR:** Introduction to microprocessor; 8085 microprocessor: Architecture; Pin Diagram; instruction set; interrupt structure; Addressing modes and assembly language programming.

2. **THE 8086 MICROPROCESSOR ARCHITECTURE:** Architecture; block diagram of 8086 with details of sub-blocks; memory segmentation and physical address computations; program relocation; addressing modes; pin diagram and description of various signals; Interrupt Structure.

**INSTRUCTION SET OF 8086:** Data transfer instructions; arithmetic instructions; branch instructions; looping instructions; NOP and HLT instructions; flag manipulation instructions; logical instructions; shift and rotate instructions; directives; programming examples.

3. **INTERFACING DEVICE:** The 8255 PPI chip: Architecture; control words and modes; interfacing and programming with 8085.

**DMA:** Introduction to DMA process; 8257 pin diagram; architecture; operation; command words; interfacing and programming with 8085.

4. **PROGRAMMABLE INTERRUPT CONTROLLER:** 8259 pin diagram; architecture; initialization command words; operational command words.

5. **PROGRAMMABLE INTERVAL TIMER:** 8253 pin diagram; architecture; modes.

**TEXT BOOK** Gaonkar, Ramesh S., —Microprocessor Architecture: Programming and Applications with 8085, 5th Edition, Prentice Hall of India, 1995

### REFERENCE BOOKS

1. Brey, The Intel Microprocessors 8086- Pentium Processor, 4th Edition, 2005
2. Hall, —Microprocessors and interfacing, Tata McGraw Hill, 3rd Edition, 2003
3. Liu Yu-Chang and Gibson Glenn A., —Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, Prentice Hall of India, 2003
4. Ray A. K. and Burchandi, —Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing, Tata McGraw Hill, 2002
5. Rafiquzzman, —Microprocessor based System Design UBS, Wiley-Interscience, 5th Edition, 2005

<b>CS-351B</b>	<b>Advance Java Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### List of Experiments

#### Part -1 : Simple classes and methods

- 1 Write a program to print “Hello Java”.
- 2 Write a program to find the area of a room using two classes.
- 3 Program that calculates and prints the simple interest using the formula: simple interest=PNR/100 Input values P, N, R should be accepted as command line input as below, e.g. java Simple interest 5 10 15
- 4 Write a program to find the greatest of the following numbers:  
325, 712, 478

#### Part -2 : Array implementation

- 5 Write a program to tell that how many numbers are evens and odds in the followings: 50, 65, 56, 71, 81
- 6 Write a program to sort the following numbers in ascending orders.  
55, 40, 80, 65, 71
- 7 Write a program to print a pattern like:  

```

1
2 2
3 3 3
4 4 4 4
5 5 5 5 5

```

#### Part -3 : Command line arguments, String Implementation

- 8 Write a program to implement command line arguments.
- 9 Write a program to arrange the following words in dictionary order.  
Madras, Delhi, Ahmadabad, Calcutta, Bombay

**Part -4 : Implementation of constructor & method overloading, overriding, nesting**

- 10 Write a program to find the area of a room using Constructor.
- 11 Write a program to implement methods overloading.
- 12 Write a program to implement static keyword.
- 13 Write a program to implement “nesting of methods”.
- 14 Write a program to implement overriding of methods.

**Part -5 : Inheritance, Package**

- 15 Write a program to implement single inheritance.
- 16 Write a program to implement multiple inheritance.
- 17 Write a program to create your own package and use that package in another program to print “ Hello package”.

**Part -6 : Multithreading, Exception Handling, Applet programming**

- 18 Write a program to implement multithreading using the system function like yield(), stop(), sleep().
- 19 Write a program to implement multiple try/catch statements.
- 20 Write a program to print “Hello Java” using applet programming.

**Part -7 : File Handling, Java Networking**

- 21 Write a program to copy the content of one file into another using character stream classes.
- 22 Write a program to copy the content of one file into another using byte stream classes.
- 23 Write a program to find the IP address of a Local machine.
- 24 Write a program to find the IP address of a Remote machine.
- 25 Write a program to find the protocol, port number, host name, file name from a URL address.

**Part -8 : Awt, Swing, Collection, Java Database Connectivity**

- 26 Write a program to implement a calculator in AWT
- 27 Write the programs to implement the followings in:-  
JTable, JList, JTree, JCombobox, JColorChooser, JProgressBar
- 28 Write the programs to implement the followings in Collection:-  
ArrayList, Vector, Map
- 29 Create a Java application to insert data in the product table using the Statement

object.

- 30 Create a Java application to execute a stored procedure that retrieves and displays the information from the customer table.

#### **Part -9 : Java RMI and Java Beans**

- 31 Write a program to implement Java RMI.  
32 Write a program to create a simple java bean.

#### **Part -10 : Java server & JSP**

- 33 Write a program to create a web page using Java server programming.  
34 Write a program to create a web page using JSP.

<b>CS-353B</b>	<b>ARTIFICIAL INTELLIGENCE LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

#### **LIST OF EXPERIMENTS**

1. Study of Prolog programming language.
2. Write a program to find out route distance between two cities using Prolog.
3. Write a program to implement Tower of Hanoi using Prolog.
4. Write a program to calculate factorial of a number using Prolog.
5. Write a program to implement Hardware simulation using Gates using Prolog.
6. Write a program to implement family relationship using Prolog.
7. Write a program to implement logon with recursion using Prolog.
8. Write a program to print the list of customer having different colored cars with price and model available using Prolog.
9. Write a program to implement water jug problem using Prolog.
10. Write a program to implement Breadth First Search using Prolog.
11. Write a program to implement Depth First Search using Prolog.
12. Write a program to implement five House logic puzzle problem using Prolog.
13. Write a program to analyze Grammar of sentences using Prolog.
14. Write a program to solve 8-Queens problem using Prolog.
15. Write a program to solve Monkey Banana problem using Prolog.

<b>EC-353B</b>	<b>MICROPROCESSOR AND INTERFACING LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

#### **LIST OF EXPERIMENTS**

1. Familiarization with the operation of 8085 Microprocessor kit.
2. Write a program using 8085 for: a) Addition of two 8-bit numbers. b) Addition of two 16-bit numbers
3. Write a program using 8085 for : a) 8-bit subtraction  
b) 16-bit subtraction
4. Write a program using 8085 for a) Multiplication of two 8- bit numbers  
b) Division of two 8- bit numbers
5. Write a program using 8085 to arrange an array of 10 Nos in-  
a) Ascending order b) Descending order
6. Familiarization with the operation of 8086 microprocessor kit
7. Write a program using 8086 for copying 12 bytes of data from source to destination.
8. Write a program using 8086 for:  
a) Finding the largest number from an array.  
b) Finding the smallest number from an array.
9. Write a program using 8086 for arranging an array of numbers in descending order and ascending order
10. Write a program for finding square of a number using look-up table and verify.
11. Write a program to interface a two digit number using seven-segment LEDs. Use 8085 microprocessor and 8255 PPI.

### SCHEME FOR BCA

BCA			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1101 A	Computer programming	4	0	0	4
2	CA-1108 A	Internet and Web Development	4	0	0	4
3	MA-101B	Applied Mathematics	4	0	0	4
4	EN-103B	Communication skill I	3	0	0	3
5	CA-1107 A	Computer fundamental and emerging technology	3	0	0	3
6	BA-247 A	Accounting and Financial Management	4	0	0	4
PRACTICALS						
1	CA-1151 A	Computer Programming Lab	0	0	2	1
2	CA-1157 A	PC Software Lab	0	0	2	1
3	CA-1158 A	Internet and Web Development Lab	0	0	2	1
4	PDP-191	Co- curricular activities	0	1	0	1*
Total			22	1	6	25+1*

B. TECH.			Semester			II
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SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1102A	Data Structures using C	4	0	0	4
2	CA-1104A	Object Oriented Programming using C++	4	0	0	4
3	CA-1106A	Discrete structure	3	0	0	3
4	EC-1101 A	Basics of Digital Electronics	4	0	0	4
5	MA-1105A	Mathematics-II	4	0	0	4
6	CE-101 A	Environmental Science and Ecology	2	0	0	2
PRACTICALS						
1	CA-1152 A	Data Structures Using C Lab	0	0	2	1
2	CA-1154A	Object Oriented Programming using C++ Lab	0	0	2	1
3	PD-251 A	MAT LAB	0	0	2	1
4	PDP-191A	Co- curricular activities	0	1	0	1*
Total			21	1	6	24+1*

## SCHEME FOR BCA

BCA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1201 A	Operating Systems	4	0	0	4
2	CA1202A	Computer Architecture & Organization	4	0	0	4
3	CA-1206A	Multimedia Technologies	4	0	0	4
4	CA-1210A	Computer Networks	3	0	0	3
5	CA-1212A	Core Java	4	0	0	4
6	CA-1213 A	Database Management System	4	0	0	4
PRACTICALS						
1	CA1256A	Multimedia Technologies Lab	0	0	2	1
2	CA-1262A	Core java Lab	0	0	2	1
3	CA-1263 A	Database Management System Lab	0	0	2	1
4	PD-292 A	Effective communication **	0	0	2	1
5	PDP-291	Co- curricular activities	0	1	0	1*
Total			23	1	8	27+1*



BCA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1204A	Computer Graphics	4	0	0	4
2	CA-1205A	Design and Analysis of Algorithms	4	0	0	4
3	CA-1207A	Linux and Shell Programming	3	0	0	3
4	CA-1208A	Applied Numerical Techniques	3	0	0	3
5	CA-1209A	IT Management	3	0	0	3
6	CA-1211A	Rapid Application Development	3	1	0	4
PRACTICALS						
1	CA-1254A	Computer Graphics Lab	0	0	2	1
2	CA-1257A	Linux and Shell Programming Lab	0	0	2	1
3	CA-1261A	Rapid Application Development Lab	0	0	2	1
4	PD-293 A	INTERPERSONAL SKILLS	0	0	2	1
5	PD-291	Co-Curricular Activities	0	1	0	1*
Total			20	2	8	25+1*

### SCHEME FOR BCA

BCA			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1302	Software Engineering Principles	3	1	0	4
2	CA-1325	Cryptography & Data Compression	3	0	0	3
3	CA-1303	Programming Using C#	3	1	0	4
4	CA-1304	Artificial Intelligence	3	1	0	4
5	CA-1305	Introduction to E-commerce	3	0	0	3
PRACTICALS						
1	CA-1353	Programming Using C# Lab	0	0	2	1
2	CA-1354	Artificial Intelligence Lab	0	0	2	1
3	CA-1381	Minor project -I	0	0	8	4
4	PD-392	Problem Solving Skills	0	0	2	1
5	PD-391	Co-Curricular Activities	0	1	0	1*
Total			15	4	14	25+1*

BCA			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1326	Elective -2 (Expert System)	3	0	0	3
2	CA-1306	Software Project Management	3	1	0	4
3	CA-1309	Network security & management	3	1	0	4
4	CA-1307	Neural Network	3	1	0	4
5	CA-1308	Data Mining and Warehousing	3	0	0	3
PRACTICALS						
1	CA-1357	Neural network lab	0	0	2	1
2	CA-1358	DataMining and Warehousing Lab	0	0	2	1
3	CA-1382	Project (Minor Project)**	0	0	8	4
4	PD-391	Co-Curricular Activities	0	1	0	1*
Total			15	4	12	24+1*

## SCHEME FOR MCA DEGREE PROGRAMME

MCA			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-101 A	Computer Programming	4	0	0	4
2	MCA-102 A	Discrete Structures	4	0	0	4
3	MCA-104 A	Data Communication and Networking	3	0	0	3
4	MCA-106 A	Web Development	3	0	0	3
5	MCA-108 A	Data Structures and its application	4	0	0	4
6	EN-105 A	Technical Communication	3	0	0	3
PRACTICALS						
1	MCA-151 A	Computer Programming Lab	0	0	4	2
2	MCA-158 A	Data Structures and its application Lab	0	0	4	2
3	MCA-156 A	Web Development Lab	0	0	4	2
Total			21	0	12	27

MCA			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-103 A	Relational DBMS	3	1	0	4
2	MCA-105 A	Object Oriented Programming USING C++	3	0	0	3
3	MCA-107 A	Computer Organization and Architecture	3	0	0	3
4	MCA-109 A	Operating Systems	3	0	0	3
5	MCA-110 A	Analysis and Design of Algorithms	4	0	0	4
6	MCA-111 A	Software Engineering Principles	4	0	0	4
PRACTICALS						
1	MCA-153 A	Relational DBMS Lab	0	0	4	2
2	MCA-155 A	Object Oriented Programming USING C++ Lab	0	0	4	2
3	MCA-159 A	Operating System lab	0	0	4	2
		<b>Total</b>	<b>20</b>	<b>0</b>	<b>12</b>	<b>26</b>

## SCHEME FOR MCA DEGREE PROGRAMME

MCA - 2 <sup>nd</sup> Year (1 <sup>st</sup> yr. for Lateral entry) Semester - 1			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-201 A	Computer Graphics and Multimedia	4	0	0	4
2	MCA-206 A	Core and Advanced Java	4	0	0	4
3	MCA-208 A	Programming Using C#	3	0	0	3
4	MCA-215 A	Computer Software Testing	3	0	0	3
5	MCA-218 A	Object Oriented Software Engineering & UML	3	0	0	3
6	MCA-219 A	Cyber Laws and Intellectual Property Right	3	0	0	3
PRACTICALS						
1	MCA-251 A	Computer Graphics and Multimedia Lab	0	0	4	2
2	MCA-256 A	Core and Advance Java Lab	0	0	4	2
3	MCA-258 A	C# Programming Lab	0	0	4	2

		Total	20	0	12	26
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MCA - 2 <sup>nd</sup> Year (1 <sup>st</sup> yr. for Lateral entry) Semester – 1I			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-209 A	Data Mining and Data Warehousing	4	0	0	4
2	MCA-213 A	Advanced Operating System	3	0	0	3
3	MCA -214 A	Soft Computing techniques	4	0	0	4
4	MCA-216 A	Cloud Computing	4	0	0	4
5	MCA-220 A	Cryptography & Data Compression	3	0	0	3
6	MCA-221 A	Big Data Analysis	3	0	0	3
PRACTICALS						
1	MCA-259 A	Data Mining and Data Warehousing Lab	0	0	4	2
2	MCA-266 A	Cloud Computing Lab	0	0	4	2
3	MCA- 271 A	Big Data Analysis Lab	0	0	4	2
		<b>Total</b>	<b>21</b>	<b>0</b>	<b>12</b>	<b>27</b>

## SCHEME FOR MCA DEGREE PROGRAMME

MCA - 2 <sup>nd</sup> Year (1 <sup>st</sup> yr. for Lateral entry) Semester – III				Semester		V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-302	System Network Administration	3	1	0	4
2	CA-1328	Digital Image Processing (Elective – 1)	3	0	0	3
3	CA-1309	Network Security & Management (Elective – 2)	3	0	0	3
4	CA-1327	Natural Language Processing (Elective-3)	3	0	0	3
5	MCA-303	Introduction to ERP	3	1	0	4
6	MCA-301	Artificial Intelligence	3	1	0	4
PRACTICALS						

1	MCA-352	System Network Administration Lab	0	1	2	2
2	MCA-351	Artificial Intelligence Lab	0	1	2	2
3	MCA-381	Minor project	0	0	4	2
4	PD-492	PDP	0	1	0	1
<b>Total</b>			<b>18</b>	<b>6</b>	<b>8</b>	<b>28</b>

<b>MCA - 2<sup>nd</sup> Year (1<sup>st</sup> yr. for Lateral entry) Semester – 1V</b>			<b>Semester</b>			<b>VI</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	MCA-371 / MCA-391	Internship/ Internship based Seminar	0	0	32	16
2	CA-1402	Elective (Software Testing)	3	0	0	3
<b>Total</b>			<b>3</b>	<b>0</b>	<b>32</b>	<b>19</b>

## SCHEME FOR MCA DEGREE PROGRAMME

<b>ELECTIVE - I</b>			<b>Semester</b>			
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CA-1309 A	Network Security & Management	3	0	0	3
2	CA-1425 A	Information Storage and Management	3	0	0	3

3	CA-1401 A	Introduction to XML	3	0	0	3
4	CA-1323 A	Advanced Computer Architecture	3	0	0	3
5	MCA-302 A	System Network Administration	3	0	0	3
6	CA-1326 A	Expert System	3	0	0	3
7	CA-1327 A	Natural language processing	3	0	0	3
8	MCA-211 A	Information Technology & Management	3	0	0	3

### SCHEME FOR MCA DEGREE PROGRAMME

ELECTIVE - II			Semester			
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1328 A	Digital Image Processing	3	0	0	3
2	CA-1406 A	EMBEDDED SYSTEM DESIGN	3	0	0	3
3	CA-1307 A	Neural Network	3	0	0	3
4	MCA-210 A	Software Project Management	3	0	0	3
5	CA-1324 A	Advanced Database Management System	3	0	0	3
6	MCA-212 A	Mobile Computing	3	0	0	3
7	CA-1421 A	Compiler Design	3	0	0	3
8	CA-1424 A	Distributed computing	3	0	0	3
9	CA-1310 A	3 D multimedia & Animation	3	0	0	3

### SCHEME FOR M. TECH.

M. TECH.			Semester	I
SN	Course Code	Course Name	Periods	Credits

			L	T	P	
1	CS-501A	Theory of Computations	3	1	0	4
2	CS-502A	Analysis & Design of Algorithms	3	1	0	4
3	CS-503A	Advanced Database Management Systems	3	1	0	4
4	CS-506A	Advanced Computer Networks	3	1	0	4
5	CS-551A	Simulation Lab	0	0	4	2
6	CS-553A	Advanced Database Management Systems Lab	0	0	2	1
		<b>Total</b>	<b>12</b>	<b>4</b>	<b>6</b>	<b>19</b>

M. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-511A	Digital image processing	3	1	0	4
2	CS-524A	Object oriented design & Analysis	3	1	0	4
3	CS-515A	Data Warehousing and Data Mining	3	1	0	4
4	CS-516A	Advanced Operating System	3	1	0	4
5		Elective – (Network Security & Management)	3	0	0	3
6	CS-555A	Software Engineering Lab	0	0	2	1
7	CS-566 A	Advanced Operating Systems Lab	0	0	2	1
8	CS-574A	Seminar – I (MLC)	0	0	2	1
9	CS-657A	Minor Project	0	0	6	3
		<b>Total</b>	<b>15</b>	<b>4</b>	<b>12</b>	<b>25</b>

### SCHEME FOR M. TECH.

B,Tech M.Tech Integrated SEMESTER -IX	Semester	III
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SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-511	Embedded System Design	3	1	0	4
2	CS-601	Knowledge Based System Design	3	1	0	4
3	CS-513	Elective – II (Robotics)	3	0	0	3
4	CS-657	Minor Project	0	0	6	3
5	CS-653	Dissertation Preliminary**	0	0	8	4
6	CS-654	Seminar-II	0	0	4	2
		<b>Total</b>	<b>9</b>	<b>2</b>	<b>18</b>	<b>20</b>

B,Tech M.Tech Integrated SEMESTER -X			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-659	Dissertation	0	0	42	21
2	CS-658	Seminar – III	0	0	4	2
3	CS-522	Expert System	2	0	0	2
		<b>Total</b>	<b>2</b>	<b>0</b>	<b>46</b>	<b>25</b>

## SCHEME FOR DIPLOMA

	<b>Semester</b>	<b>III</b>
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DIPLOMA 2 <sup>ND</sup> YEAR						
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-201D	Data Structure Using C	4	0	0	4
2	CS-202D	DBMS	4	0	0	4
3	CS-203D	Computer Architecture and Organization	4	0	0	4
4	CS-204D	Internet and Web Development	3	0	0	3
5	CS-254D	Computer Workshop	1	0	4	3
6	EC-203D	Digital Electronics	1	0	4	3
7	CS-251D	Data Structure Using C LAB	0	0	2	1
8	CS-253D	Digital Electronics LAB	0	0	2	1
9	CS-252D	DBMS LAB	0	0	2	1
10		Co- Curricular Activities	0	1	0	1
		TOTAL	17	1	14	25

DIPLOMA 2 <sup>ND</sup> YEAR						Semester	IV
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	CS-205D	Object Oriented Programming	4	0	0	4	
2	CS-206D	Operating System and System Programming	4	0	0	4	
3	CS-207D	Multimedia Technology	4	0	0	4	
4	EC-209D	Microprocessor	3	0	0	3	
5	CS-209D	Computer Networks	3	0	0	3	
6	CS-258D	Windows and Linus Operating System Lab	0	0	2	1	
7	CS-255D	Computer Networks LAB	0	0	2	1	
8	CS-256D	Object Oriented Programming LAB	0	0	2	1	
9	CS-257D	Multimedia Technology LAB	0	0	2	1	
10	PD 293A	INTERPERSONAL SKILLS	2	0	0	1	
11	PD-291D	Co- Curricular Activities	0	1	0	1*	
		TOTAL	20	1	8	24+1*	

## SCHEME FOR DIPLOMA

DIPLOMA 3 <sup>RD</sup> YEAR			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	PD-391D	Employability Skills-1	3	0	0	3
2	CEA-101	Environmental Science and Ecology	2	0	0	2
3	CS-301D	Computer Graphics(Deptt Core – 13)	4	0	0	4
4	CS-302D	Core Java (Deptt Core – 14)	4	0	0	4
5	CS-307D	Elective (Inctoduction to E-Commerce) Deptt Elective - 15	3	0	0	3
6	CS-303D	Software Engineering (Deptt Core 16)	4	0	0	4
7	CS-351D	Computer Graphics LAB(Deptt Core – 13)	0	0	2	1
8	CS-352D	Core Java Lab (Deptt Core – 14)	0	0	2	1
9	CS-353D	Workshop/ Minor Project/ Troubleshooting	0	0	4	2
10		Co- Curricular Activities	0	1	0	1*
		<b>TOTAL</b>	<b>20</b>	<b>1</b>	<b>8</b>	<b>24+1*</b>

DIPLOMA 3 <sup>RD</sup> YEAR			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	HD-392D	Employability Skills-2	2	0	0	2
2	BA-276D	Entrepreneurship Development and Management0	3	0	0	3
3	CS-304D	Network Security Management (Deptt Core – 17)	3	0	0	3
4	CS-305D	Artificial Intelligence (Deptt Core – 18)	3	0	0	3
5	CS-306D	Software Project ManagementDeptt Elective – 19	3	0	0	3
6	CS-354D	Major Project	0	0	16	8
7	CS-355D	Seminar	0	0	2	1
8	PD-391D	Co- Curricular Activities	0	1	0	1
		<b>TOTAL</b>	<b>14</b>	<b>1</b>	<b>18</b>	<b>24</b>



## ***SCHOOL OF EDUCATION***

### **SCHEME FOR BACHELOR OF EDUCATION**

<b>B. ED</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BED-110	Childhood And Growing Up	4	0	0	4
2	BED-111	Philosophical Foundations Of Education	4	0	0	4
3	BED-112	Language Across The Curriculum	2	0	0	2
4	BED-113	Understanding Discipline And Subjects	2	0	0	2
5	BED-200	Critical Understanding Of ICT	4	0	0	4
6	BED-114	School Organization And Management	2	0	0	2
7	PD 191A	Hobby club	0	0	0	0
<b>PRACTICAL</b>						
1	BED-155	Understanding The Self	0	0	4	2
2	BED-199	Drama And Art In Education	0	0	4	2
3	BED-157	PSE (Preliminary School Engagement)	0	0	4	2
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>12</b>	<b>24</b>

## SCHEME FOR BACHELOR OF EDUCATION

B. ED			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BED-115	Learning and Teaching	4	0	0	4
2	BED-120	Historical and sociological foundations of education	4	0	0	4
3	BED-117	Assessment for learning	4	0	0	4
4		Pedagogy (Any Two)	0	0	0	0
5	BED-121	Teaching of Hindi	4	0	0	4
6	BED-122	Teaching of English	4	0	0	4
7	BED-123	Teaching of Math's	4	0	0	4
8	BED-128	Teaching of Commerce	4	0	0	4
9	BED-129	Teaching of Life Science	4	0	0	4
10	BED-126	Teaching of Home Science	4	0	0	4
11	BED-134	Teaching of Sanskrit	4	0	0	4
12	BED-136	Teaching of Business Studies	4	0	0	4
13	BED-124	Teaching of Social Science	4	0	0	4
14	BED-125	Teaching of Integrated Science	4	0	0	4
15	BED-127	Teaching of Accountancy	4	0	0	4
16	BED-130	Teaching of Economics	4	0	0	4
17	BED-133	Teaching of Computer Science	4	0	0	4
PRACTICAL						
1	BED-231	Reading and reflecting on text	0	0	4	2
2	BED-160	PSE (Preliminary School Engagement) -II	0	0	4	2
		Total	64	0	8	68

## SCHEME FOR BACHELOR OF EDUCATION

B. ED			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BED - 201	Internship – I	9	0	0	9
2	BED - 202	Internship - II	9	0	0	9
		Total	18	0	0	18

B. ED			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BED-203	Gender school and Society	4	0	0	4
2	BED-204	Knowledge and curriculum - II	2	0	0	2
3	BED-205	Creating and Inclusive School	4	0	0	4
4	PD-293A	Inter personal skills	2	0	0	2
5		Elective Course*(any one)	4	0	0	4
6	BED-216	Guidance & Counseling	4	0	0	4
7	BED-217	Value Education	4	0	0	4
8	BED-218	Peace Education	4	0	0	4
9	BED-219	Environmental Education	4	0	0	4
PRACTICAL						

<b>1</b>	<b>BED-230</b>	<b>Reflection on School Experience</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
	<b>BED-231</b>	<b>Reading &amp; Reflecting on Text</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
		<b>Total</b>	<b>32</b>	<b>0</b>	<b>8</b>	<b>36</b>

## **SYLLABUS FOR BACHELOR OF EDUCATION**

### **Semester-I**

#### **Preliminary School Engagement (PSE-1) (2Weeks)**

- 1. Writing a reflective journal on observation of regular class room teaching with respect to pedagogical practices and class room management techniques used by the teachers**
- 2. Reflection on roles and responsibilities of different school staff and Critical study of their infrastructural facilities, namely Library, Laboratories, Playground, Canteen, Sports facilities, Seminar Halls, Auditorium etc. which are available in the school.**
- 3. The Student- teacher shall also undertake the field activities pertaining to the practical's during this period.**

**This semester shall entail a field engagement of 16 weeks wherein the first week will be exclusively dedicated to observing a regular classroom with a regular teacher and would include peer observation, teacher observations and observation of interns lessons by faculty. In the next 15 weeks of internship the student teacher shall be engaged in teaching experience wherein the aim shall be meaningful and holistic engagement including the writing of reflective journals. This shall be enriched through extended discussion with peers and faculties on different aspect of the teaching experience accompanied by the presentations post the internship in schools.**

## **SCHOOL INTERNSHIP PART –I**

School internship I shall include the undertaking of the following task and the assessment shall be based on a viva voce External examination which shall be held in the university.

### **SCHOOL INTERNSHIP PART –I M.M: (200 Marks)**

**10 Credits**

<b>S.No.</b>	<b>Components</b>	<b>Marks</b>
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<b>1</b>	<b>Simulated Teaching (2 in each)</b>	<b>10</b>	<b>10</b>
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<b>2</b>	<b>Discussion Lessons (2 Lessons in each pedagogy course)</b>		
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<b>Total 4 Discussion Lessons (10x4)</b>	<b>20</b>	<b>20</b>
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<b>3</b>	<b>50 Lesson Plans ( in each pedagogy course) (25x2)</b>	<b>25</b>	<b>25</b>
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<b>4</b>	<b>Achievement Test Report (ATR) (In one subject)</b>	<b>10</b>	<b>10</b>
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<b>5</b>	<b>Two Lessons Delivered in each pedagogy course</b>		
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	<b>through the use of Multimedia (5x4=20)</b>	<b>10</b>	<b>10</b>
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<b>6</b>	<b>Text Book Review</b>	<b>10</b>	<b>10</b>
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<b>7</b>	<b>Use of Teaching Learning Material in Classroom Discourse</b>		
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	<b>(including teaching aids and reference material)</b>	<b>10</b>	<b>10</b>
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<b>8</b>	<b>Peer Group observation</b>	<b>5</b>	<b>5</b>
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<b>Total</b>	<b>100</b>	<b>100</b>
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## **SCHOOL INTERNSHIP PART –II**



**M.M: (200 Marks)**

**10 Credits**

**The School Internship Part-II shall entail the assessment of the final lesson plan at the culmination of the internship wherein the student teacher will be observed by external and internal examiners while they teach in the schools. This assessment shall be done for both the pedagogies of teaching subjects opted by the students-teacher and each shall carry 100 marks.**

## **SYLLABUS OF B.Ed.**

### **SEMESTER I**

**Course Title: Childhood and Growing Up      Credits:4**

**Course Code: BED110 MM:100**

**Objectives of the Course:**

**To familiarise student- teachers about the conceptions about child and childhood (specifically with reference to the Indian Social context)**

**To develop a critical understanding of the different Social, Educational and Cultural contexts at the core of the exploration of childhood.**

**To develop an understanding of the different aspects of a Child with diverse abilities in the Social, Cultural and Political context of India**

**To acquaint them with respect to the role of different agencies in the healthy development of children.**

**Course Content:**

## **Unit-I :Growth and Development**

### **Meaning of Growth and Development**

**Stage of Growth and development with special emphasis on the Development stages of Childhood and Adolescence**

### **Principles of Development**

**Theories of Growth and Development (with reference to the influence of childhood experiences on later personality)**

- (a) Freud's Theory of Psycho-sexual development**
- (b) Jean Piaget's theory of Cognitive Development**
  
- (c) Erickson's theory of Psycho Social Development**
- (d) Kohlberg's Theory of Moral Development**

## **Unit-II :Childhood and Development**

### **Physical- Motor Development**

- (a) Growth and Maturation**
- (b) Development of Gross and Fine Motor Skills**
- (c) Role of Parents and Teachers in providing opportunities of Physical – Motor Development eg. play**

### **Social and Emotional Development :**

- (a) Basic understanding of Emotions (How differential Gender Socialisation is seen happening in the Indian context?)**

**(b) Development of Emotions : Functions of Emotions**

**(c) Meaning of Gender roles, influences on Gender roles, Gender Stereotypes experienced in Home, School, Neighbourhood (Including playground)**

### **Unit- III: Socialisation Agencies and the Child**

**The 21 century child and childhood in the context of Poverty, Globalisation and Adultculture.**

**Childhood – similarities and Diversities within the stage and the factors leading to the construction of multiple childhoods with particular reference to the Indian context.**

#### **Concept of Socialisation**

**(a) Family, Parenting, Child Rearing practices and its agencies**

**(b) Peers- Friendships and Gender competition, cooperation and conflict; Aggression and bullying from Early childhood to Adolescence, Peer Influences**

**(c) School – Relationship with peers, Teachers and Staff, Teacher Expectation and school achievement, overage learners and peer relationships.**

**Social, Economic and Cultural Differences in Socialisation: Implications for Inclusion.**

### **Unit-IV: Childhood: Issues and Concerns.**

**Social Issues: Counselling of Children for coping with stress in the following conditions:**

**(a) Separation of Parents**

**(b) Loss of Parents in Armed Conflict etc.**

**(c) Survivors of Child Abuse Health Concerns:**

**Child Abuse: Issues and Problems and Awareness about Rights of the Child**

**Child Obesity: Causes and Remedies, Prevention through sports activities and yoga**

**Equity Issues and Inclusion: Inclusion of the Differently Able Street Children and other marginalised groups in the context of India: Problems and strategies to achieve EFA(SSA, RMSA in particular)Schemes and programmes of GOI for Gender Equity and Equality in Education**

**Protection of Child Rights: Role and Contribution of UNICEF, WHO, National**

**Commission for the Protection of Child Rights, National Human Rights Commission, Child Help lines and NGOs**

**Practical Assignments/Field Engagement (any one):**

**Student's teachers to collate about ten newspaper articles that involve issues of parenting and childhood analyze these and hold discussions.**

**Hands-on Experience of Studying Children and varying contexts in Childhood by undertaking a detailed Case Study of a child.**

**The students can identify any child to understand 5-14 year old children in diverse contexts and use case profile method to study her.**

**The teacher educator could organize the class in such a manner that different students' profile children from varied socio-economic backgrounds. This would allow for a wide-range of data which could be subsequently analysed in groups. The task could be helpful in understanding and supporting developmental and educational needs of the marginalized learner; first-generation learners, street children and slum children; children with special needs.**

### **Suggested Readings :**

**Aries, P. (1965).Centuries of Childhood-A social history of the family life.RandomHouse Inc.**

**Chapter 1: The Ages of Life, Chapter 2: The Discovery of Childhood,**

**Cole, M., Cole, S. R. and Lightfoot, C. (2004).The Development of Children.New York: Worth Publishers. Chapter 1: The study of Human Development.**

**Harris, M. and Butterworth,G(2002) The two concepts of childhood,DevelopmentalPsychology: a student's handbook. New York: Taylor & Francis. Chapter 1: A BriefHistory of Developmental Psychology.**

**Newman, B. M. and Newman, P.H. (2007).Theories of Human Development.London: Lawrence Erlbaum Associates, publishers. Chapter 1: Introduction.**

**Papalia, D. E. and Olds, S. W. (2003).Human Development.New York: McGrawHill Higher Education. Chapter 1: The Study of Human Development, Chapter 2:Theory and Research, Chapter 4: Physical Development During the First ThreeYears, Chapter 7: Physical Development in Early Childhood, Chapter 9: PhysicalDevelopment in Middle Childhood.**

**Saraswathi, T.S. (Ed.) (1999). Culture, Socialization and Human Development:Theory, Research and Applications in India.Sage publications.**

### **MESTER I**

**Course Title: Philosophical Foundations of Education**

**Credits: 4**

**MM100**

**Course Code BED 111 Objectives of the Course:**

**To gain an understanding of the concept, meaning and aims of education and the inter-relation of education and philosophy.**

**To reflect upon the thoughts of Indian and Western thinkers on education and explore the implications of the concepts involved in educational practices.**

**To promote reflective thinking among students.**

**To build up their capacity to be able to formulate their response to the concerns in education**

**Course Content:**

**Unit I: Education and Philosophy: Meaning and Functions**

**Concept, Meaning and Aims of Education Philosophy and its relation to Education**

**Education as a liberal discipline and its Interdisciplinary nature**

**Basic concepts in philosophy of education: Teaching, Training, Learning, Inquiry, Indoctrination  
w.r.t. child**

**Unit II: Methodological Options in Education**

**Assumptions about human nature**

**Various Schools of Thoughts in Philosophy of Education and their relevance in education:**

**Idealism, Realism, Naturalism, Pragmatism, Existentialism**

**Nature and place of Dialogue, Activity, Discovery in the process of education**

**Unit III: Epistemological Basis of Education**

**Meaning of Knowledge, Reason, Belief**

**Sources of Knowledge: Empirical knowledge, Rational Knowledge, Authentication of Knowledge, Experience, Values and Ideals**

**Relationship of School, Education, Knowledge, Subjects Constructivism, Scientific Methods, Reflective Judgements**

**Unit IV: Analytical study of major thinkers on education and their practice**

**Relevance of educational thoughts of Indian and Western thinkers to the present Education system. To deliberate upon Aims and Functions of Education, Pedagogy, Pedagogical practices in the classroom, Teacher-Student Relationship and Essential Values and Qualities needed in a Teacher to prepare a child for life}**

**Indian Thinkers :M.K.Gandhi, Rabindranath Tagore, Jiddu Krishnamurti, B.R. Ambedkar**

**Western Thinkers: Plato, J.J. Rousseau, John Dewey, Paulo Freire**

**Practical Assignments/ Field Engagement:**

**Reflecting on the Readings on any two thinkers on Education and Maintaining a diary of the same after discussions and brainstorming on key ideas on Education and their contemporary relevance.**

**Suggested Readings:**

**Brubacher, J.S. [1969] McGraw Hill Book Co. Modern Philosophies of Education Carr, David.**

**[2003] Making Sense of Education; Routledge Falmer**

**Cenkener, William: [1976] Manohar Publishers Hindu Personality in Education Dewey, John**

**[1966] Democracy and Education ; New York, Macmillan**

**Israel, Scheffler [1966] Philosophy and Education; Allyn Bacon Inc. 2nd ed.**

**Kneller, George F. [1971] : Introduction to the Philosophy of Education ; John Wiley and Sons,**

**Inc.**

**Krishnamurti, J.; [1953] Education and the Significance of Life. ;**

**KrishnamurtiFoundationIndia.**

**Mani, R.S. [1964] ; Educational ideals of Gandhi and Tagore.**

**O'Connor, D.J. [1973] An Introduction to Philosophy of Education. Universal Book Stall. Ozmon,**

**Howard A. and Craver, Samuel M.: [1976] Philosophical Foundations of Education**

**2nd ed. Charles, Merrill Publishing Co.**

**Peters, R.S. The concept of Education series Part 2 and 3 Edited by R.F. Dearden, P.H. Hirst and  
R.S. Peters ; Routledge and Kegan Paul, London and Boston.**

**Schofield, Harry; [1982] The Philosophy of Education—An Introduction; Unwin Education  
Books, London**

**Siegel, Harvey [2009] The Oxford Handbook of Philosophy of Education.; Oxford University  
Press.**

**Seetharamu, A.S.; [1989] Philosophies of Education. Ashish Publishing House. Snook, I.A. [1967]  
Indoctrination and Education; Routledge and Kegan Paul'**

## **SEMESTER I**

**Course Title: Language Across the Curriculum Credits: 2**



**Course Code:BED 112 MM:100**

**Objectives of the Course:**

**To enable student-teachers to understand the nature and structure of language. To help them appreciate the relationship between language, mind and society. To acquaint them with the process of language acquisition and learning.**

**To support them in the understanding of different language skills and development of the same.**

**To develop sensitivity and competency towards catering to a multilingual audience in Schools.**

**Course Content:**

**Unit I Language and Communication**

**Language as a tool of Communication**

- (a) Features of Language**
- (b) Structure of Language**
- (c) Language and Power**

**Language Diversity in the context of India**

- (a) Multilingualism: Nature and Scope**
- (b) Multilingualism : As a Resource and a strategy**

**Socio-cultural Variations in Languages: Accents and Linguistic Variations.**

## **Unit II Acquisition of Language skills**

### **Acquisition of the Four Language Skills**

- (a) Listening Skills: Developing Pronunciation by Phonic Drills, Developing Vocabulary by listening to the usage of new words in different contexts and meaning making.**
- (b) Reading and Writing**

#### **Relationship between Reading and Writing.**

**Oral and silent Reading of Expository Texts: Strategic; Comprehension; Pre-Reading and Post Reading activities.**

**Characteristics of a Good Handwriting; Developing the skill of writing effective compositions: Creative Writing, Letter Writing: Formal, Informal (emphasis on the letters which the teachers write in schools)**

**Developing Effective Presentations by integration of the four language skills effectively: Principles and Procedure**

**Emergent Literacy: Meaning and Implications**

## **Unit-III Development of Language**

### **Human and Animal Communication**

**Perspectives in Language Development (with reference to how children acquire language at early age): Skinner, Bandura and Walters and Nativist Chomskian Perspective.**

**Relationship of Language and Society: Identity, Power and Discrimination**

## **Unit-IV Language and Curriculum Transaction**

### **Bilingual or Trilingual Children: Implications for teachers**

### **Multilingual Classroom: Challenges and Strategies to Cater to Diversity Nature of Multilingualism:**

- a) Differences in Communication,
- b) Hierarchical status of Indian Languages and its effect on classroom dynamics
- c) Qualities and Competences of a Teacher to cater to a multilingual classroom.

### **Practical Assignments/Field Engagement (any one):**

The students to be actively engaged in drill and practice exercises with respect to honing their proficiency in Speaking, Reading and Writing in English and Hindi with the support of assistive devices in the Language Laboratory under the guidance of Faculty Mentors.

Participation in two Extempore Presentations, one Debate, one Paragraph writing and One Application Writing. (To be the basis of Evaluation after exhaustive sessions to improve Communication Skills.)

Students to maintain a record of observation on the communication of children (both verbal and non-verbal) within the peer group and with teachers and to find the patterns with respect to the themes of conversations Formally-Informal Communication and the challenges they face in Communicating.

### **Suggested Readings:**

Agnihotri, R.K. & Khanna, A.L. (eds.) (1994). Second language acquisition. New Delhi: Sage Publications.

Agnihotri, R.K. (1999). Bachchon ki Bhasha seekhne ki kshamata, bhag 1

or 2. Shiksha Sandarbha. Bhopal: Eklavya (p.p?? ).

**Agnihotri, R.K. (2007).Hindi: An essential grammar. London: Routledge**

**Agnihotri, R.K. (2007).Towards a pedagogical paradigm rooted inmultiliguality.InternationalMulilingual Research Journal, Vol.(2) 1-10**

**Agnihotri, R.K. and Vandhopadhyay, P.K. (ed.) (2000).Bhasha, bhubhashita orhindi:**

**Ekanthsamvaad, New Delhi: Shilalekh**

**Butler, A. and Turbill, J. (1984).Towards Reading-Writing Classroom. New York:Primary English Teaching Association Cornell University.**

**Krashen, S. (1982).Principles and practice in second language acquisition.Pergamon Press Inc.**

**Kumar, K. (2000).Childs language and the teacher. New Delhi: National BookTrust. Mason, J. M. and Sinha, S. (1992).Emerging Literacy in the Early ChildhoodYears.**

**Applying a Vygotskian Model of Learning and Development in B. Spodek(Ed.)Handbook of Research on the Education of Young Children, New York:Macmillan.137-150.**

**NCERT (2005).National Curriculum Framework (NCF). New Delhi: NCERT. Reading Development Cell, NCERT (2008).Reading for meaning.New Delhi:NCERT.**

**Rosenblatt, Louise M. (1980). What Fact Does This Poem Teach? LanguageArts.57(4). Yule, G. (2006).The study of language. Delhi: Cambridge University Press.**

## **SEMESTER I**

**Course Title: Understanding Discipline and Subjects Credits:2**

**Course Code: BED113 MM:100**

## **Objectives of the Course**

**To interrogate existing terminology, constructs and notions of pedagogic practice, such as child-centered learning, discovery learning, activity-based learning, intelligence (IQ) etc.**

**To engage student-teachers with epistemological questions of subject matter and how they unfold in the study of pedagogical approaches.**

## **Course Content:**

**Unit I: Knowledge and Methods of Enquiry Disciplinary Knowledge :Nature and Scope, Interdisciplinary Knowledge: Nature, Scope and Need**

**Knowledge as Construction of Experience; Case examples from School Subjects Knowledge as distinct from Information; Case examples from School Subjects**

**Methods of Inquiry, Scientific Thinking, Social Scientific Thinking, Mathematical Thinking, Critical Thinking**

**Language, Social Relations, Power, Identity and Thinking (Relationship and Interface with Knowledge).**

## **Unit II: Learner and their Contexts**

**Interface between Knowledge, Subjects, Curriculum, Textbooks, Linguistic background of learners**

**Alternative Frameworks of Children's Thinking**

**Child and Adult Misconceptions: Meaning, Scope in a Classroom, Processes to be used to Dispel Misconceptions.**

**Everyday Concepts and Situated Cognition**

**Pedagogical Perspective and Concerns of Inclusive Education in Schools**

**Unit III: Pedagogic Practice and the Process of Learning**

**Critical Examination of Terminology and Notions associated with Child-centered Education**

**Critical understanding of standardised pedagogic methods: concept-formation; enquiry-based learning; project-based learning etc**

**Interrogating disciplinary practices and Creating non-threatening learning environments: Relevance, Scope and Process**

**Unit IV: Critical Study of ICTs and Developing Capacities**

**Critical examination of the role of ICT in Effective Curriculum Transaction and Evaluation**

**Capacity development of teachers and Students in the use of ICTs**

**ICT – based teaching-learning approaches in schools**

**Role of Open and Distance Learning in Catering to Diversity in Learners and Learning Styles.**

**Practical Assignments/Field Engagement (Any one: Records to be Maintained)**

**Critical readings of specific texts to develop conceptual clarity**

**Analysis of school text books to construct and discuss nature and types of knowledge and pedagogic elements**

**Collating and analyzing child and adult conceptions of social and natural phenomena Developing concept maps to design subject-based and thematic-based curriculum materials Observing,**

**documenting and interpreting classroom discourse (teaching-learning episodes) Investigating perspectives in children's literature and other teaching-learning materials**

**Suggested Readings :**

**Batra, P. (Ed.) (2010).Social Science Learning in Schools: Perspective and Challenges.New Delhi: Sage.**

**Bruner, J. (1996).In The Culture of Education.Cambridge: Harvard University Press,2: Folk Pedagogy, 44-65.**

**Dewey, J. (1897).My Pedagogic Creed.School Journal, Vol. 54.**

**Driver, R. (1981).Pupils' Alternative Frameworks in Science.European Journal of Science Education.3(1), 93-101.**

**Holt, J. (1990).Learning All the Time.New York: Addison-Wesley Publishing Co.**

**SEMESTER I**

**Course :Critical Understanding of ICT                      Credits:4**

**Course Code : BED 200                      MM:100**

**Objectives of the course**

**To equip student – teachers in the effective use of ICT tools, software applications and digital resources.**

**To familiarise them with the understanding and skills of integration of ICT in teaching learning, evaluation and management of an institution.**

**To acquire the skill of organising and creating her/his own digital resources. To sensitise them to practice safe, ethical and legal ways of using ICT.**

**To enable them to use ICT for making classroom processes more inclusive and supportive in addressing multiple learning abilities.**

**Course Content:**

**Unit-I: ICT: Connecting with World**

**National Policy on ICT in School Education**

**Accessing the Web-Introduction to the Browser, Browsing and Web. Search and Retrieval: Strategies and Techniques**

**Internet as a Learning Resource: Using Websites, Web based Learning objects, Simulations, Tutorials.**

**Computing in Indian Languages – Fonts and Keyboard Using ICT to Create-Text, Data, Media**

**Combining text, Graphics and Audiovisuals to create a Communication. Web as a space for continuous learning.**

**Unit-II: ICT for Teaching-Learning: Possibilities and Concerns**

**(a) ICT for Supporting Teaching-Learning and Inclusive Education**



**Exploration of ICT resources for Teaching – Learning, Appropriate ICT Infusion in developing of a lesson plan on a given topic using ICT resources.**

**Critiquing and Curation of ICT resources: Need, Relevance, Validity, Appropriateness and Use**

**ICT – based teaching-learning approaches in schools**

**Educational Applications of ICT using appropriate hardware and software:**

**Hardware:(CD/DVD, Projectors, Interactive boards etc. Software:(Single and multiple media, animations and simulations.**

**Gaming Environments for Education – Range and Scope.**

**Infusing games into Teaching –Learning and Creating appropriate Classroom environments, Evaluating Games and Gaming Environments**

**Role of ICT in fostering the Creation of an Inclusive School and Classroom Environment**

**Assistive Technologies and Devices to foster Inclusion Computing in Indian Languages to foster Inclusion**

**(b) Social, Ethical and Legal aspects:**

**Impact of ICT on Work, Socialising and Other Areas**

**Cyber Crimes: Concerns and Implications, Software Piracy and Legal Remedies, Plagiarism and Fair Use**

**Proprietary and Open Source Software; Licencing of Software and Content, OER**

**Intellectual Property and Copyright and Related Issues of Plagiarism and Fair Use. Indian Initiatives in Open Source Software and Sharing of Digital Content**

**Unit-III: ICT for Evaluation, Documentation and Communication**

**(a) ICT for Evaluation:**

**ICT : Scope and Techniques for Evaluation**

**Exploring and using appropriate Software tools for Evaluation**

**Constructing and Implementing ICT based Tests / Quizzes using ICT Resources**

**Managing Data, Analysis of results and tracking student achievement using ICT Software tools.**

**(b) Documentation and Communication**

**Documenting and Communicating events and processes using ICT: Tools and Techniques Digital Story Telling and Storyboarding**

**Publishing on the Web: Possibilities and Scope ; Evaluating Choices**

**Unit-IV: ICT for Building Communities, Collectivising and Administration & Management of an Institution:**

**(a) Building Communities and Collectives:**

**Online Communities and Collectivising: Participating, Analysing Interaction and Evaluating Social Networking Forums.**

**Sharing thoughts and Ideas: Blogs, Social networking Websites, Discussionforums and Mailing lists**

**Virtual Communities: Educational Applications**

**(b) ICT for Educational Administration and Management**

## **Role of information management, process and tools in EducationalAdministration and Management**

### **Tools and Techniques for Automation of Data Sources in Schools:Collection, Analysis and Interpretation**

#### **UDISE :State and National Level Databases in Education**

#### **Practicals (Entailing Hands on Experience Individually)**

**Explore different sources of Data, read and make meaning using MS Excel. Combining text graphic and audio visuals in developing a digital story.**

**Analysing a Lesson, Identifying the need for ICT; Selecting Appropriate resources**

**Preparing and transacting a lesson infusing ICT resources (using appropriate hardwareand software) and evaluating it**

**Creating a discussion forum around an uploaded content in teaching-learning. Creating a Peer Network using Social Networking Platforms**

**Creating a blog for building an online community to share resources such as texts, audiovisuals, animations and simulations**

**Creating a e portfolio based on the above practicals and engaging in peer evaluation ofthe same before online submission to the faculty mentor.**

#### **Suggested Readings:**

**Guide to measuring Information and Communication Technologies in Education.(2009).**

**Canada: UNESCO Institute for Statistics. Retrieved from:<http://www.uis.unesco.org>**

**Lowther, D. L., Grant, M. M., Marvin, E. D., Inan, F., Cheon, J., & Clark, F. (2005).Teacher's technology handbook: A resource to support effective technologyintegration. Appalachian Technology in Education Consortium and the Universityof Memphis, Memphis, TN.**

**Mayer, R.E. (2002). Cognitive Theory and the Design of Multimedia Instruction: AnExample of the Two - Way Street between Cognition and Instruction.NewDirections for Teaching and Learning.Number 89. 55-71..**

**Morrison, G.R., Lowther, D.L. &Demeulle L. (1999).Integrating ComputerTechnology into the Classroom. United States of America: Merrill (Prentice Hall)**

**Moursund, D. (2005).Introduction to Information and Communication Technologyin Education.Retrieved from website of University of Oregon: [www.uoregon.edu](http://www.uoregon.edu)**

**National Policy on ICT in School Education. (2010). New Delhi: Department ofSchool Education and Literacy.Ministry of HRD, GOI. Retrieved from:[http://mhrd.gov.in/ict\\_school](http://mhrd.gov.in/ict_school)**

**Rajasekar, S. (2010).Computers in Education.ND: Neelkamal Publications Pvt.Ltd.**

**Roblyer, M.D. (2008).Integrating Educational Technology into Teaching. New Delhi: Pearson Education, South Asia, India.Shiksha Mein Computer (2001). Available on website of Indira Gandhi National OpenUniversity, Delhi: <http://www.ignou.ac.in>**

## **SEMESTER I**

**Course Title: School Organization and Management Credits: 2 Course Code: BED114**

**MM:100**

**Objectives of the Course:**

**To enable the student-teachers to understand the meaning, nature, scope, functions and principles of Educational Administration of a School.**

**To develop an understanding about various components of school Administration**

**To develop an understanding of leadership qualities and accountability to be maintained by the different school personnel like headmaster, teacher etc.**

**To orient students with the concept of supervision and decision making To acquaint the students with specific problems of school management.**

#### **Course Content:**

##### **Unit I: Administration of Schools**

**Meaning, Concept, Scope and Functions of Educational Administration Principles of Educational Administration**

**Educational Administration and their Advantages and Disadvantages**

**Role of a Head in a School as a Transformative Leader :Analysis of Need and Relevance of any Change before institutionalising the same, Taking the Team On-board Organisational Culture in a School to foster a Stress-free Work Environment for the**

**Head, Teachers, Staff and Students**

##### **Unit II: School as an Organisation**

**The School – its functions and relationship with the society School building: Design and Components (including Hostels)**

**School Personnel-Roles and Responsibilities: Headmaster, Teachers, Non-Teaching Staff School finance – Sources of Income and Items of Expenditure, School Budget**

### **Unit III Dynamics of Supervision**

**Supervision: Concept, Need, Functions and Scope**

**Role of the Head and Teachers of the Institution in Supervision**

**Role of School Management Committees(SMCs),Mother TeacherAssociations(MTAs),Parent Teacher Associations(PTAs) in School Development**

**Democratic Decision Making:Concept and Procedure with respect to functioning of aSchool**

### **Unit IV: Elements of School Management**

**School Climate: Meaning and Types**

**Timetable – Principles and Techniques of Time -table preparation Preparation of a Calendar of Activities of Co-curricular Activities**

**School Discipline: Concept and Approaches, Self Discipline: Concept and Relevancein a School**

**Problems Faced in School Management:Issues of Security and Disaster Management**

**Juvenile Delinquency: Concept and Steps to Deal Effectively in a School**

**Practical Assignments/Field Engagement(Any one):**

**The students to be thoroughly acquainted with the nuances of different types ofregisters/records a teacher maintains in a school: Attendance Registers, MarksRegisters, Cumulative Records of CCE(Continuous Comprehensive Evaluation) inparticular.(Also to include the role of ICT as an Assistive Technology in the same)**

meeting of student –teachers with the Head of the School and other Supervisory cadre to be arranged to make them understand the expectations of a school from them and their responsibilities they may shoulder apart from regular classroom teaching.

The students to be given hands on experience in the construction of the Time Table using ICT of a School by the Faculty Mentors keeping in mind all principles of Time Table preparation.

#### **Suggested Readings:**

Owens, Robert G(1970).: Organizational Behaviour in Schools, Prentice Hall Inc., Englewood Cliffs, N.J.,

Kimbrough, R.B. and Nunnery, M.Y.(1983): Educational Administration: An Introduction, MacMillan Publishing Co. Inc., N.Y.

Bhatnagar, R.P. and I.B. Verma (2000): Educational Administration. Loyal Book Depot, Meerut,

Safaya, R.N. and Shaida, B.D. (2000): School Administration and Organization. Dhanpat Rai and Sons, Delhi

Agarwal, J.C.(2006): School Administration, Arya Book Depot, Delhi,

#### **SEMESTER I**

#### **PRACTICALS**

**Course Title: Understanding the Self Credits:2**

**Course Code: BED155 MM:100**

#### **Specific Objectives**

**To help student- teachers develop life skills to understand self**

**To develop the capacity for sensitivity, sound communication and ways to establish peace and harmony**

**To develop the capacity to facilitate personal growth and social skills in their own students**

**To enable student-teachers to recall and reflect on their own educational journeys and become conscious of factors that have shaped their aspirations and expectations**

**To synthesize their experiences and learning over a period of time**

**To enable student-teachers to become more conscious of their responses to experiences, observations of life situations, as also of ideas and issues that arise in their minds, and to thus develop their capacity for reflection.**

**Course Content:**

**Unit I**

**Journal Writing**

**Each student-teacher will be asked to maintain a regular Journal, in which he/she may write:**

- a) Short reflective accounts of significant life experiences**
- b) Observations of life situations that evoke questions and responses**
- c) Questions on education, learning and teaching that he/she is facing**

**The Journal should be periodically shared (once may be undertaken in a week) with a faculty mentor, who will read through it and offer brief comments, suggestions, or further questions for the student-teacher to reflect on.**



## **Unit II**

### **Writing Tasks**

**Writing an ‘Educational autobiography’ with respect to their experience as a learner till now**

**Writing a reflective statement of aspirations and expectations, based on one’s learnings so far in the course (after 4 months in the course)**

## **Unit III**

### **Workshop 1: A significant event or experience in life**

#### **Suggested workshop themes**

**Representing key events and experiences – as timeline, mind-map, pictorial poster, digital story using audio visual tools of Media.**

**Sharing and assimilating a range of experiences on the event / experience in the form of finding answers to what that experience meant to me? How did I feel going through experience?**

### **Workshop 2: Learning to Observe (and to Listen)**

#### **Suggested workshop themes**

**Observation of nature; observation of people around you; observation of (and listening to) situations around you.**

**Exercises in observation and listening to uncover one’s judgments and interpretations (and slow these down, to allow for richer perceptions) (one to one communication, one to many)**

**Multiple views on a variety of situations: classroom situations, and human situations in a school context**

### **Workshop 3: Mindfulness in the classroom**

#### **Suggested workshop themes**

**Sitting quietly and inviting mindfulness by focusing and concentrating energies on a single task  
(Meditation and Yoga may be used for the purpose)**

**Individual breathing exercises and self-awareness of body and mind Exploring group exercises  
for mindfulness**

**Mindfulness through the day, in classrooms, in stressful contexts Mindfulness and Emotional  
Well-being**

**Mindfulness and Decision-Making Mindfulness in Cognitive Learning**

### **Unit IV**

### **Workshop 4: Understanding working in groups**

#### **Suggested workshop themes**

**Exploring structural situations that promote competition or cooperation such as participation in  
games**

**Exploring hierarchies and role-taking in group situations Exploring Gender Stereotypes in  
groups**

**Facilitation of group working – everyone has a part to play**

**Exercises for learning to work in groups (Modes of Transaction would include ‘roleplays’ and  
‘enactments’ followed by discussions)**

### **Workshop 5: Viewing and analyzing film(s)**

**Suggested workshop themes Purposeful film viewing Ways of analyzing themes**

**Detailed observation of a key scene and discussion Ways of seeing situations in the film**

**Writing a film review**

**Workshop 6: Celebration of an iconic cultural figure (any three)(e.g.**

**Kabir/Tagore/VeerSarvarkar/ SaadatHasanManto/Begum Akhtar/HabibTanvir /Narayan**

**Guru/Meerabai/AkkaMahadevi/ Jnaneswar/ Basava/TeejanBai**

**Suggested workshop themes**

**Authentic performance by a practitioner who is continuing the Legacy Participation in learning and celebrating (in appropriate media) Documentary Film Discussion of cultural world-view and contemporary relevance of the Icon Writing based on the above**

**Seminar 1: Glimpses of different childhoods in India**

**Format: Student-teachers present, via different media-narrative, photographs, audio-visual presentation, illustrated poster etc - stories of Indian children growing up in vastly differing circumstances; sharing to be followed by discussion.**

**Preparation: Resource books and films to be gathered; each student-teacher picks a particular type of childhood and researches the life situation.**

**Student -Teachers to develop then, own digital stories on the theme of: Journey towards understanding self-integrating text, graphics and audio-visuals.**

**\*The activities undertaken to be documented in the form of an e portfolio for external evaluation.**

**SEMESTER I**

**PRACTICAL**

**Course Title: Drama and Art in Education      Credits:2**

**Course Code: BED199 MM:100**

**Objectives of the Course:**

**To develop basic understanding of different Art forms – impact of Art forms on the human mind**

**To enhance artistic and aesthetic sensibility of learners to enable them to respond to the beauty in different Art forms, through genuine exploration, experience and free expression**

**To develop skills for integrating different Art forms across school curriculum at secondary level**

**To create awareness of the rich cultural heritage, artists and artisans**

**Course Content:**

**Unit I: Visual Arts and Crafts**

**Experimentation with different materials of Visual Art, such as pastel, poster, pen and ink, rangoli materials, clay, etc.**

**Exploration and experimentation with different methods of Visual Arts like Painting, block printing, collage, clay modelling, paper cutting and folding, etc.**

**Paper framing and display of Art works.**

**Unit II: Performing Arts: Dance, Music, Theatre and Puppetry**

**Listening/viewing and exploring Regional Art forms of Music, Dance, Theatre and Puppetry.**

**Viewing/listening to live and recorded performances of Classical and Regional Art forms**

**Participation and performance in any one of the Regional Arts forms keeping in mind the integrated approach**

**Planning a stage-setting for a performance/presentation by the student-teacher.**

**Unit III: Appreciation of Arts**

**Meaning and concepts of Arts and Aesthetics and its significance at secondary level of School Education.**

**Difference between Education in Arts and Arts in Education**

**Identification of different performing Art forms and artists; Dance, Music and Musical Instruments, Theatre, Puppetry (based on a set of slides, videos, documentaries selected for the purpose)**

**Knowledge of Indian Craft Traditions and its relevance in education (based on a set of slides, Videos Films, Documentaries selected for the purpose)**

**Knowledge of Indian Contemporary Arts and Artists; Visual Arts based on the videos, Films and Documentaries selected for the purpose**

**Indian festivals and its artistic significance.**

**Unit IV Engagement in Analysis and Activities:**

**Initiation into the craft of Drama and related activities for engagement in schools with learners**

**Theme-based projects from any one of the curricular areas covering its social, economic, cultural and scientific aspects integrating various Arts and Craft forms.**

**Practical Engagement**

**Workshops:**

**Two workshops of half a day each, of one week duration for working with artists/artisans to learn basics of Arts and Crafts and understand its pedagogical significance. The Arts forms learnt during the course should be relevant to the student-teachers in their profession.**

**Activities, such as drawing, posters and painting, rangoli, clay modelling, pottery, mixed collage, woodcraft, theatre, puppetry, dance, music, etc. region specific should be given more importance**

for making arts learner-centered. The focus of the workshops should be on how art forms can be used as tool/method of teaching-learning of Languages, Social Sciences, Mathematics and Sciences.

#### **Approach for Teaching-learning Process in Institutions:**

Every student-teacher must participate and practice different Art forms. They need to be encouraged to visit places of Arts/See performances/Exhibitions/Art and Craft fairs/Local craft bazaars, etc. Artists and artisans may be invited for demonstrations and interactions from the community. Student-teachers should be encouraged to maintain their diary on art interactions to enhance their knowledge and awareness in this area. Student-teachers may also be motivated to interpret art works/events etc. to enhance their aesthetic sensibility.

Resource Centre for Arts and Crafts should house materials, including books, CDs, audio and video cassettes, films, software, props, art works of Regional and National level, books and journals which must be displayed for the purpose of reference and continuous motivation.

Application of Arts and Aesthetics in day-to-day life, in the institute and in the community are some of the practical aspects, which needs to be taken care too. Student teachers must organise and participate in the celebrations of festivals, functions, special days, etc.

Students to be assessed externally based on the e portfolio they submit to their faculty mentors individually, documenting all the activities they undertake in this practical course.

The e portfolio will include the video clips, photographs and reference material of the field visits and documentation of the activities undertaken in workshops while the student –teachers engages in the same including their reflection on the experience.

#### **SEMESTER I**

**Course Title: Preliminary School Engagement (PSE-1) (Two Weeks) Credits: 2 Course Code:**

**BED157 M.M:100**

- 1. Writing a reflective journal on observation of regular class room teaching with respect to pedagogical practices and class room management techniques used by the teachers**
- 2. Reflection on roles and responsibilities of different school staff and Critical study of their infrastructural facilities, namely Library, Laboratories, Playground, Canteen, Sports facilities, Seminar Halls, Auditorium etc which are available in the school.**
- 3. The Student teacher shall also undertake the field activities pertaining to the practicals during this period.**

## **SEMESTER II**

**Course Title: Learning and Teaching Credits:4**

**Course Code: BED-115 MM:100**

**Objectives of the Course:**

- To create awareness in student-teachers with respect to the range of cognitive capacities and affective processes in human learners.**
- To acquaint student-teachers with the different contexts of learning and situate schools as a special environment for learning.**
- To enable them to reflect on their own implicit understanding of the nature and kinds of learning.**
- To develop an understanding of different theoretical perspectives of learning with a focus on cognitive views of learning.**

- To familiarize them with the concept and nature of Intelligence, Personality and Adjustment.

#### **Course Content:**

#### **Unit I: Development and Learning**

- Learning and Teaching – Nature, Relevance and Relationship.
- Nature and Nurture, Growth and Maturation.
- Relationship between Development and Learning
- Developmental Influences: Development as a resultant of interactions between individual and the external environment (physical, Socio-cultural, Economic, Ecological and Technological)
- Key Cognitive Processes: Perception, Attention, Memory, Language, Thinking, Problem Solving, Emotions and Motivation.

#### **Unit II Cognition and Learning**

- Approaches to Learning:
  - (a) Behaviorist, Cognitivist, Information-Processing, Humanist, Social Constructivist.
  - (b) Theories of Learning (Concepts, Principles and applicability is different learning situations): - Thorndike, Pavlov, Skinner, Kohler, , Rogers, Bandura , Vygotsky
- Distinction between learning as ‘Construction of Knowledge’ and Learning as ‘Transmission and Reception of Knowledge’
- Meaning of ‘Cognition’ and its role in learning.
- Socio-Cultural factors influencing Cognition and Learning



- **Understanding processes that facilitate ‘Construction of Knowledge’:**

- (i) **Experiential Learning and Reflection**
- (ii) **Social Mediation**
- (iii) **Negotiability**
- (iv) **Situated Learning and Cognitive Apprenticeship**
- (v) **Meta-cognition**

- **Role of a teacher in a teaching-learning context:**

- (a) **Transmitter of knowledge**
- (b) **Model**
- (c) **Facilitator**
- (d) **Negotiator**
- (e) **Learner**

### **Unit-III Intelligence and Motivation**

- **Defining Intelligence (Definitions given by different Psychologists)**
- **Nature of Intelligence and the role of Heredity and Environment**
- **Theories of Intelligence**
  - (a) **Spearman’s Two Factor theory**
  - (b) **Guilford’s Factor Analytical Theory**

- (c) **Cattell and Horn's Theory of Intelligence**
- (d) **Sternberg's Information Processing Theory**
- (e) **Howard Gardner's Theory of Multiple Intelligence**

- **Assessment of Intelligence**

- (a) **Individual Tests – Verbal Tests**

- (b) **Group Tests : Verbal/Non Verbal**

- **Use, Misuse and Abuse of Intelligence Testing**
- **Motivation-Meaning and Need, Difference between Needs and Drives, Motives and Incentives, Role of a teacher in motivating students: Need and Strategies.**

#### **Unit – IV Personality and Adjustment**

- **Meaning and Nature of Personality**
- **Theories of Personality**
  - (a) **Type Approach – Hippocrates, Kretschmer, Sheldon, Jung**
  - (b) **Trait Approach – Cattell**
  - (c) **Type cum Trait Approach – Eysenck**
  - (d) **Psychoanalytic Approach – Adler**
- **Meaning and nature of Adjustment –(in the context of teaching and learning )**
- **Methods of Adjustment – Direct methods/Indirect methods**
- **Characteristics of a Well Adjusted Person**

**Practical Assignments / Field Engagements(Any one):**

- The student-teacher does observation of children at play and maintain diaries to acquaint themselves with the different strategies of children employ in Learning and Cognition -2 hours each across 4 observations; observations can be carried out in the schools. The students could

identify different games that children play; Individual and Group behaviour in play; friendships and social relationships. (The analysis could include the

following aspects: Motor Skills, Language used during Play, Group Structure and Interactions, arriving at rules and following them, Gender Behaviour, Patterns of Negotiation and Resolving Conflict, Folk Songs and Games, Popular Culture). The above field engagement is to be followed by post-assignment discussions during contact hours to arrive at linkages between play social, emotional, cognitive, language and motor development of children.

- Student-teachers shall conduct Individual and Group Intelligence Testing through appropriate culture fair Tests chosen by Faculty Mentors and prepare an e-portfolio of the entire project. Suggested Readings:

- Bettelheim, B. (1987). The Importance of Play. The Atlantic Monthly, March.

- Bodrova, E. and Deborah J. Leong (1996). Tools of the Mind. New Jersey:

Merrill Chapter 3: The Vygotskian Framework and other Theories of Child Development, Chapter 10: Play as a leading activity.

- Bodrova, E. and Leong, D. (1996). Tools of the Mind. New Jersey: Merrill. Chapter 1: Introduction to the Vygotskian Approach. Chapter 2: Acquiring Mental Tools and Higher Mental Functions, Chapter 3: The Vygotskian Framework and Other Theories of Development and Learning, Chapter 4: The Zone of Proximal Development.

- Cox M. (2005). *The Pictorial World of the Child*. New York: Cambridge University Press.
- Crain, W. (1992). *Theories of Development: Concepts and Applications*. (3rd Edition). New Jersey: Prentice Hall. Chapter 7: Kohlberg's Stages of Moral and Development, Chapter 8: Learning Theory: Pavlov, Watson, and Skinner, Chapter 9: Bandura's Social Learning Theory, Chapter 11: Freud's Psychoanalytic Theory, Chapter 12: Erikson and the Eight Stages of Life.
- Elkind, D. (1976). *Child Development and Education*. Oxford University Press.
- Erikson, Eric, H. (1972). *Play and Development*. New York: W.W. Norton.
- Gardner, H. (1985). *Frames of Mind: The Theory of Multiple Intelligences*. London: Paladin Books.
- Garvey, C. (1990). *Play*. Cambridge: Harvard University Press.
- Gilligan, C. (1977). *In a Different Voice: Women's Conception of Self and Morality*. Harvard Educational Review, 47 (4), 481-517.
- Harris, M. and Butterworth, G. (2002). *Developmental Psychology: a student's handbook*. New York: Taylor & Francis. Chapter 7: The beginnings of Language Development, Chapter 10: Social Development in Pre-school Years, Chapter 14: Social Development in the School Years.
- Hergerhahn, B.R. (1976). *An Introduction to Theories of Learning*, Englewood Cliffs, NJ: Prentice Hall.
- Holt, J. (1967). *How Children Learn*. London: Penguin.
- Lefrancois, G. (1991). *Psychology for Teaching*. Wadsworth Publishing Co. Chapter 1: Psychology for teaching, Chapter 5: Thinking and remembering, Chapter 8: Intelligence and creativity.

- **Mukunda, Kamala, V. (2009). What Did You Ask in School Today? A Handbook on Child Learning. Noida: Harper Collins. Chapter 2: Learning, 22-50; Chapter 6: Moral Development, 117- 146; Chapter 10: Emotions, Learning and Emotional Health, 222-253.**
- **Mangal, S.K(1997)Advanced Educational Psychology; New Delhi :Prentice Hall of India**
- **Piaget J. (1997). Development and Learning. In Gauvian, M. and M. Cole. (eds.)Readings on the Development of Children. New York: W. H. Freeman.**

## **SEMESTER II**

**Course Title: Historical & Sociological Foundations of Education**

**Credits:4      Course Code: BED-120      MM:100 Objectives**

- **To enable student teachers to understand the importance of policies & programs during pre & post independence era.**
- **Comprehend the system of Indian education.**
- **Analyze the forces affecting the education system.**
- **Critically examine the issues and concerns of education in the socio-cultural context in India.**
- **Sensitize with the cause & effects of social evils**
- **Inculcation of sensitivity & values in education.**
- **Develop vision for future of Indian education.**

**Course Content:**

**Unit-I: Historical development of Indian Education**

- **Pre-Independence Development in Indian education**
- **Pre-British Period (Vedic, Buddhist, Muslim)**
- **Prominent Characteristics of Education in India During Colonial Period (special reference to Anglicist- Oriental Controversy, Downward Filtration Theory & Basic Education)**
- **Post- Independence Developments in Indian Education**
- **Constitutional provisions Of Education**
- **Kothari Commission(1964-66)**
- **NPE 86 & POA 92**
- **Yashpal Committee**
- **Knowledge Commission**
- **RTE 2009**

## **Unit-II: Contemporary development of Indian Education**

- **System Of Indian Education**
- **UEE**
- **USE (RMSA)**
- **Higher Education (RUSA)**
- **Issues of Indian Education**
- **Vocationalisation of Education (Skill Development)**
- **Decentralization of Educational Administration (Administrative Hierarchy)**
- **Autonomy & Accountability in Higher Education**

- **Student Unrest (Special reference to Lingdoh Committee Report)**
- **Agencies Of Indian Education**
- **UGC**
- **NCERT**
- **NCTE**
- **NAAC**
- **CBSE**
- **RCI (Rehabilitation Council of India)**

### **Unit-III: Education & Socio-Cultural Context**

- **Relationship between Society & Education**
- **Social Process: Socialisation, Social Stratification, Social Change, Social mobility**
- **Education as an instrument of social Change, Influence of education on Society, Family & their practices.**
- **Education & Culture: Analysis of the concepts of Cultural Lag, Cultural Conflict, cultural Pluralism, Ambivalence, Cultural Tolerance, Acculturation & Enculturation**
- **Socio-Cultural influences on the aims & organization of education ( in context of sanskritisation, Industrialisation & Modernisation)**

### **Unit-IV: Social Issues in Education**

- **Values in Education: Causes of Value Degeneration. Methods & Techniques of value inculcation (Classroom Context)**

- **Democracy, Socialism & Secularism: Concept & Practices in Schools.**
- **Role of Education in reproducing dominance & challenges of Marginalization with reference to Class, Caste, Gender & Religion.**
- **Sensitization towards Social Evils (Inequality and Social Exclusion on basis of Class, Caste, Gender & Religion).**
- **Teacher & Society: A Critical Appraisal of the status of a Teacher in Indian Society.**

#### **Practical Assignments / Field Engagements**

- **The students will be engaged in community work wherein they would study the role of education in schools in reproducing dominance & challenges Marginalization with reference to Class, Caste, Gender & Religion and look at the prevailing in equality and social exclusion. They are expected to prepare a report on the same.**

#### **Suggested Readings:**

- **Anand, C L and et al (1993) Teacher and Education in the Emerging Indian Society, NCERT, New Delhi.**
- **Aggarwal (2002) - Landmarks in the history of Modern Indian Education, Vikas Publishing House Pvt. Ltd., New Delhi. - Aggarwal, J.C. (2002) – Development of Modern Indian education, Vikas Publishing House Pvt. Ltd., New Delhi.**
- **Biswa Ranjan Purkait (2001) - Milestones in Modern Indian Education, New Central Book Agency, Calcutta –**
- **Chandra, B. (2005). Modern India. New Delhi. NCERT**
- **Dash, M. (2000). Education in India: Problems and Perspectives. New Delhi: Atlantic**



- **Government of India (GoI) (1966). National Education Commission (1964-66), Ministry of Education: New Delhi. Government of India (GoI) (1986/92).**
- **New Education Policy, MHRD: New Delhi.**
- **Gore M.S. (1994). Indian Education – Structure and Process. Macmillan: Delhi..**  
**New Delhi: Rawat Pub.**
- **Humayun Kabir (1951). Education in New India. London: George Allen and Unwin Ltd.**  
**Jagannath Mohanty (1998). Jayapalan, N. Modern Trends in Indian Education. Hyderabad:**  
**Neelkamal Publication. New Delhi: Deep and Deep**
- **Delors, Jacques (1996) Learning the Treasure Within, Report to UNESCO of the**
- **International Commission on Education for Twenty-first Century, UNESCO.**
- **Dewey, John. (1952). The School and the Child, New York: The Macmillan Company,**
- **(Also available in Hindi School aur Bachche Translation: RRCEE)**
- **Gandhi M K (1956) Basic Education, Ahmedabad, Navjivan.**
- **Govt. of India (1952) Report of the Secondary Education Commission, New Delhi**
- **Govt. of India, MHRD (1986, Revised 1992) National Policy of Education, New Delhi**
- **Govt. of India, MHRD (1992) Programme of Action (Draft) New Delhi, Aravali Printers and Publishers.**
- **Mani R S (1964) Educational Ideas and Ideals of Gandhi and Tagore,**
- **Saraswathi T S (1999) Culture, Socialization and Human Development, Sage Publication.**

- •Kumar (Eds.) (1985). Sociological Perspectives in Education: A Reader. Delhi:Chanakya publications.
- Kumar, Krishna (1988). What is Worth Teaching. New Delhi: Orient Longman.
- Listening to Gandhi (Also Available in Hindi Shaekshik Gyan aur Varchasav.NewDelhi: Granthshilpi.)
- • Krishnamurti, J. (2006). Krishnamurti on Education. Chennai: KrishnamurtiFoundation of India.
- Nurullah S. & Naik J.P. (1981)- Student history of Education in India, Macmillan,Bombay
- Lal & Palod (2008) Educational thoughts and Practices, Meerat: Vinay Rakheja MathurS.S. (1988). Sociological approach to Indian Education. Agra: Vinod Pushtak Manir.
- National Curriculum Framework for School Education (2005). NCERT NCTE (1998).Gandhi on Education. New Delhi.
- Taneja. V.R. (2003). Educational Thoughts and Practice. New Delhi: SterlingPublishers.

## **SEMESTER II**

**Course Title :Assessment of Learning Credits:4 Course Code: BED-117**

**MM:100**

### **Unit I – Concept of Evaluation**

- Concept of Measurement, Assessment and Evaluation

- **Need and Scope of Evaluation**
- **Distinction between the following :Measurement, Examination, Assessment and Evaluation**
- **Evaluation Approaches:**  
  
**Formative -Summative**
- **Continuous Comprehensive Evaluation :Need ,Relevance, Implementation Procedure, Problems**

## **Unit - II Tools and Techniques of Evaluation**

- **Characteristics of good measuring instruments and factors affecting them.**
- **Reliability and Validity of Tools**
- **Tools of evaluation: -**  
  
**Quantitative – Written, Oral and Practical ( Types of Questions:Short, Long, MCQ covering all three domains of Learning-Cognitive, Affective and Psychomotor)**
- **Qualitative – Observation, Introspection, Projection and Sociometry**
- **Use of these tools for internal assessment & maintaining cumulative records of learners in School**
- **Planning and Preparation of test (including blue print)**

## **Unit- III Statistical Methods and Interpretation of scores**

- **Need & Importance of Statistics in Evaluation**
- **Graphical Representation**

## **Histogram, Frequency Polygon, Pi Charts,**

- **Measures of Central Tendency:- Mean, Median, Mode. (Meaning, Characteristics, useonly)**
- **Measures of Variability:(Meaning, Characteristics, Use only) Range, Quartile deviation, Standard deviation**
- **Normal Probability Curve:-Properties and Uses. (Skewness and Kurtosis ( Meaning &Reasons)**
- **Coefficient of Correlation-Spearman's Rank Rule Method**
- **Percentile & Percentile rank (Meaning & Uses)**

## **Unit IV New Trends in Evaluation(Need and Use )**

- **Question bank**
- **Grading system**
- **Online Examination**
- **Open Book Examination**
- **Credit System**
- **Exam on Demand (meaning & uses only)**

## **Practical Assignments/Field Engagement(Any one):**

- **Develop a Power Point Presentation on the current practices of Assessment andEvaluation at the Upper Primary Stage**
- **Analyse the question papers of the subject of your choice (Previous-3 Years)**

- **Classes X and XII (any board) in the light of new approach of assessment**
- **Develop a question paper for upper primary and secondary stage to assess all the aspectsof language learning using ICT as a tool**
- **Analyse answers given by the learners for one particular question**
- **Select any ten questions from the Class VI textbook of the subject of your choice whichlend scope to the creativity of the learners**
- **Study the key points of the Ist Term assessment of any student of Class VI**
- **Devise a strategy to incorporate the suggestions given in the Ist CCE report for theprogress of the learner.**

**Suggested Readings:**

- **Cohen, Louis; Manion, Lawrence and Morrison, Keith(2004); A Guide to TeachingPractice- Fifth Edition; Routledge Falmer-Taylor and Francis Group; London.**
- **Ebel Robert L., (1991). Essentials of Educational Measurement, Prentice Hall of India.**
- **Gunter, Mary Alice et.al(2007)., Instruction: A Model's Approach- Fifth Edition;Pearson Education Inc.; Boston.**
- **Kubiszyn Tom. (2003). Educational Testing and Measurement, John Wiley.**
- **Linn, Robert L. and Gronlund, Norman E. (2000). Measurement and Assessment inTeaching; Pearson Education Inc.**

**Course Title: Teaching of English      Credits: 4 Course Code: BED-122**

**M.M:100**

### **Objectives of the course:**

- **To understand the need and importance of English language .**
- **To develop proficiency in the language.**
- **To be familiar with the psycholinguistics and sociolinguistics aspects of language.**
- **To enable the students to use technology to enrich language teaching.**
- **To be aware of the pedagogical practices required for teaching English on second language.**
- **To facilitate the effective use of learning resources.**
- **To encourage continuous professional development.**
- **To develop an appreciation of the role of English in both academics and life.**

### **Course Content**

#### **Unit - I: Fundamentals of Language**

- **Nature and Scope of Language**
- **Psycholinguistic and Sociolinguistic perspectives of language**
- **Role of Language in Life: Intellectual, Emotional, Social and Cultural Development**
- **Language Acquisition vs. Language Learning**
- **Multilingualism as resource to Second Language Teaching-Learning**
- **Language across Curriculum**
- **Principles and Maxims of Language Teaching**

## **Unit - II: Language Development Skills and Learning Resources**

- **Listening: Concept, types, Significance and Activities to develop Listening and its evaluation**
- **Speaking: Concept, Significance and activities to develop speaking and its evaluation**
- **Reading: Concept, Methods (Phonic, Whole Word), Types (Loud, Silent, Intensive, Extensive and Supplementary), Techniques to Increase Speed of Reading (Phrasing, Skimming, Scanning, Columnar Reading, Key word Reading) and its evaluation.**
- **Writing: Types of Composition (Guided, Free and Creative), Evaluating Compositions, Letter Writing (Formal, Informal)**
- **Study Skills (Note Taking and Making), Reference Skills (Dictionary, Encyclopaedia, Thesaurus)**
- **Learning resources: Computer Assisted Language Learning (CALL), Library, Language Laboratory e-resources.**

## **Unit - III: English Language Pedagogy**

- **Micro Teaching Skills**
- **Approaches/Methods to English Language Teaching: Direct Method, Structural Approach, Communicative Approach, Constructivist Approach**
- **Planning a Lesson, Instructional Objectives and Specifications for:**

**Prose: Techniques (Discussion, Narration, Questioning), Methods (Story Telling, Dramatization)**

**Poetry: Methods (Recitation, Song-action), Techniques of Appreciation Grammar: Types (Functional, Formal), Methods (Inductive, Deductive) Unit - IV: Professional Growth and Learner Evaluation**

- **Action research: Concept and Identification of problems faced by the teachers in the classroom.**
- **Critical Appraisal of an English text book.**
- **Professional Competencies of a teacher.**
- **Comprehensive and Continuous Evaluation and its use in English class.**
- **Different Elicitation Techniques used in English; cloze, diagnostic and achievement test.**
- **Remedial Teaching, Contrastive analysis; Error analysis**

**Practical Assignments/Field Engagement(Any one):**

- **Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.**
- **Preparation of an Achievement Test in English.**
- **Organisation of inter-class contests in English**
- **Identifying and Evaluating ICT resources suitable for teaching English.**

**Suggested Readings:**

- **Amritavatli, R, (1999): Language as a Dynamic Text: Essays on Language, Cognition and Communication. CIEFL Akshara series. Hyderabad: Aillied Publishers**
- **Choudhary, N.R, (2002) :English Language Teaching, Himalaya Publish House, Mumbai**



- **Dave, Pratima S, (2002): Communicative Approach to the Teaching of English as A Second Language, Himalaya Publishing House, Mumbai**
- **Davis, Paul and Mario Rinvolutri, (1988): Dictation: New Methods, New Possibilities. Cambridge Handbook for Language Teachers**
- **Grillett, M (1983): Developing Reading Comprehension, London, CUP.**
- **Halbe Malati, (2005) :Methodology of English Teaching , Himalaya Publishing House,**
- **Parrot, M (1993),Tasks for the Classroom Teacher, London, Pergamon**
- **Prabhu, N.S. (1987): Second Language Pedagogy. Oxford University Press, NY.**
- **Sahni Geeta(2006),Suggested Methodology of Teaching English .**
- **Sunwani, V.K, (2005), The English Language and Indian Culture.**

**Course Title: Teaching of Mathematics**

**Credits – 4 Course Code: BED-123**

**MM: 100**

**Objectives of the course:**

- **To understand the nature of Mathematics.**
- **To understand the historical developments leading to concepts in modern Mathematics.**
- **To understand the learning theories and their applications in Mathematics Education.**
- **To improve the competencies in secondary level Mathematics.**
- **To understand the various instructional strategies and their appropriate use in teaching Mathematics at the secondary level.**
- **To understand the preparation and use of diagnostics test and organize remedial teaching.**

- **To apply appropriate evaluation techniques in Mathematics.**

## **Course Content:**

### **Unit-I: Introduction to Mathematics**

- **Introduction to mathematics education**
- **Nature of mathematics (axioms, postulates, patterns and language of Mathematics), Need and importance of Mathematics at secondary stage.**
- **Developing objectives of teaching mathematics in behavioral terms**
- **Correlation of Mathematics with other subjects.**
- **Historical developments in Mathematics**

### **Historical development of Notations and Number systems**

**Contributions of Indian Mathematicians (Ramanujan, Aryabhatta, Bhaskaracharya, Shakuntala Devi).**

### **Vedic Mathematics.**

### **Unit-II : Place of Mathematics in secondary school curriculum**

- **Critical evaluation of the curriculum in use in Mathematics at the secondary stage according to NCF.**
- **Qualities of a good Mathematics textbook and its evaluation (Content analysis).**
- **Professional competencies of a Mathematics teacher.**

### **Unit-III: Instructional strategies and methods of teaching mathematics**

- **Inductive, deductive approach.**

- **Analytic and synthetic approach.**
- **Heuristic and project approach.**

• **Problem solving method.**

- **Constructivist approach.**
- **Activity method and cooperative learning.**
- **Organization of teaching strategies in Mathematics**
- **Different models of lesson planning.**
- **Micro Teaching, Unit Planning and Lesson planning**
- **Selecting appropriate instructional strategies related to various topics included**

**insecondary classes of the CBSE in the following areas:**

**Teaching of Arithmetic (Commercial Maths)**

**Teaching of Algebra (Polynomials, algebraic identities, Linear equations, Quadratic equations)**

**Teaching of Geometry (Lines, Angles, Congruent Triangles and Similar triangles)**

**Teaching of Mensuration (Surface areas and volumes of solid figures) Teaching of Statistics  
(Measures of central tendency - graphical representation)**

- **Mathematics clubs Development and use of Mathematics club in school.**
- **Organising various activities - Mathematics fairs, quiz, Olympiad, talent search examination.**

**Unit-IV: Technology Integration and Evaluation**

- **Technology Integration: Planning with the integrating Technology for inquiry (NTeQ) model for Mathematics at secondary school level.**
- **Diagnostics test and remedial teaching in Mathematics**
- **Continuous and Comprehensive evaluation**
- **Achievement Test. Need and importance of class tests.**
- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

**Practical Assignments/Field engagement(Any one):**

- **Construction and administration of achievement test in Mathematics.**
- **Organizing a co-curricular activity in School.**
- **Identifying and Evaluating ICT resources suitable for teaching Mathematics.**
- **Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.**

**Suggested Readings:**

- **Boyer, Carl B., (1969): A History of Mathematics; Wiley, New York.**
- **Content cum Methodology of Teaching Mathematics for B.Ed; NCERT New Delhi.**
- **Davis David R., (1960); Teaching of Mathematics Addison Wesley Publications.**
- **Ediger Mariow (2004); Teaching Math Successfully, Discovery Publication.**
- **Gupta H.N. and Shankaran V (Ed.), (1984); Content cum Methodology of Teaching Mathematics, N CERT New Delhi.**
- **Hudgins, Bryce B. (1966); Problem Solving in the classroom, MacMillan, New York.**

- **James Anice (2005); Teaching of Mathematics, Neelkamal Publication.**
- **Johan R.E. et.al, (1961): Modern Algebra; First Course, Addison-Wesley Publishing Company INC. USA.**
- **Kapur S.K. (2005); Learn and Teach Vedic Mathematics; Lotus Publication.**
- **Kulshreshtha, A.K. (2012) Teaching of Mathematics, R. Lal and Sons. Meerut, U.P.**
- **Tyagi, S.K.(2004); Teaching of Arithmetic; Commonwealth Publications.**

**Course Title: Teaching of Accountancy**

**Credits – 4 Course Code: BED-127**

**MM: 100**

**Objectives of the course:**

- **To student-teachers will develop the understanding of the nature of Accountancy As a subject at Senior Secondary Stage.**
- **To understand the rationale of including Accountancy in the school curriculum,**
- **To make use of workbooks and practice sets for gaining practical knowledge of the world of Accountancy.**
- **To equip them with the essential qualities of an ideal Accounting teacher,**
- **To familiarize them with the techniques of evaluation in Accountancy.**
- **To develop in them the awareness about curricular innovations in Accountancy.**

**Course Content:**

**Unit - I: Introductory framework and Objectives**

- **Nature and Need of Accounting:** Nature, need and objectives of Accounting, rationale of its inclusion in the school curriculum. Development of Accounting as a 'Profession'. Skills required by Contemporary Accounting Professionals.
- **Development of Accounting Curriculum:** Comparative analysis of the present accounting syllabus of CBSE & ICSE. Critical appraisal of CBSE/ICSE accounting syllabus.
- **Integration of Accountancy with Business studies, Mathematics & Economics.**

#### **Unit - II: Planning and Objectives:**

- **Micro Teaching, Unit planning and Lesson Planning:** Planning lessons for Theoretical aspects, Practical/numerical sessions and Projects.
- **Objectives of Teaching Accounting:** General and specific objectives of teaching Accounting. Domains of writing specific objectives. Techniques of writing objectives.

#### **Unit - III: Learning Resources, Methods & Techniques**

- **Learning Resources**
- **Workbooks and Practice sets**
- **Use of software and hardware for the teaching of Accountancy, including the use of computers**

#### **Methods and Techniques of Teaching Accounting**

- **Lecture cum Discussion method**
- **Question –answer technique**

- **Problem solving method ,Gamesmethod, Project method**
- **Case study**
- **Computer Assisted Instruction**

#### **New Pedagogic ideas in Accountancy**

- **Team Teaching, Co-operative learning, Peer learning, Blended learning, collaborative learning.**
- **Co-Curricular Activities: Different types of co-scholastic activities for strengthening the learning of Accounting. Quizzes and other group activities.**

#### **Unit - IV: Professional Requirements and Evaluation**

- **Accounting Teacher: Qualities of an ideal Accounting teacher, Avenues available for professional growth**
- **Text Book: Critical appraisal of an Accounting text book. Journals (Conceptual, Professional and from Industry) in relation to Accounting.**
- **Professional Accounting Software: Working knowledge about the prevalent accounting (business record maintaining) software [Tally, Busy, etc.]. Use of spreadsheets in Accounting.**
- **Evaluation in Accounting: Evaluating assignments, project work and giving feedback. Types of test items in accounting. Open book examination. Remedial Teaching. Practicing good quality of questions-objective, short answer. Continuous and Comprehensive evaluation.**
- **Development of Achievement Test in Accountancy. Types of Test Items.**

- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

**Practical Assignments/Field engagement(Any one):**

- **Identifying and Evaluating ICT resources suitable for teaching Accountancy.**
- **Prepare a workbook of any three Accountancy topics.**
- **Take up a project on any unit of +2 accounting and write a model report thereon.**
- **Maintenance and use of practice set**
- **Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.**

**Suggested Readings:**

- **Bhatia, S.K. (2012). Teaching of Business Studies and Accountancy. New Delhi: Arya Book Depot.**
- **Bhatia. S.K. (1996). Methods of Teaching Accounting. Publication No. 16. CIE. Delhi.**
- **Binnion. John E. (1956). When you use a Book-Keeping Practice Set. Journal of Business Education. Vol. 32 Oct. pp. 30-33**
- **Boynton. Laewis.D. (1955). Methods of Teaching Book-Keeping. Cincinnati; South Western Publishing Co.**
- **Forkher Handen L., R.M. Swanson and R. J. Thompson (1960) The Teaching of Book-Keeping South Western Publishing.**



- **Maheswari, S.B. (1969) Teachers' Guide in Book-Keeping & Accountancy, Monograph. NCERT Regional College of Education, Ajmer.**
- **Ments, M. (1960). Simulations, Games and Role Play. Handbook of Education Ideas and Practices, London: Routledge.**
- **Musselman, Vernon A and J.M. Hanna (1960). .Teaching Book-Keeping and Accounting. New York. McGraw Hill Book Co.**
- **Sapre, P.M. (1968), Trends in Teaching Book-Keeping and Accountancy, Regional College of Education, Mysore.**
- **Support material for PGT (Commerce) (2011). New Delhi: State Council of Educational Research and Training. Retrieved from: [http://delhi.gov.in/wps/wcm/connect/doi\\_scert/Scert+Delhi/Home/Questpaedia/Learning+Material/Commerce/](http://delhi.gov.in/wps/wcm/connect/doi_scert/Scert+Delhi/Home/Questpaedia/Learning+Material/Commerce/)**
- **Verma, D.P.S.(2000); Commerce Education in Rajput, J.S. (Ed.) Encyclopaedia of Indian Education, Vol. I; NCERT.**

**Course Title :Teaching of Life Science Credits:4**

**Course Code: BED-129**

**MM:100**

**Course Objectives:**

- **To develop in student-teachers an understanding of the nature of Biology and its interface with Society**
- **Acquire a conceptual understanding of the Pedagogy of Biology.**

- **To Acquire and learn specific laboratory skills to conduct practical work in Biology.**
- **Develop and use the techniques of CCE for assessment of student's performance.**
- **To evolve as a reflective practitioner through use of innovative practices in the teaching of Biology.**

#### **Course Content:**

##### **Unit-I: Biology in the School Curriculum**

- **Nature of Biological Science**
- **Meaning, nature and scope of Biology as a discipline in Science .**
- **Significance of Biology in daily life and its relevance to Social and Environmental Issues**
- **Aims and Objectives of Teaching of Biology :**
- **Relevance, meaning and need of Objective Based Teaching.**
- **General and specific aims of teaching Biology at senior secondary level.**
- **General and Specific Objectives of teaching Biology at Senior Secondary level**

##### **Unit-II: Planning, Designing and Transaction of Biology Curriculum.**

- **Micro Teaching**
- **Development of Unit plan, Lesson Plan, Concept Maps using variety of approaches.**
- **Teaching Learning process with a focus on:**
- **Inquiry Approach**

- **Problem Solving Approach**
- **Project Method**
- **Constructivist Approach**
- **Peer Learning/Group Learning, Team Teaching**
- **Biology Laboratory: Design, Organization & Management.**
- **Teaching Learning Materials :Real Objects and Specimens, Visits to Botanical and Zoological Museums,**
- **Planning and execution of Extended Experiences:-**
- **Field Trips and Excursions**
- **Science Exhibition**
- **Science Fair**
- **Science Quizzes**
- **Role of Biology in Teaching Integrated Science, EVS and Health Education**

### **Unit-III: Assessment in Biology**

- **Evaluation: Concept and Importance**
- **Nature of Learning and Assessment: Analysis and Critique of present pattern of Examinations**

- **Design and analysis of Class-tasks and Home-tasks (With reference to inculcation of Thinking and Process Skills**
- **Techniques of Evaluation for Theory & Practical.**
- **Continuous Comprehensive Evaluation: Scope and Effective use in Biology Teaching-Learning**
- **Diagnostic tests , remedial/enrichment measures & monitoring learner's progress.**
- **Achievement test-its construction & administration.**
- **Assessment through Creative Expression: Essays, Posters, Drama, Poetry, Riddles etc**

#### **Unit-IV: Professional Development of a Biology Teacher**

- **Need for professional development at Individual level, Organizational level and Government level.**
- **Need and Relevance of Participation in Seminars, Workshops, Conferences , Symposiaetc well as membership of Professional Organisations in Professional development of teachers.**
- **Field Visits to Institutions /Organisations such as Other Schools ,Museums, Parks, Research Organisations etc :Need and Relevance for Professional development**
- **Preparing the Teacher for Technology Integration: Planning with integrating Technology for inquiry (NTeQ) in Biology at Senior Secondary school level.**
- **Teacher as a Researcher :Need and Competencies.**
- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

#### **Practical Assignments /Field Engagement(Records to be maintained)**

- **Identifying and conducting at least 5 experiments/demonstrations the Biology syllabus individually or in small groups**

### **Suggested Readings:**

- **Bremmer, Jean (1967), Teaching Biology, London: MacMillan.**
- **Heller, R. (1967), New Trends in Biology Teaching, Paris : UNESCO**
- **Miller, David, F. (1963), Methods and Materials for Teaching the Biological Sciences, New York, McGraw Hill.**
- **NCERT (1969), Improving Instructions in Biology, New Delhi.**
- **Novak, J.D. (1970), The Improvement of Biology Teaching Modern Science Teaching, Delhi: Dhanpat Rai & Sons.**
- **Nunn, Gordon (1951), Handbook for Science Teachers in Secondary Modern Schools, London: John Murray.**
- **Thurber, Walter (1964), Teaching of Science in Toda's Secondary Schools, New Delhi: Prentice Hall.**
- **Vaidya, N. (1971), The Impact of Science Teaching, New Delhi: Oxford and IBHPublication Co.**
- **Voss, Burton F.A. and Bren, S.B., Biology as Inquiry: A Book of Teaching Methods.**
- **Waston, N.S. (1967), Teaching Science Creativity in Secondary School, London U.B.Saunders Company.**

**Course Title: Teaching of Home Science      Credits – 4 Course Code:BED-126**

**MM: 100**

**Objectives of the course:**

- **To familiarize student-teachers with the meaning and scope of Home Science and Objectives of Teaching Home Science at Higher Secondary Level.**
- **To sensitize them to understand the importance of Teaching Home Science in Schools.**
- **To enable them to know and apply various techniques and approaches of Teaching of Home Science at Higher Secondary level.**
- **To plan instructions effectively for Teaching of Home Science in Schools.**
- **To develop the skills to evaluate student performance effectively with reliable and valid tools.**

**Course Content:**

**Unit – I : Meaning and Scope of Home Science**

- **The modern meaning of Home Science and its place in Secondary School**
- **Objectives of Teaching Home Science at Senior Secondary Level.**
- **Status of Home Science**
- **Scope of Home Science in School Curriculum**
- **Principles of curriculum planning and development of Home Science Syllabus**
- **Characteristics of a good Home Science text book.**
- **Correlation of Home Science with other subjects and School activities**
- **SUPW related to Home Science**

## **Unit - II: Planning and Designing for Effective Instruction in Home Science**

- **Planning for instructional process – need, advantages and strategies**
- **Micro Teaching, Unit Planning and Lesson planning.**
- **Illustrations of Teaching Learning Process in Home Science**
- **Teaching of Human Development**
- **Teaching of Foods and Nutrition**
- **Teaching of Textiles and Clothing**
- **Teaching Community Resource Management and Extension**
- **Audio visual aids in teaching of Home Science**
- **Use and Management of Home Science Laboratory**

## **Unit - III: Approaches and Methods of Teaching Home Science**

- **Discussion method**
- **Demonstration method ,**
- **Laboratory work**
- **Project method**
- **Problem solving method ,**
- **Field trips**
- **ICT as a resource for Teaching-Learning**

- **Market survey**
- **Use of community resources**
- **Exhibition and displays .**

#### **Unit - IV: Evaluation in Home Science**

- **Evaluation and assessment**
- **Techniques for assessment in theory and practical**
- **Monitoring learner's Progress . Preparation of Achievement Test.**
- **Diagnostic and remedial measures in Home Science**
- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

#### **Practical Assignments /Field Engagement(Any one):**

- **Identifying and Evaluating ICT resources suitable for teaching Home Science.**
- **Planning and Organization of Home Science Laboratory**
- **Organization of any two Co-curricular activities in Home Science**
- **Develop a Multi-Media lesson using appropriate ICT resources and transact the same beforepeers in a simulated teaching exercise.**

#### **Suggested Readings:**



- **Bloom, Benjamin, (Ed.) and others (1965) Taxonomy of Educational Objectives: The Classification of Educational Goals, Handbook 1: Cognitive Domain, New York, David McKay Company Inc.**
- **Broudy, Harry S. and Palmer, John R. (1966) Examples of Teaching Method, Chicago, Second Printing, Chicago, Rand McNally & Co.**
- **Chandra A. (1995) Fundamentals of Teaching Home Science, ND: Sterling publishers.**
- **Dale Edgar (1962), Audio Visual Methods in Teaching, revised edition, Hold, Rivehart and Winston, New York.**
- **Das, R.R. & Ray B. (1989) Teaching of Home Science, ND: Sterling Publishers.**
- **Devdas R.P. (1976). Teaching Home Science, AI Council for Teaching Science.**
- **Hall & Paolucci (1968), Teaching Home Economics, NY: Wiley Eastern P. Ltd.**

**Course Title: Teaching of Sanskrit      Credits: 4 Course Code: BED-134**

**M.M:100**

**Objectives of the course:**

- **To enable student-teachers to attain efficiency and effectiveness in teaching and learning Sanskrit Language.**
- **To understand the role of Sanskrit in India and its place in the school curriculum.**
- **To be committed, inspired and interested in teaching Sanskrit.**
- **To facilitate the effective use of learning resources.**
- **To develop strategies in order to meet the learning difficulties in teaching Sanskrit.**
- **To identify and be sensitive to the proficiency, interests and needs of learners.**

- **To encourage continuous professional development.**

**Course content:**

**Unit - I : Fundamental of Language**

- **Nature, Evolution and Development of Sanskrit language.**
- **Importance and objectives of teaching Sanskrit.**
- **Aims and Objectives of teaching Sanskrit as Language at the Secondary Level**
- **Interaction of Sanskrit Language with other Indian Languages and its Structural, Lexical and Semantic relationship. Place of Sanskrit in the school curriculum.**
- **Textbook: Selection of text books, reference books .**
- **Critical Appraisal of a Sanskrit text book.**

**Unit - II: Development of Skills**

- **Recitation, silent Reading, Oral Expression and Special Language teaching skills.**
- **Audio Visual Aids: Meaning, Classification,**
- **Importance and uses in Teaching Sanskrit.**
- **Unit planning in Sanskrit language**

**Unit: III Learning Resources and Professional Growth**

- **Computer Assisted Language Learning (CALL), Library,**
- **Professional Competencies of the teacher.**
- **Use of Multi Media in teaching of Sanskrit**

- **Micro-teaching skills in teaching Sanskrit**
- **Lesson Planning for Prose, Poetry, Grammar, and Composition**
- **Different Approaches of Lesson Planning**

#### **Unit-IV: Evaluation**

- **Difference between Measurement, Assessment and Evaluation,**
- **Criterion Referenced Testing and Norm Referenced Testing**
- **Types of Test Items and development of Achievement test**
- **Significance of Comprehensive and Continuous Evaluation**
- **Diagnostic and Remedial Teaching**
- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

#### **Practical Assignment/Field engagement(Any one):**

- **Critical study of any one Sanskrit textbook prescribed for secondary level.**
- **Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.**
- **Preparation of an Achievement Test in Sanskrit.**
- **Develop two games for teaching any Sanskrit Topic.**
- **Identifying and Evaluating ICT resources suitable for teaching Sanskrit.**

**Suggested Readings:**

- **Apte, D. G. and Dongre, P. K.: Teaching of Sanskrit in Secondary School, Acharya Book Depot, Baroda, 1980.**
- **Bokil, V. P. and Parasnik, N. K.: A New Approach to Sanskrit, Loka Sangraha Press, Poona.**
- **Joyce, B. & Weil, M: Models of Teaching. Prentice Hall Inc., New Jersey, 1979.**
- **Pal, H.R and Pal, R.: Curriculum – Yesterday, Today and Tomorrow. Kshipra, New Delhi, 2006.**
- **Pal, H.R.: Methodologies of Teaching & Training in Higher Education. Delhi: Directorate of Hindi Implementation, Delhi University, 2000.**
- **Panday, R. S. : Sanskrit Shikshan, Vinod Pustak Mandir, Agra, 2000.**
- **Sansanwal, D.N. & Singh, P.: Models of Teaching. Society for Educational Research & Development, Baroda, 1991.**
- **Safaya, R. N.: Sanskrit Shikshan Vidhi, Harayana Sahitya Academy, Chandigarh. Shastri and Shastri: Sanskrit Shikshan, Rajsthan Prakashan, Jaipur.**
- **Singh, S. D. and Sharma, Shashikala: Sanskrit Shikshan, Radha Prakashan Mandi, Agra, 1999.**

**Course Title: Teaching of Business Studies Credits : 4 Course Code: BED-136**

**MM:100**

**Objectives of the course:**

- **To develop in the student-teachers an awareness why business studies is taught at +2level.**
- **To develop an analytical ability to appraise the existing CBSE curriculum of Business Studies meant for +2 students, and its comparison with other school boards**
- **To familiarize with the nature of business studies being taught at the school level**
- **To be conversant with the different methods of teaching meant for teaching +2 students,**
- **To instil the competence of organizing co-curricular activities for enriching the subject matter of business studies,**
- **To develop the tools and techniques of evaluation for appraising and enhancing students knowledge in Business Studies,**
- **To develop awareness of curricular innovations in Business Studies.**

#### **Course Content:**

##### **Unit - I: Introductory Framework**

- **Business Studies: Nature & Need and objectives of Business Studies, its scope and rationale of its introduction at senior school level, recent advancements in Business Studies. Evolution of education for business.**
- **Curriculum of Business Studies: Concept of curriculum and syllabus. Comparative analysis of the present syllabus of CBSE with ICSE. Critical appraisal of present syllabus developed by CBSE/ICSE.**

- **Integration of Business Studies with other subjects: Concept, objectives and Importance of Integration. Integration of Business Studies with other subjects –Accountancy, Economics, Social Science and English language.**

## **Unit - II: Objectives and Planning for Business Education**

- **Nature of general & specific objectives, behavioural objectives, techniques of writing objectives**
- **Micro Teaching.**
- **Unit Planning and Lesson Planning.**

## **Unit–III: Pedagogy of Business Studies**

- **Lecture Method**
- **Discussion Method**
- **Group work & collaborative learning**
- **Project Method**
- **Problem Solving method**
- **Teaching through Games**
- **ICT as a Resource in Teaching-Learning**
- **Case Studies**
- **Development of Higher Order Thinking Skills (through following activities) Collaborative group activities, Problem-solving activities and Questioning for development of critical thinking.**

**Co-curricular activities**

- **Business Studies based co-scholastic activities and their utility, linkage of school and outside organizations for strengthening knowledge about business.**

#### **Instructional Media**

- **Meaning, Types of Instructional Media, scope of using Instructional Multi Media for the teaching of Business Studies.**
- **Textbook: Features of a good textbook, Selection of text books, reference books and professional journals for business studies.(Educational tours to any business organisation)**
- **Use of web quest, blogs and social media for teaching-learning Business studies.**

#### **Unit - IV: Technology Integration and Evaluation**

- **Technology integration: NTeQ model for Business Studies at senior school level, Blended learning**
- **Evaluation: Concepts of Evaluation, Measurement & Tests. Types of Evaluation.**
- **Use of portfolio**
- **Development of Achievement test in Business Studies. Types of test items.**
- **Evaluation of Assignments and Project work. Remedial Teaching.**
- **Continuous and Comprehensive Evaluation in Business Studies.**
- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

#### **Practical Assignments/Field engagement(Any one):**

- **Develop a game for teaching some Business Studies topic (explain step by step, the process of developing this game, giving its rules of participation)**

- **Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.**

- **Identifying and Evaluating ICT resources suitable for teaching Business Studies**
- **Organise a co-curricular activity for strengthening the knowledge of any topic taught recently in the class.**

**Suggested Readings:**

- **Bhatia, S.K. (2012). Teaching of Business Studies and Accountancy. New Delhi: Arya Book Depot.**
- **Bhatia, S.K. (1979), Teaching of Principles of Commerce and Accountancy, CIE Publication, Delhi.**
- **Calfrey C. Alhon (1988), Managing the Learning Process in Business Education, Colonial Press USA**
- **Musselman Vernon A. and Musselman Donald Lee. (1975). Methods in Teaching Basic Business Subjects, 3rd ed Dannirl III. The Interstate Printers and Publishers**
- **Nolan, C.A. (1968), Principles and Problems of Business Education, Cincinnati, South Western Publishing Company**
- **Schrag & Poland (1987). A System for Teaching Business Education. McGraw Hill Book Company. New York.**
- **Siddique, M. Akhtar and Khan, R. S. (1995). Handbook for Business Studies Teachers, Jamia Millia Islamia, New Delhi.**



- **Support material for PGT (Commerce) (2011). New Delhi: State Council of Educational Research and Training. Retrieved from:**  
**[http://delhi.gov.in/wps/wcm/connect/doi\\_tscert/Scert+Delhi/Home/Questpaedia/Learning+Material/Commerce/](http://delhi.gov.in/wps/wcm/connect/doi_tscert/Scert+Delhi/Home/Questpaedia/Learning+Material/Commerce/)**
- **Tonne, Herbert & Lovis C. Nancy. (1995). Principles of Business education. McGraw Hill, New York**
- **Verma, D.P.S.; Commerce Education in Rajput, J.S. (Ed.)(2000) Encyclopaedia of Indian Education, Vol. I; NCERT; .**

- **Wadhwa, Toolika(2008); Commerce Education at Senior- Secondary Level: Some Reflections: in MERI Journal of Education; New Delhi; Vol. III; No. II..**

**Course Title: Teaching of Social Sciences Credits : 4 Course Code: BED-124**

**MM: 100**

**Objectives of the course:**

- **To develop understanding about the basic differences between Social Studies and Social Sciences.**
- **To understand the need for teaching Social Sciences as an integrated discipline**
- **To develop the ability to justify the relevance of social Sciences in terms of Contemporary events.**
- **To gain knowledge about the different approaches associated with the discipline**
- **To develop certain professional skills useful for classroom teaching.**
- **To develop notion of Democracy, National integration etc.**

## **Course Content:**

### **Unit - I: Learning and Teaching Social Science**

- **Nature and Scope of Social Science**
  - **Difference between Social Science and Social Studies**
  - **Aims and objectives of teaching Social Sciences**
  - **Social Science curriculum at School level - correlation with other subjects.**
  - **Critical appraisal of a Social Science Text book.**
  - **Democratic values and National objectives, Citizenship.**
- 
- **Importance of Democratic inclusive class room for Social Science teaching.**

### **Unit - II: Methods and Strategies**

- **Approaches / Methods of Teaching Social Sciences**
- **Difference between Approaches, strategies and methods**
- **Types of Approaches and their use in lesson planning: Inductive, deductive, constructivist, multidisciplinary & integrated approach in Social Sciences.**
- **Transactional Strategies**
- **Methods – Story telling, Problem Solving, Project Method, Observational Method, Assignment Method, Discussion method.**
- **Grouping students for learning, Cooperative learning, Role play and simulation**

- **Micro Teaching, Unit Planning and Lesson Planning.**
- **Social Science Laboratory - organization and management**
- **Organization and planning of Co-curricular Activities in Social Science – Field**

#### **Trip/Excursion / Bulletin Board in Social Science**

- **Dealing with controversial Issues in Social Science. Current events**

#### **Unit - III: Integration of Technology and its Applications**

- **Developing Concept and Generalizations**
- **Concept formation and classification**
- **Concept Mapping in Social Science**
- **Instructional strategies for concept learning**
- **Technology Integration: Planning with the integrating Technology for inquiry (NTeQ)model for Social Sciences at secondary school level, e-technologies.**
- **Instructional Aids: - Preparation, improvisation and effective use - Chart, Models, ScrapBooks, Media (Print Non-print and Electronic Media), Maps, Globe.**
- **Social Science Teacher: Teaching skills, teacher as a reflective practitioner**

#### **Unit IV: Evaluating Student learning**

- **Evaluation: Concept, importance and Types of Evaluation.**
- **Concept of Comprehensive and Continuous Evaluation**
- **Type of Test items and development of Achievement test in social sciences.**
- **Diagnostic testing and remedial measures.**

- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

**Practical Assignments/Field engagement(Any one):**

- **Project report on any topic of social Science.**
- **Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.**
- **Identifying and Evaluating ICT resources suitable for teaching Social Science.**

**Suggested Readings:**

- **Aggarwal, J.C. (1982), Teaching of Social Studies, New Delhi: Vikas Pub..**
- **Kochhar, S.K. (1983), Teaching of Social Studies, New Delhi: Sterling Publications,.**
- **Martorella H. Peter (1994) Social Studies for elementary School Children (Developing Young Citizens)**
- **Mehta, D.D. (2004), Teaching of Social Studies, Ludhiana: Tandon Pub.,**
- **Michaels U. John(1992), Social Studies for Children**
- **Mittal, H.C., Teaching of Social Studies, New Delhi: Dhanpat Rai & Chandna R.N. Sons.**
- **Preston, Ralph C(1955)., Handbook of Social Studies, Rhinehart and Company,.**
- **Shaida, B.D(1962)., Teaching of Social Studies, Jalandhar: Panjab Kitab Ghar,**
- **Teaching Social Studies in High School, Wesley Edgar Bruce**
- **UNESCO (1981), Handbook for teaching of Social Studies.**

- **Wesley, Edgar Bruce, Teaching of Social Studies, Boston: D.C. Herth and Co.**

**Course Title :Teaching of Integrated Science Credits:4      Code: BED-125**

**MM:100**

**Objectives of the Course:**

- **To develop in student-teachers an understanding of the nature of integrated science and its interface with society.**
- **Appreciate the significance of integrated science at various levels of school curriculum.**
- **Acquire a conceptual understanding of the Pedagogy of Science.**
- **To Acquire and learn specific laboratory skills to conduct practical work in Science.**
- **Develop and use the techniques for evaluation of student's performance.**
- **To critically analyse the Curriculum and textbooks from the dimension of integration**

**Course Content:**

**Unit-I: Science in School Curriculum**

- **Nature of Science ,Scientific inquiry and Integrated Science**
- **General Science Vs Integrated Science: Basic Assumptions of Integrated Science**
- **Scope of Science and Rationale of Teaching Science as a Compulsory Subject upto class X.**
- **Correlation of Integrated Science with other Subjects.**

• **Aims & Objective of Teaching of Science with special reference to integrated Science.**

• **Integrated Science Books: Qualities of good Integrated Science books, Effective use; Criteria for evaluation of integrated science textbook.**

## **Unit-II: Planning, Designing and Transaction**

• **Development of Unit plan, Lesson Plan, Concept Maps using variety of approaches.**

• **Teaching Learning process with a focus on:**

• **Inquiry Approach**

• **Problem Solving Approach**

• **Constructivist Approach**

• **Teaching Methods: Lecture Method, Lecture cum Demonstration, Laboratory Method, Project Method, Heuristic Method.**

• **Peer Learning/Group Learning, Team Teaching**

• **Science Laboratory: Organization & Management.**

• **Instructional Aids (Teaching Learning Material): Preparation, Improvisation and Effective use.**

• **Planning and execution of Extended Experiences:- Excursions, Science Exhibition, Science Fair, Science Quizzes, Science Club**

## **Unit-III: Assessment in Science**

• **Evaluation: Concept, Need and Importance, Scope**

• **Techniques of Evaluation for Theory & Practical.**

- **Diagnostic tests , remedial/enrichment measures & monitoring learner's progress.**

- **Achievement test-its construction & administration.**

- **Assessment through Creative Expression: Essays, Posters, Drama, Poetry, Riddles etc**

#### **Unit-IV: Professional Development of an Integrated Science Teacher**

- **Need for professional development at Individual level, Organizational level and Government level.**

- **Need and Relevance of Participation in Seminars, Workshops, Conferences, Symposia etc well as membership of Professional Organisations in Professional development of teachers.**

- **Field Visits to Institutions / Organisations such as Other Schools ,Museums, Parks, Research Organisations etc :Need and Relevance for Professional development**

- **Preparing the Teacher for Technology Integration: Planning with integrating Technology or inquiry (NTeQ) in Science at secondary school level.**

- **Teacher as a Researcher :Need and Competencies**

- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

#### **Practical Assignments /Field Engagement(Records to be maintained)**

- **Identifying and conducting at least 5 experiments/demonstrations from classes 6-10 syllabus individually or in small groups**

#### **Suggested Readings:**

- **Chauhan. S.S (1985), Innovation in teaching-Learning Process, Delhi, Vikas Publishing House.**

- **Das. R.C (1985), Science Teaching in school, Sterling Publishers Pvt. Ltd., New Delhi.**
- **Dass R.C., Parsi.B.K & Singh, .L.C. (1975), Effective of Microteaching in Training of Teachers, NCERT, Delhi.**
- **Gupta, S.K. (1983), Technology of Science Education Vikas Publishing House Pvt. Ltd., New Delhi.**
- **Jangira. N.K & Ajit Singh (1982), Core Teaching Skills, The Micro-teaching Approach, New Delhi: NCERT.**
- **Mangal, S.K. (1995). Teaching of physical and life science, AVG Book Depot, Karol Bagh.**
- **Radha Mohan (2004), Innovative Science Teaching for Physical Science- Prentice Hall of India Pvt. Ltd., New Delhi.**
- **Siddiqui N.N. and Siddiqui M.N. (2000). Teaching of science today tomorrow, Doaba House, Nai Sarak, Delhi.**
- **Sood J.K (1987), Teaching of life science, Kohli Publishers Chandigarh.**
- **Vaidya N (1997), The i\mpact of Science Teaching Oxford & IBH Publication Co, New Delhi.**

**Course Title: Teaching of Economics Credits :4**

**Course Code: BED-130          MM:**

**100**

**Objectives of the course:**

- **To familiarize the student-teachers with various strategies, methods, techniques and skills of teaching Economics at the senior secondary level.**
- **To develop competence in use of appropriate strategy in relation to the content to be taught.**



- **To inculcate spirit of experimentation for finding out effectiveness of alternative strategies of teaching.**
- **To promote reflection on issues pertaining to teaching of Economics.**
- **To develop competence in designing effective instructional strategies to teach Economics.**
- **To develop ability to design, develop; and use various tools & techniques of evaluation.**
- **To develop awareness about syllabus prescribed by different State Boards.**
- **To develop awareness about recent advancements in teaching of Economics.**

#### **Course Content:**

#### **Unit- I: Introduction to teaching of Economics**

**Nature of Economics as a Discipline: Study of economic thought as reflected in economic theories, major turning points, classical Economics and its linkages Keynesian and contemporary models and their relevance. Economics study as a social reality and its linkage with social economics.**

**Economics as a part of social science programme in Indian schools.**

- **The perspectives presented by NCF's (1975,1986,2000,2005)**
- **The Curricular linkages with regard to contemporary issues in social science**
- **Economics for the beginners: when to teach and what to teach?**
- **Aims and objectives of teaching Economics at secondary and senior secondary school level. Instructional objectives of teaching Economics.**
- **Integration of Economics with other school subjects**
- **Comparative analysis of prescribed syllabus of CBSE & ICSE.**

## **Unit- II: Methods & Skills of teaching Economics**

- **Lecture, Discussion, Debate, Inquiry, Problem solving, Survey, Project method as discovery modes of transaction and Problem solving routes to learning.**
- **Framing meaningful and developmental Assignments for an effective teaching learning process.**
- **Small group and whole group activities. Class and outside class learning strategies.**
- **Recent advancements in teaching of Economics – Team teaching, Co-operative learning, Computers in teaching of Economics.**
- **Developing Critical thinking, Creative thinking and Problem solving.**
- **Challenges of an teaching Economics. Role of Economics teacher in teaching of Social Science and in current affairs.**
- **Use of ICT in Economics. Designing resource plans for effective transaction.**

## **Unit-III: Instructional Media & Co-curricular Activities**

- **Instructional Media: Concept, Importance and types of instructional media and their use in teaching of economics.**
- **Co-Curricular Activities: Type, role and significance of co-curricular activities in teaching of Economics**
- **Text Book: Features of a good text book. Criteria for evaluation of economics textbook**
- **Micro Teaching, Unit Planning and Lesson Planning**

#### **Unit - IV: Evaluation in Learning outcomes**

- **Evaluation: - Nature of educational evaluation, its need, role in education process.**

**Methods of Assessment: Formative, Summative, Diagnostic.**

- **Preparation of test items and portfolios in Economics.**
- **Evaluation procedure for appraising learners' performance.**
- **Planning & preparation of achievement test in Economics.**
- **Informal assessment techniques. Observation recording. Performance assessment preparation of performance standards. Evaluation of group projects and skills.**
- **Diagnostic and Remedial teaching,**
- **Continuous and Comprehensive evaluation (CCE)**
- **Action research: Concept and Identification of problems faced by the teachers in the classroom**

**Practical Assignments/Field engagement(Any one):**

- **Development and organization of co-curricular activities**
- **Identifying and Evaluating ICT resources suitable for teaching Economics**
- **Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.**

**Suggested Readings:**

- **Arora, P.N. (1985). Evaluation in Economics. New Delhi: NCERT.**

- **Arora, P.N. And Shorie, J.P. (1986), Open Book Examination Question in Economics, New Delhi, NCERT.**
- **Assistant Masters Association (1974), The Teaching of Secondary School Examinations, London Cambridge University Press.**
- **Bawa M. S. (ed.) (1998), Source Book on Strategies of Teaching Social Sciences, IASE, Deptt. of Education, Delhi University.**
- **Bawa, M. S. (ed.) (1995), Tendering of Economics: Contemporary Methods and Strategies for Secondary and Senior Secondary levels, IASE, Deptt. of Education, Delhi University.**
- **Bawa, M. S. (ed.) (1996), Evaluation in Economics, IASE, Deptt. of Education, Delhi University.**
- **Chakravorty, S. (1987), Teaching of Economics in India, Bombay, Himalaya Publishing.**
- **Hicks, J.R. (1960), The Social Framework- An introduction to Economics, London: Oxford University Press.**
- **Hodkinson, Steve, Whitehead and David J. (ed) (1986), Economics Education: Research and Development Issues, London, New York: Longman.**
- **Kanwar, B.S. (1973), Teaching of Economics, Ludhiana; Prakash Brothers.**
- **Khan, R.S., Teaching Economics (In Hindi), Kota Open University, BE-13.**
- **Lee, N. (ed) (1975), Teaching Economics, London: Heinemann Educational Books, Prentice Hall.**

- **NCERT (1974), Teaching Units in Economics for High and Higher secondary Stage, New Delhi.**
- **Oliver, J. M. (1977), The principles of Teaching Economics within the curriculum, London Routledge & Kegan Paul.**
- **Sachs, I, (ed.) (1971), Main trends in Economics Project and Role Playing Economics, London, Macmillan.**
- **Siddiqi, M.H. (1998) Teaching of Economics: New Delhi; Ashish Publishing House.**
- **Srivastava, H.S. (1976), Unit Tests in Economics, New Delhi, NCERT.**
- **Tyagi, S.D. (1973), Teaching of Economics (In Hindi), Agra: Vinod Pustak Bhandar.**
- **Whitehead, D. J. (ed.) (1974), Curriculum Development in Economics, London, Heinemann Education Books.**

## **SEMESTER II PRACTICAL**

**Paper: Reading and Reflecting on Texts      Credits:2 Paper Code: BED-231**

**MM:100**

### **Objectives of the Course:**

- **To enable student-teachers to read and respond to a variety of texts in different way and also learn to think together and appreciate that depending on the text and the purposes of reading, responses may be personal or creative or critical or all of these together.**
- **To develop meta-cognitive awareness in student-teachers to become conscious of their own thinking processes as they engage with diverse texts.**
- **To enhance their capacities as readers and writers by becoming participants in the process of reading.**

## **Course Content:**

**Readings for Discussion, Analysis and Reflection (In depth Reading of any Five of the following):**

- **Delpit, Lisa D. (1988). The Silenced Dialogue: Power and Pedagogy in Educating Other People Children. Harvard Educational Review 58(3), 280-298.**
- **Donovan, M. S. And Bransford, J. D. (Ed.) (2005). How students learn. WashingtonDC: The National Academies Press, Chapter 1: Introduction 1-26, Chapter 13: Pulling Threads 569-590.**
- **Gilligan, C. (1977). In a Different Voice: Women's Conception of Self and Morality. Harvard Educational Review, 47 (4), 481-517**
- **Illich, I. (1970). Deschooling Society, London, UK: Marion Boyars.**
- **Vasanta, D. (2004). Childhood, Work and Schooling: Some Reflections. Contemporary Education Dialogue, Vol. 2(1), 5-29.**

- **Mukunda, K. V. (2009). What Did You Ask in School Today? A Handbook on Child Learning.**

**Noida: Harper Collins. Chapter 4: Child Development, 79-96.**

- **Wood, D. (2000). Narrating Professional Development: Teacher's stories as texts for improving practice. Anthropology and Education Quarterly, 31(4), 426-448.**

**Audio-visual Resources : )Any Three of the following to be screened for the student teachers and discussion to be followed )**

- **A New Education for a New India ( CD ROM) (By Gnostic Centre/NCTE)**

- **Had-Anhad: Journeys with Ram and Kabir by Shabnam**

**Virmani**<http://www.kabirproject.org/>

- **Teacher's Journey: An observational film on teaching methodologies of a primary school teacher in a single-teacher school in MP, India. Director-Deepak Verma,**
- **Azim Premji Foundation. For copies contact –madhumita@azimpremjifoundation.org**
- **Where Knowledge is Free: A documentary film about children branded by Caste and excluded from education. Director Binitesh Baruri. Available at Indian Institute of Dalit Studies, Q-3, Green Park Ext., New Delhi-16, Ph. 91-11-41643981 <http://www.dalitstudies.org.in>.**

**Note:**

- Based on the discussions held on the reading of the above texts students in the practical time the student-teachers shall maintain a detailed account of their reflection on the readings in the light of their own experiences in the form a diary. The Internal Assessment shall be on the extent of participation in an reading exercise in the class individually and in a Group and reflection on the same simultaneously .External

**Assessment shall be in the form of a Viva Voce Examination.**

**Semester-II**

**Course Title: Preliminary School Engagement PSE-2 (2weeks)**

**Credits:2 Course Code:**

**BED-160**

**MM:100**

- 1. Organisation of Co-curricular activities by pupil teachers by assisting and participating in the organisation of the same and recording experiences of the same in a reflective journal.**
- 2. Writing a reflective journal on the problems faced by teachers in assessment through the scheme of Continuous and Comprehensive Evaluation by observing the teachers evaluating students and engaging with them to know their problems with respect to implementation of the scheme in their school.**
- 3. The student teacher shall also undertake the field activities pertaining to the practicals during this period.**

### **SEMESTER III**

#### **INTERNSHIP**

**Course Code: BED-201 & BED- 202 Credits:18 M.M:500**

#### **Rationale and Aim**

The school-based activities are designed to enable the student-teachers to connect theory to practice and to help them acquire a perspective regarding the aims of education within which their previously acquired knowledge and practices can be systematized and structured to enable them to teach effectively. The purpose of the internship programme is to provide the student intern) with the opportunity of undergoing a meaningful experience as a practitioner. As conceived, the programme should be structured so that it is a partnership between the school and the DIET. The intern must function as a regular teacher and therefore be immersed in all aspects of the school but with the provision that the intern is enabled to be creative in her role as a practitioner. This can be accomplished by providing her the necessary physical space as well as pedagogical



freedom to innovate. For this it is necessary to negotiate with the school focusing on the benefit that will accrue to the school by the proposed partnership model. The programme will be largely field-based

so that the intern will get to experience the real problems that a practitioner has to deal with. To achieve the aim of the programme the intern will need to integrate her knowledge base, her understanding of children and classroom processes, theoretical pedagogical considerations, the strategies and skills she has developed in order for her to become a reflective practitioner.

#### **Objectives of the Course:**

- **To observe children and the teaching learning process in a systematic manner.**
- **To learn to relate to and communicate with children.**
- **To learn the nuances of the practice of teaching in a School using appropriate methods, materials and skills**
- **To evaluate school textbooks and other resource material critically in the context of Children's development and pedagogic approach used.**
- **To develop a repertoire of resources which can be used by the intern later in his/her teaching – textbooks, children's literature, activities and games, planning excursions**
- **To reflect critically on practice by visiting a learning centre. School Experience Details during Internship:**
- **During the school-internship the student teacher is expected to observe classroom teaching of mentors/ peers, to get insights into student behavior, instructional practices, student learning, learning environments and classroom management.**
- **The student-teacher is expected to critically reflect and discuss these practices and engage in activities like maintenance of records and registers, preparation of lesson and unit plans using different artefacts and**

technology, classroom management, activities related to school- community- parent interface, and reflections on self-development and professionalization of teaching practice.

- The other component of school-based activities to be carried out during internship is delivering the lessons/units of pedagogic courses in the first and second year as specified.
- The activities undertaken during the internship period will be presented in e-Portfolios and Reflective Journals. The student-teachers are expected to record their experiences, observations and conclusions regarding all the activities undertaken.
- The entries of Reflective Journals will be analytical answering ‘what’ is new and different from their previous understandings, ‘why’ certain observations made by them with regard to instruction, classroom management, PTAs, etc., are different / same and ‘how’ these observations might lead to a criticism and change in their practice. The students will be assessed on the basis of entries made in e-Portfolios and Reflective Journals.

#### **SEMESTER IV**

**Course Title: Gender, School and Society Credits: 4 Course Code: BED-203**

**MM:100**

- To develop understanding of some key concepts and terms and relate them with their context in understanding the power relations with respect to Educating and Education
- To develop an understanding of the paradigm shift from Women studies to Gender Studies based on the historical backdrop.
- To reflect on different theories of Gender and Education and relate it to power relations.

- **To analyse the institutions involved in Socialisation processes and see how socialization practices impact power relations and identity formation**

## **Course Content:**

### **Unit I: Gender Issues: Key Concepts**

- **Gender, Sex, Sexuality**
- **Third Gender, Transgender**
- **Patriarchy, Masculinity and Feminism**
- **Gender bias, Gender Stereotyping, and Empowerment**
- **Equity and Equality in Education w.r.t. relation with caste, class, religion, ethnicity, disability and region with respect to Gender: Present status in India and prospects**
- **Polyandrous, Matrilineal and Matriarchal Societies in India :Relevance and Status of Education**

### **Unit II: Gender Studies: Paradigm Shift**

- **Paradigm shift from Women's studies to Gender studies**
- **Historical backdrop: Some landmarks from social reform movements**
- **Theories on Gender and Education and their application in the Indian context**
- **Socialisation theory**
- **Gender difference**
- **Structural theory**

- **Deconstructive theory**
- **Power Control in Patriarchal, Patrilineal, Matriarchal and Matrilineal**

**Societies: Assessing affect on Education of Boys and Girls**

### **Unit III: Gender, Power And Education**

- **Gender Identities and Socialisation Practices in: Family, other formal and informal organisation.**
- **Schooling of Girls: Inequalities and Resistances (issues of Access, Retention and Exclusion).**
- **Collection of folklores reflecting socialisation processes.**
- **Changing Perspectives with Legal Provisions: Right to Inheritance etc**

### **Unit IV: Gender Issues in Curriculum**

- **Social Construction of Masculinity and Femininity**
- **Patriarchies in interaction with other social structures and identities**
- **Reproducing Gender in School: Curriculum, Text-books, Classroom Processes and Student- Teacher interactions**
- **Overcoming Gender Stereotypes**
- **Working towards gender equality in the classroom: Need and Strategies**
- **Empowerment of Women: Strategies and Issues**

### **Practical Assignments /Field Engagement(Any one):**

- **Discussion on theories of gender and education with its application in the Indian context**

- **Project on analysing the institution of the family Marriage, reproduction Sexual division of labour and resources**
  - **Debates and discussions on violation of rights of girls and women**
  - **Analysis of the Films post screening of the following: Bawander, India's Daughter, Water**
  - **Analysis of textual materials from the perspective of gender bias and stereotype**
- 
- **Organising debates on equity and equality cutting across gender, class, caste, religion, ethnicity disability, and region.**
  - **The above discussion / debates to be documented in the form of an e-portfolio.**

**Suggested Readings:**

- **Ambasht, et al (1971). Developmental Needs of Tribal People, NCERT**
- **Bhattacharjee, Nandini (1999). Through the looking-glass: Gender Socialisation in a Primary School in T. S. Saraswathi (ed.) Culture, Socialization and Human**
- **Development: Theory, Research and Applications in India. Sage: New Delhi.**
- **Frostig, M, and Maslow, P. (1973). Learning Problems in the Classroom: Prevention and Remediation. Grune & Stratton: New York.**
- **Geetha, V . (2007). Gender. Stree: Calcutta.**
- **Ghai, A. (2005). Inclusive education: A myth or reality In Rajni Kumar, Anil Sethi &**

- **Ghai, Anita (2008). Gender and Inclusive education at all levels In Ved Prakash & K.Biswal (ed.) Perspectives on education and development: Revising Educationcommission and after, National University of Educational Planning and Administration:New Delhi**
- **Jeffery, P. and Jeffery, R. (1994). Killing My Heart's Desire: Education and Female**
- **Autonomy in Rural India. in Nita Kumar (ed.) Women as Subjects: South AsianHistories. New Delhi: Stree in association with the Book Review Literacy Trust:Kolkata pp 125-171.**

#### **SEMESTER IV**

**Course Title: Knowledge and Curriculum Perspectives in Education Credits:4 Course Code:**

**BED-238 MM: 100**

#### **Objectives of the Course:**

- **To enable student teachers to understand the meaning of the term Knowledge and Curriculum.**
- **To sensitise them towards the conceptual linkages and distinctions between Educational aims, Curriculum framework, Curriculum development, curriculum transaction, curriculum evaluation and Pedagogy.**
- **To explore the role of School as an organization and its culture along with the teacher in operationalising and developing, a contextually responsive ‘Curriculum’ which fosters the spirit of Critical Pedagogy.**
- **To familiarize student-teachers with the recommendation of NCF 2005 andNCFTE2009 pertaining to Curriculum and Schooling.**

#### **Course Content:**

## **Unit – I Knowledge, Curriculum and Schooling**

- **Curriculum:**
  - (a) **Concept and principles,**
  - (b) **Core Vs Hidden Curriculum,**
  - (c) **Centralized Vs Decentralised**
- **Significance of Curriculum in School Education with reference to-**
  - (a) **Curriculum Framework**
  - (b) **Curriculum & Syllabus**
  - (c) **Teaching & Instruction**
- **Interrelationship between curriculum, society and learner.**
  
- **NCF 2005: Recommendations for curriculum and schooling.**
- **NCFTE 2009: Impact on Teacher Education curriculum**

## **Unit – II Construction of Knowledge**

- **Meaning and Nature of knowledge**
- **Information, knowledge, conception and perception**
- **Sources of knowledge: Empirical Vs Revealed knowledge**
- **Types of Knowledge:**
  - (a) **Disciplinary Knowledge**

**(b) Course content Knowledge**

**(c) Indigenous Knowledge**

**(d) Scientific Knowledge**

- **Relevance of Knowledge construction through dialogue**

- **Contestations to 'Knowledge'-**

**(a) Dominance**

**(b) Marginalisation**

**(c) Subversion**

- **Role of curriculum in challenging marginalization with reference to class, caste, gender and religion**

### **Unit – III Curriculum Planning, Construction and Transaction (At School Level)**

- **Broad determinants of Curriculum Construction-**

**(a) Learner and his/her interest and developmental context**

**(b) Diversity- socio- cultural- geographical- economic and political**

**(c) National and international contexts**

- **Different Approaches to Curriculum Development-**

**(a) Subject- centred**

**(b) Learner centred**

**(c) Constructivist**



**(d) Competency based**

**(e) Environmental**

- **Models of Curriculum Development by Ralph Tyler, Hilda Taba, Franklin Bobbit**

**Unit –IV School: The site of Curriculum Engagement**

- **Role of School Administration in creating a context for transacting the curriculum effectively**
- **Role of Infrastructural support in teaching and learning**
- **School culture and organizational ethos as the context for Teachers' work**
- **Role of Teacher as a critical pedagogue in curriculum transaction**
- **Role of Apex bodies in providing curriculum and pedagogic supports to teachers within schools- NCERT, CBSE, NIOS, SCERT, and CIET.**

**Practical Assignments/Field Engagement:**

- **CDs/DVDs to be Screened for the Student-teachers and report to be prepared with respect to the issues touched upon in the form of an e-portfolio (Any two):**

- 1. CIET/NCERT CD ROM Four Educational Riddles by Krishna Kumar**
- 2. Debrata Roy DVD The Poet & The Mahatma**
- 3. Krishnamurthy Foundation India DVD The Brain is Always Recording**
- 4. NCERT CD ROM Battle For School by Shanta Sinha**
- 5. NCERT CD ROM Globalisation and Education.**

### **Suggested Readings:**

- **Apple, Michael W. (1979). Ideology and Curriculum; Routledge and K. Paul.**
- **Arends, Richard I.; Learning to Teach- Fifth Edition; McGraw Hill Higher Education;New York.**
- **Bawa, M.S. & Nagpal, B.M. eds (2010); Developing Teaching Competencies; VivaBooks.**
- **Cohen, Louis; Manion, Lawrence and Morrison, Keith(2004); A Guide to TeachingPractice- Fifth Edition; Routledge Falmer-Taylor and Francis Group; London.**
- **Connelly, F. Michael (Editor) (2008); The Sage Handbook of Curriculum andInstruction; Sage Publications India Pvt. Ltd.; New Delhi.**
- **Gunter, Mary Alice et.al(2000).; Instruction: A Model's Approach- Fifth Edition;Pearson Education Inc.; Boston.**
- **Instructional Technology: A Systematic Approach to Education (1986), Frederick G.Knirk, Kent L. Gustafson, Holt, Rinehart and Winston, Inc.**
- **Instructional Technology: Foundations (1987), Robert Mills Gagne, Lawrence ErlbaumAssociates.**
- **Kelly, A.V.; (2006) The Curriculum: Theory and Practice- Fifth Edition; SagePublications; London**
- **Kumar, Krishna (1988). What is Worth Teaching. New Delhi: Orient Longman.**

### **Chapter 1: What is Worth Teaching? Chapter 2: Origins of the Textbook Culture,Chapter 9:**

- **Listening to Gandhi (Also Available in Hindi Shaekshik Gyan aur Varchasav. NewDelhi: Granthshilpi.)**

- **Kubiszyn Tom. (2003). Educational Testing and Measurement, John Wiley.**
- **Linn, Robert L. and Gronlund, Norman E. (2000). Measurement and Assessment in Teaching; Pearson Education Inc.**
- **McNeil, John D. (2003); Curriculum: The Teacher's Initiative; Third Edition; MerrillPrentice Hall; Ohio.**
- **Moore, Kenneth D. (2005); Effective Instructional Strategies: From Theory to Practice;Sage Publications India Pvt. Ltd.; New Delhi.**
- **Muijs, Daniel and Reynolds, David (2005) Effective Teaching: Evidence andpracticeSecond Edition; Sage Publication; London.**
- **Mukunda, Kamala V. (2009) What Did You Ask At School Today: A Handbook ofChild Learning; Harper Collins Publishers; NOIDA.**
- **National Curriculum Framework for School Education (2005); NCERT; New Delhi;Ornstein, Allan C. and Hunkins, Francis P. (1993). Curriculum: Foundations,Principles and Issues; Allan and Bacon; Boston.**

#### **SEMESTER IV**

**Course Title: Creating an Inclusive School      Credits:2**

**Course Code :BED-205              MM:100**

#### **Objectives of the Course:**

- **To familiarise student- teachers with the concept of Inclusive Education and appreciate its Philosophy in the context of Education for All.**
- **To identify and address the diverse needs of all learners.**

- **To acquaint with the trends and issues in Inclusive Education**
- **To develop capacity of student- teachers for creating an inclusive School**
- **To appreciate various inclusive practices to promote Inclusion in the classroom**

**Course Content:**

**Unit-I : Inclusive Education**

- **Forms of Inclusion and Exclusion in Indian education (Marginalised sections of Society: On account of Gender, Caste, Socio-Economic status and language, Disability.**
- **Meaning of inclusive education, historical, development, Philosophical and social basis of Inclusive Education.**
- **Benefits of Inclusive Education to children without special needs.**
- **Addressing Inequality and Diversity in the India classroom: Pedagogical and curriculum concerns**

**Unit –II Children with Special Needs**

- **Historical and contemporary perspectives to disability and inclusion**
- **Range of learning problems across various disabilities**
- **Types of Disabilities: Characteristics and Identification of the educational needs of these special focus groups**
- **Assessment of learning problems in children with various disabilities.**
- **Assistive devices, equipments and technologies for different disabilities.**
- **Adaptation and accommodation according to various disabilities**

- **Educational provision in laws on disability, policies and international instruments like UNCRPD**

### **Unit-III School's Preparedness for Inclusion**

- **School organisation and management : Ideology, infrastructures**
- **Reproducing gender in school for achieving gender equality: Curriculum inputs, Textbooks, Student – teacher interactions**
- **Provision of assistive devices, equipment and technological support to cater to different disabilities**
- **Support services available in the school to facilitate inclusion: Role and functions of the following personnel:**
  - **Special Education Teacher**
  - **Audiologist cum Speech Therapist**
  - **Physiotherapist**
  - **Occupational Therapist, Counsellor**

### **Unit-IV Inclusive Practices in the Classroom**

- **Making Learning more meaningful- Responding to special needs by developing strategies for differentiating content, curricular adaptations, lesson planning and TLM.**
- **Pedagogical strategies to respond to individual needs of students: Cooperative Learning strategies in the classroom, Peer tutoring , Social Learning , Buddy system, reflective teaching, Multisensory teaching**
- **Provisions pertaining to appearing in examination for facilitating differently abled students (As available in CBSE and ICSE)**
- **CCE and its implications to facilitate inclusion**

### **Practical Assignments/Field Engagement(Any one)-(Records to be maintained)**

- **The students shall undertake field work to in understanding how structures in school create barriers for inclusionary practices**
- **The student-teachers shall explore spaces for inclusion in schools**
- **Dialogue and discussions on creation of an inclusive teaching learning environment with different stakeholders such as :Administrative functionaries, teachers ,parents, community**

### **Suggested Readings:**

- **Baquer, A. & Sharma,A. (1997) .Disability: Challenges Vs. responses, Can Pub.**
- **Bartlett, L. D., Weisentein, G.R. (2003) Successful inclusion for educational leaders, Prentice Hall, New Jersey.**
- **Bhargava, M. (1994), Introduction to exceptional Children, Sterling Publishers.**
- **Blackurst & Berdine (1981), Introduction to Special Education**
- **Chaote Joyce,S. (1991) . Successful mainstreaming, Allyn & Bacon**
- **Daniels, Harry (1999) .Inclusive Education, London: Kogan.**
- **Dash, M. Education of Exceptional Children. New Delhi: Atlantic Publisher and Distributors.**
- **Deiner, P. L. (2000). Resource for Teaching children with diverse abilities, HarcourtBrace & Company, Florida**
- **Dessent, T. (1987). Making ordinary school special. Jessica Kingsley Pub.**

- **Gargiulo, R. M. (1997). Special education in contemporary society: an introduction to exceptionality, Wadsworth, Belmont**
- **Gartner, A. & Lipsky, D. D. (1997) Inclusion and school reform transferring America's classrooms, P. H. Brookes Pub. Baltimore.**
- **Gathoo, V. (2004). Curriculum strategies and adaptations for children with hearing impairment (RCI), Kanishka Pub. New Delhi**
- **Giuliani, G. A. & Pierangelo, R. (2007) Understanding, developing and writing JEPs Corwin press, sage Pub**
- **Hallahan & Kauffman (1978), Exceptional Children: Introduction to special Education Prentice Hall**
- **Hegarty, S. & Alur, M. (2002) Education of children with special needs: From segregation to inclusion, Corwin press, sage Pub**
- **Joyce S. Choate (1997). Successful inclusive teaching, Allyn & Ba**
- **Karant, P. & Rozario, J. ((2003). Learning Disabilities in India. Sage Pub.**
- **Karten, T. J. (2007) More inclusion strategies that work. Corwin press, sage Pub**
- **M. C. Gore (2004). Successful Inclusion strategies for secondary and middle school teachers, Crowin Press, Sage Pub.**
- **Madan Mohan Jha (2002). School without walls: inclusive education for all, Heinemann edu. Oxford**
- **Mangal, S.K., Education of Exceptional Children, PHI, New Delhi**

- **Mathew, S. (2004) Education of children with hearing impairment. RCI, KanishkaPub. New Delhi**
- **National Policy on Education (1986, 1992), MHRD, GOI, Delhi**

#### **SEMESTER IV**

**Course Title: Guidance and Counselling      Credits - 4**

**Course Code: BED-216      MM: 100**

#### **Objectives of the Course:**

- **To appreciate the nature, need, principles for guidance and counselling;**
- **To familiarize the responsibilities and moral obligation of teacher as a guide and counsellor;**
- **To develop capacity of applying the techniques and procedures of guidance and counselling;**
- **To facilitate career development of all the different types of students;**
- **To understand the facilities at governmental and non-governmental level; and ethical and legal guidelines for differently-abled, special needs, and deprived group students.**

#### **Course Content:**

##### **Unit-I: Understanding Guidance**

- **Guidance: Concept, aims, objectives, functions, principles and ethics**
- **Role of Guidance in human development and adjustment**
- **Need & Procedure for (Educational, Psychological and Social) guidance**



- **Group Guidance: Concept, Need, Significance and Principles**
- **Role of Teacher: in providing guidance and organization of guidance programs inschools.**

## **Unit-II: understanding Counselling**

- **Counselling: Meaning, Principles, Approaches (Directive, Non-Directive, Eclectic),Types (Individual, Group)**
- **Process of counselling (Initial Disclosure, In-Depth Exploration and Commitment toAction)**
- **Counseling Services for Students: Face to Face and Online**
- **Counsellor: Qualifications and Qualities (including Skills for Listening, Questioning,Responding, Communicating)**
- **Differences between Guidance and Counselling**
- **Role of Teacher as a Counsellor**

## **Unit-III: Major Concerns in Guidance and Counselling**

- **Emotions: Meaning, Emotional Intelligence, Managing Emotions, Role of Teacher**
- **Skills: Self Discovery, Decision Making, Problem Solving**
- **Coping skills: Types, Integration**
- **Dealing with Depression and Academic Stress**
- **Guidance and Counselling Career Options available in India**
- **Special Counseling: Population, Multi-Cultural Counselling**

- **Values: Patience, Empathy, etc**
- **Ethics: , Professional Ethics and Code of Conduct of Teacher Counsellor**

#### **Unit-IV: Guiding Differently-abled Students•**

- **Meaning, Types of Differently-abled (DA) Students**
- **Behavioral Problems of Children with Special Needs (CWSN) and of Deprived Groups (DG)**
- **Behavior Modification Techniques**
- **Career Development: Teacher's role in dissemination of Occupational Information, Career Planning, Vocational Training and Placement Opportunities for CWSN, DG,DA students**
- **Persons with Disabilities Act 1995, Governmental and Non-governmental Facilities, Ethical and Legal Guidelines**

#### **Practical Assignments/Field Engagement (Any one):**

- **Group Guidance - One Career Talk**
- **Design a Questionnaire to collect information on Students' Educational, Psychological or Social problems.**
- **Detailed study of the Guidance and Counselling Services available in a given School**
- **Prepare a list of the online Guidance and Counselling Services available for students and teachers in India.**
- **Enrichment Lectures, Seminars, Workshops, Demonstrations by Experts working as Guidance and Counsellors in Schools or Organizations working specially in the area of Adolescent Psychology.**
- **Self-Study and Reflective sessions: Field visits to explore the working of Guidance Institutions School Counsellors, Career Counsellors etc.**

### **Suggested Readings:**

- **Aggarwal, J. C., (2000). Educational & Vocational Guidance and Counseling, Jalandhar : Doaba House.**
- **Asch, M. (2000). Principles of Guidance and Counseling, New Delhi: Sarup and Sons.**
- **Bhatia, K. K., (2002). Principles of Guidance and Counseling, Ludhiana: VinodPublications.**
- **Bhatnagar, R. P.; Rani. S. (2001); Guidance and Counseling in Education andPsychology.**
- **Gibson, R.L. and Mitchell (2008). Introduction to counseling and Guidance. NewDelhi: PHI Learning Pvt.**
- **Goswami, M. (2016). Essentials of Guidance and Counselling, Lakshmi Publishersand Distributors.**

### **Bachelor of Education**

- **Indira Gandhi National Open University, (2000). Guidance and Counselling (ES- 363):Career Development.**
- **Indira GandhiNational Open University, (2000). Guidance and Counselling (ES- 363):Techniques and Procedures of Guidance.**
- **Indira GandhiNational Open University, (2000).Guidance and Counselling (ES- 363):Introduction to Guidance and Counselling.**
- **Joneja G. K. (1997); Occupational Information in Guidance, NCERT publication**

- **Kochhar S.K. (1999) Guidance and counseling in colleges and universities**
- **Minocha, M. (2008). Educational and Vocational Guidance, Arya Book Depot, NewDelhi.**
- **Nayak A.K. (2004); Guidance and Counseling**
- **Oberoi S.C (2000); Educational, Vocational Guidance and Counseling**
- **Rao S. N. (1991) Counseling and Guidance.**
- **Safaya, B.N., (2002). Guidance & Counseling, Chandigarh: Abhishek Publications.**
- **Sharma R A Fundamentals of Guidance and Counseling**
- **Sharma, R. N. (2004); Guidance and Counseling**
- **Sharma, Tara Chand, (2002). Modern Methods of Guidance and Counseling, NewDelhi: Sarup and Sons.**
- **Shertzer, Bruce and Stone, Shelly C., (1974). Fundamentals of Counseling, London:Houghton Missli.**
- **Shirley, A. Harmin and Guilford, E., (1987). Guidance in the Secondary Schools, NewDelhi: NCERT.**
- **Sidhu, H. S., Guidance and Counseling, (2005), Twenty First Century, Patiala.**
- **Sodhi, T.S. & Suri, S. P., (1999). Guidance and Counseling, Patiala: BawaPublication.**

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#### **SEMESTER-IV**

**Course Title: Environmental Education**

**Credits:4**

**Course Code : BED-219      MM:100**

**Objectives of the Course:**

- **To understand and reflect on the concept and characteristics of environmental education from various aspects.**
- **To develop awareness understanding and concern about environment and as sociated problems, and to develop knowledge, skills, attitudes, motivation and commitment to work individually and collectively towards their solutions and prevention of new ones.**
- **To do teaching learning about the environment, through the environment and for the environment.**
- **To develop special skill needed to link theoretical understanding with practical/applied aspects.**

**Course Content:**

**Unit I: Nature and scope of environmental education**

- **Nature, need and scope of environmental education and its conservation**
- **Environmental education: a way of implementing the goals of environmental protection.**
- **Present status of environmental education at various levels**
- **India as a mega biodiversity Nation, Different ecosystems at national and global level.**
- **Role of individual in conservation of natural resources: water, energy and food**
- **Role of individual in prevention of pollution: air and water**
- **Equitable uses of resources for sustainable livelihoods**

- **Environmental legislation: awareness and issues involved in enforcement**
- **Role of information technology and media in environment awareness/consciousness**

## **Unit II: Community Participation and Environment**

- **Community participation in natural resource management – water, forests, etc.**
- **Change in forest cover over time.**
- **Deforestation in the context of tribal life**
- **Sustainable land use management**
- **Traditional knowledge and biodiversity conservation**
- **Developmental projects, including Government initiatives and their impact on biodiversity**
- **conservation**
- **Issues involved in enforcement of environment legislations**
- **Role of media and ecotourism in creating environmental awareness**
- **Role of local bodies in environmental management**
- **Shifting cultivation and its impact on environment**

## **Unit III: Environmental Issues and concerns**

- **Consumerism and waste generation and its management**
- **Genetically-modified crops and food security: Impacts positive and negative**
- **Water consumption pattern in rural and urban settlement**
- **Ethno-botany and its role in the present day world**

- **Environmental degradation and its impact on the health of people**
- **Economic growth and sustainable consumption**
- **Organic farming**
- **Agricultural waste: Their impact and management**
- **Rain water harvesting and water resource management**
- **Biomedical waste management**
- **Changing patterns of energy and water consumption.**

#### **Unit IV: Initiatives by various agencies for Environment Education**

- **Environmental conservation in the globalised world in the context of global problem**
- **Alternative sources of energy**
- **Impact of natural-disaster/man-made disaster on environment**
- **Biological control for sustainable agriculture**
- **Heat production and green house gas emission**
- **Impact of industry/mining/transport on environment**
- **Sustainable use of forest produces.**
- **Governmental and non-government initiatives.**
- **Supreme Court order implementation of Environmental Education(EE)**

#### **Practical Assignments/Field Engagement(Any one):**

- **A study of major initiatives taken by NCERT regarding environmental education.**

- **Study of Development of slum area and their inhabitants in a nearby area/institute**
- **A critical study of school habitat in the context of drinking water, sanitation paper, energy, garbage management etc.**
- **Develop a road map for implementation of Environmental Education as suggested by NCF2005.**
- **Develop a list of investigatory environmental problems (stage specific) work on the problem in a group of 2-3. Prepare a report.**

**Suggested readings:**

- **Falmer Press CEE (1987). Joy of Learning: Handbook of Environmental Education Activities: CEE Bhrucha E. (2004). Textbook For**
- **NCERT (2005). National Curriculum Framework. New Delhi: NCERT.**
- **NCERT (2005). Syllabus for Elementary Classes, Volume I. New Delhi: NCERT.**
- **NCERT (2007/2013). Looking Around Us, EVS Textbooks (3-5), New Delhi: NCERT.**
- **NCERT (2008). Source Book on Assessment for Classes I–V, Environmental Studies, New Delhi: NCERT.**
- **Sarabhai V.K. et al. (2007). Tbilisi to Ahmadabad – The Journey of Environmental Education—A Source book, Centre for Environment Education, Ahmadabad.**
- **SCERT (2011). Paryavaran adhyayan aur vigyan shikshan, D.El.Ed.-ODL Course: Chhattisgarh.**
- **SCERT (2012/2013). We-Our environment, EVS Textbooks (3-5): Andhra Pradesh. Seminar Proceedings (1995-96). Seminar on EVS, organized by Vidya Bhawan, Udaipur.**



- **Springer (2006). Science Literacy in Primary Schools and Pre-Schools.**
- **The Green teacher (1997). Ideas, Experiences and Learning in Educating for the environment: Centre for Environment Education**
- **UNESCO (1988). Games and Toys in Teaching of Science and Technology: UNESCO.**
- **UNESCO (1990). An Environmental Education Approach to the Training of Middle Level Teachers: A Prototype Program: UNESCO, UNEP International EE Program.**
- **UNICEF (2008). Best Practice Guidelines for teaching Environmental Studies in**
- **Maldivian Primary Schools: UNICEF.**

#### **SEMESTER IV**

**Course Title: Value Education Credits 4**

**Course Code: BED-217 MM:100 Objectives of the Course:**

- **To enable student teachers to understand the need and importance of value-education and education for Human Rights as a duty.**
- **To enable the student teachers to understand the nature of values, moral values, moral education as a duty based as they are on the golden rule of religious education and its related moral training**
- **To orient the student teachers with the basis of duty-conscious ethics and morality based on a rational understanding of moral personality development of oneself and the child.**
- **To enable them to understand the process of moral personality development vis-à-vis as a means of their cognitive and social development**

- **To orient the student teachers to draw lessons from principles of life and converting them into moral learning towards moral education.**

**Course Content:**

**Unit-I: Value Education in a Pluralistic World (Multi-Cultural, Multi- Religious and Multi-Ethnic)**

- **Value Education Concept, Nature, Source & Perspectives (Rational, Philosophical, Socio-Cultural, Religious and Psychological).**
- **Fundamental Human values-Truth, Peace, Non-violence, Righteous Conduct.**
- **Connected Terminology: Realism, Accountability, Duty, Virtue, Dharma, Ethics, Religion, Morality, Values,**
- **Typologies: Intrinsic and Extrinsic Values.**
- **Duty Approach to Ethics: Deontology, Justice as a Duty**
- **Learning through Examples:**
- **Indian Pluralism: Mutual Respect, Tolerance and Dialogue in Islam, Buddhism, Christianity, Jainism, Sikhism and Hinduism.**
- **Greco-Roman and Chinese Cultural values: Open-Mindedness, Free thinking, Cooperation, etc.**
- **Secular Values: Facing Challenges Positively through examples of Super-Achievers (lifehistory and quotes)**
- **Commonalities of all religious at Philosophical levels.**
- **Diversities of religion at politics of religion.**

## **Unit-II: Development of the Individual**

- **Personality Development and Character building education: through unilateral ethics**
- **Development of right attitude, aptitudes and interest: through higher thinking, contemplation and patience**
- **Yoga, meditation and self-control; introspection on one's strengths and weakness, wrong speech, habits and actions.**
- **Positive approach to life – in words and deeds: through positive thinking and positive living**
- **Self-discipline Leading to Duty-Consciousness: Politeness, Punctuality & Righteous Conduct**
- **The importance of Affective domain in Education in Compassion, Love and Kindness**

## **Unit-III: Response to Value Crisis and Impact of Modern Education & Media on Values**

- **Value Crisis: Values Crisis Concept, Conflicts as Challenge Vs. Hindrance**
- **Strategies of Response: Lawrence Kohlberg and Carol Gilligan**
- **Arnold Toynbee's Challenge-Response Mechanism: Case Study of the Life of Dr. AbdulKalam**
- **Gandhian Formula: "Be the Change you wish to see in the world"**
- **Positive Response: "Seek to Change Yourself; Do Not Complain about Others"**

### **Impact of Modern Education and Media on Values:**

- **Role of a teacher in the preservation of tradition and culture**

- **Role of family, tradition & community in value development**
- **Build on the positive impact and navigate the negative impact of value crisis due to impact of modern life:**
- **Impact of Science and Technology: Build on the Positive—reasoned thinking, knowledge explosion, technology, universalization of learning, modern education, etc.; Navigate the Negative—modern culture should not be randomly followed**
- **Effects of Printed Media and Television on Values: Build on the Positive—instant news, information and entertainment; Navigate the Negative—think and avoid negative influence through reasoned thinking**
- **Effects of computer aided media on Values (Internet, e-mail, Chat etc.): : Build on the Positive— knowledge explosion, information at the click of the button, interaction at our finger-tips, etc.; Navigate the**

**Negative—avoid exposure to negative media, share personal information with care, accept friends requests after due deliberation, etc**

#### **Unit- IV: Values: The ideal of Human Unity and Peace**

- **Human Rights, Rationale and Evolution, UDHR and its Articles( particularly 1, 3, 7, 10, 18, 19)**
- **UDHR and Duties: Article 26, Receiving Rights subject to performing duties**
- **Human Rights Education: Meaning, Objectives, Strategies and Role of Education towards duty- consciousness**
- **National Human Rights Commission and its role**

- **Role of the Indian Constitution: The Right of Children to Free and Compulsory Education Act, 2009 in context of human Rights and Human Duties Article 51A**
- **Peace Education: Meaning, objectives, Role of Education in promoting Peace based on unilateral ethics of ‘in giving we receive’**
- **Education, Strategies for imparting Peace Education through imparting of duty consciousness**

**Practical Assignments/Field Engagement(Any one):**

- **Application of one strategy of value inculcation among school children and its report**
- **Study of Golden Rule of Ethics in various religions**
- **Write your understanding of Arnold Toynbee’s Challenge-Response Mechanism**
- **Study of UDHR: Human Rights through Performing Duties**

**Suggested Readings:**

- **Bhatt, S.R(1986). Knowledge, Value and Education: An Axiomatic Analysis, Delhi: Gian Pub.,.**
- **Kar, N.N.(1996). Value Education: A Philosophical Study. Ambala: Associated Pub. .**
- **Khan, Wahiduddin. (2010) Family Life, Goodword Books, New Delhi,.**
- **Kulshrestha, S.P. (1979), Emerging Value Pattern of Teachers & Value Pattern of Teachers & New Trends, Education in India, New Delhi: Light & Life Pub.,.**

- **Mascarenhas, M. & Justa, H.R.,( 1989)., Value Education in Schools and Other Essays,Delhi Konark.,**
- **R., King, (1969) Values & Involvement in Grammar School, London: Routledge.,**
- **S. Abid Hussain; The Indian Culture**
- **Sharma, S. R, (1999)., Ed., Teaching of Moral Education, N. Delhi: Cosmos, Pub.,**
- **Singh, Samporn(1979) Human Values, Jodhpur: Faith Pub.,**
- **Source book of Human Rights – NCERT**

#### **SEMESTER-IV**

**Course Title: Peace Education Credits - 4**

**Course Code: BED-218          MM: 100 Objectives of the Course:**

- **To understand the concept of peace as an umbrella concept of all positive values.**
- **To understand the importance of peace education in personality development.**
- **To imbibe the knowledge, attitudes and skills of culture of peace needed to achieve and sustain a global culture of peace and values.**
- **To make future teachers aware of the scale and variety of conflicts affecting contemporary life and learn to deal with them through unilateral ethics**
- **To encourage inquiry into the complex role that institutionalized education plays in the Context of different types of conflicts and To learn to play the role of peace-maker in conflict situations.**

- **To enable students to develop personal initiative and resources for the pursuit and promotion of peace by inculcating change to culture of peace within themselves.**
- **To analyse the need for Peace Education to foster National and International**
- **Understanding.**

**Course Content:**

**Unit I Peace Education: Concept and Scope**

- **Meaning of Peace: Umbrella term of all positive values to build a positive personality**
- **Meaning, Nature and Concepts of Peace Education**
- **Aims and Objectives of Peace Education**
- **Status of peace education in the curriculum and its relevance in present global scenario**
- **Different sources of peace: Philosophical, Religious, Social, Secular and Psychological.**
- **Classification of Peace: Individual and social; positive and negative peace**
- **Method of Peace in Mind: Learning Positive Lessons from Negative Experiences**
- **Peace as a concomitant result of Human values.**

**Unit II Integrating Peace Education in the Present Curriculum**

- **Integrating Peace Education in Curriculum: Subject context, subject perspectives, Teaching Methods, Co- curricular activities, Staff development, class- room management, School Management**

- **Practical steps to build Culture of Peace in schools: Simulations Classroom Discussions, Book Clubs, Experience-Sharing Sessions**
- **Developing Attitude of Culture of Peace and Peace-Making: Mutual Respect, Tolerance, Patience, Seeking Spirit and Realistic, Objective Thinking through Accountability**
- **Educating for a Culture of Peace: Learning mutual respect, duty consciousness, leadership skills through unilateral ethics, introspection and mutual learning through duty-consciousness.**

### **Unit III Violence for Peace and conflict Resolution**

- **Peace, Violence and conflict: conflict and violence—in life, media—a normal part of life; importance of not considering it a crisis but managing them to maintain peace**
- **Conflict Management: Maintaining Normalcy in Conflict; Managing Conflict through dialogue and discussion, cooperation; peace education in managing conflicts in family and student life**
- **Non-Violent Activism: Speech, Behaviour and Action with others based on non-violence takes the justification of acting violently away from others; role of peace education in learning nonviolence**
- **Peace Education: Agencies Role of community, school and family in the development of values for Peaceful Co existence**

### **Unit IV Global Issues and Peace Movements**

- **Human Rights as a Duty: Learning to give human rights to others.**
- **Preservation of Ecology, population control, Economic Exploration: Limited Use as Duty-Conscious citizen; not indiscriminate use as rights-conscious citizens.**
- **Challenge Not Deprivation: Problems of life are challenges not situations of deprivation**



- **Role of World Organizations in Promoting Peace Education: Case Study of UNESCO's Culture of Peace Program in global scenarios and suggestions**

**Practical Assignments/Field Engagement(Any one):**

- **Hold a Peacemaking Workshop in the School to understand the use of Conflict Management techniques**
- **Make a Report on how problems can be taken as challenges, not deprivation. What is its importance in personality and social development?**
- **Develop a Personality Development Program that incorporates the Culture of Peace and Peacemaking techniques**

**Suggested Readings:**

- **Adans, D. (Ed). (1997). Unesco and a Culture of peace, promoting a global movement.**
- **Aggarwal, J.C. (2005) Education for values, environment and human rights. New Delhi : Shipra Publication.**
- **Chadha, S.C. (2008) Education value & value education . Meerut: R. Lall Books Depot.**
- **Chand, J. (2007) . Value education. Delhi : Anshah Publishing House.**
- **Civilization. London: SAGE Publications, 1996.**
- **Diwaar, R.R., & Agarwal, M. (Ed) . (1984). Peace education. New Delhi: Gandhi peace foundation.**
- **Education for Human Values(2003), sathya sai instructional centre for Human Values: New Delhi.**

- **Jagannath, M. (2005). Teaching of moral values development. New Delhi:Deep and Deep Publication.**
- **Johan, G.(1996). Peace by peaceful means. New Delhi: Sage Publication.**
- **Khan, Wahiduddin(2003). Ideology of Peace, Goodword, New Delhi.**
- **Kumar, M. (Ed). (1994). Non-violence, Contemporary Issues and Challenges.New Delhi: Gandhi Peace foundation.**
- **Morrison, M.L. (2003) Peace Education. Australia: McFarland.**
- **Passi, B.K., & Singh, P. (1999). Value education. Agra: PsychologicalCorporation.**
- **Ruhela, S.P. (1986) . Human Values and Education. New Delhi : Sterlingpublishing.**
- **Salomon, G., & Nevo, B. (2002). Peace Education: The concept, principles,and practices around the world. London: Lawrence Erlbaum Associates.**
- **Singh, Y.K. (2009) Value Education. New Delhi: APH PublishingCorporation.**
- **Singh, Y.K. , & Natha, R. (2008) Value Education. New Delhi : A.P.H.Publishing Corporation.**
- **Subramanian, K. (1990) . Value Education. Madurai: Ravana Publication.**
- **UNESCO. Learning the Way of Peace : Teacher's Guide.**
- **UNICEF. The State of the World's Children (reports of the last five years).**
- **Venkataiah, (2009). Value Education. New Delhi: APH PublishingCorporation.**

**Online Resources:**

- **Peace in Minds of Men: <http://www.learndev.org/dl/WarPeaceMinds.PDF>**

- **History of Culture of Peace:** [http://www3.unesco.org/iycp/kits/uk\\_concept.pdf](http://www3.unesco.org/iycp/kits/uk_concept.pdf)
- **UNESCO Culture of Peace:**  
[http://www.pathwaystopeace.org/documents/idp\\_essaycontest.pdf](http://www.pathwaystopeace.org/documents/idp_essaycontest.pdf)
- **Conflict Management Techniques:**  
[http://www.imd.org/research/publications/upload/PFM149\\_LR\\_Kohlrieser.pdf](http://www.imd.org/research/publications/upload/PFM149_LR_Kohlrieser.pdf)
- **Nonviolence in Education:**  
[http://portal.unesco.org/education/en/file\\_download.php/fa99ea234f4accb0ad43040e1d60809cmuller\\_en.pdf](http://portal.unesco.org/education/en/file_download.php/fa99ea234f4accb0ad43040e1d60809cmuller_en.pdf)
- **Peacemaking in Schools:** [http://www.learningpeace.com/pages/LSP\\_PSchool.htm](http://www.learningpeace.com/pages/LSP_PSchool.htm)
- **Peace Education Resource:** [www.cpsglobal.org](http://www.cpsglobal.org).

#### **SEMESTER IV**

**Course Title: Health and Physical Education Credits – 4**

**Course Code: BED-232 MM: 100**

#### **Objectives of the Course:**

- **To acquaint pupil teachers with the concept of holistic health.**
- **To enable them to understand the various dimensions & determinants of health.**
- **To acquaint them to school health program and its importance.**
- **To enable them to understand the need & importance of Physical Education.**
- **To develop organisation skills in organising inter house tournaments and sports meet.**

- **To understand the need and relevance of Yoga and develop the skills in yogic practices.**

## **Course Content:**

### **Unit-I: Health, Hygiene and Wellness**

- **Concept of Mind and Healthy Mind, Relation of Healthy Mind and Healthy Body.**
- **Health: Concept, definition, dimensions and determinants.**
- **Health Education: Definition, aims and objectives.**
- **School Health Program: Health Services, Health Supervision and Health Instruction.**
- **Hygiene Education: Definition, aims and objectives.**
- **Role of teacher in development of health and good hygienic habits.**
- **Health and Wellness.**

### **Unit-II: Areas of Concern for Health, Hygiene and Wellness**

- **Communicable Diseases: Mode of Transmission, Methods of Prevention and Control.**
- **Nutrition: Elements of Balanced Diet, Food habits, Functions of Food and Malnutrition.**
- **Postures: Importance of Good Posture, Common Postural Defects and Remedial Exercises.**

- **Recreation: Meaning, Significance and Recreational Programs in Schools.**
- **Wellness common Health Problems and Preventions: Accidents, Environmental Pollution, Overpopulation, Alcoholism, Smoking, Drug Abuse.**
- **Sex Education and concerns for HIV/AIDS.**

### **Unit-III: Physical Education and Integrated Personality**

- **Physical Education: Concept, definition, aims and objectives**
- **Need, scope and Importance of Physical Education Programs at different school levels**
- **Organization and administration: planning, budgeting, fixture(Knock out and league)**
- **Athletic meet – Meaning, need and importance. Process to organize athletic meet at school level**
- **Concept of integrated personality and its realization through physical education program.**
- **Tournaments -Types, inter-house competitions, drawing of fixture and sports meet.**
- **Rules and Regulations and skills of any one of the Games/events: Hockey, Badminton ,Volleyball, Basketball, Football, Tennis, Table Tennis, Kho-Kho, Track and Field Events.**

#### **Unit-IV: Yoga and Physical Fitness**

- **Introduction, Meaning and mis-concepts about Yoga**
- **Types of Yoga, Ashtang Yoga of Patanjali (Eight stages of Yoga)**
- **Effects of asana on our body and relation of Psychology with Yoga**
- **Importance of Yogasanas, Pranayama and Shudhikriya**
- **Importance of Meditation in school**
- **Physical fitness: Meaning, importance. motor component of physical fitness(strength, flexibility, endurance, speed, Agility and neuro-muscular coordination).**
- **Training methods of physical fitness.**

#### **Practical Assignments/Field Engagement(Any one):**

- **Prepare a Project Report on: Three types of Sports Ground.**

- **Organise a sports meet at school level.**
- **Participate in any two games and sports activities of your choice in your institution**
- **Perform Any three Yoga Asanas in supervision of your faculty mentor at an appropriate time of the day conducive for the same.**
- **Prepare a plan of activities for a three days out door camp.**
- **Prepare a league-cum-knockout fixture for teams(10-20) in number.**

**Suggested Readings:**

- **Atwal & Kansal. (2003). A Textbook of Health, Physical Education and Sports, Jalandhar, A. P. Publisher,**
- **Kamlesh, M.L. & Sangral, M.S. (1986). Methods in Physical Education, Ludhiana Prakash Brothers.**
- **Kangane, Sopan & Sonawane, Sanjeev. (2007). Physical Education. Pune: Nirali publication.**
- **Kaur, Manjeet. (2003). Health and Physical Education, Ludhiana: Tendon Publications.**
- **Sharma, Anil P. (2011). Mind, Body and Divine Yoga. New Delhi: Personal Graphics & Advertiser Pvt. Ltd.**
- **Sharma, Anil P. & Pandey, Pradeep K. (2010). Psychology in Yoga. New Delhi: Personal Graphics & Advertiser Pvt. Ltd.**
- **Singh, Ajmer. (2003). Essentials of Physical Education. Ludhiana: Kalyani publishers.**

- **Syedentop, Daryl (1994). Introduction to physical education, fitness and sports (2nd ed.).London: Mayfield publishing company.**

- **Uppal, A.K. & Gautam, G. P. (2004). Physical Education and Health. Delhi: Friendspublisher.**

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#### **SEMESTER IV**

**Course Title: Adult and Population Education                      Credits - 4**

**Course Code: BED-233                      MM:100**

#### **Objectives of the Course:**

- **To enable the student teachers to develop an understanding of the meaning and concept of Adult Education.**
- **To impart knowledge to student teachers about the problems and difficulties coming in the way of achieving full literacy in the country.**
- **To acquaint the student teachers with chief characteristics of an adult learner, different methods and evaluation techniques of adult learning.**
- **To be aware of the population trends and spread of AIDS in the world.**
- **To understand that population becomes stable when there is little difference between birth and death rates.**
- **To develop among themselves a healthy, rational and scientific attitude towards the natural phenomena of birth and death.**

## **Course Contents:**

### **Unit - I: Adult and Continuing Education**

- **Meaning, Concept and Scope of Adult and Continuing Education.**
- **Need and Importance of Adult Education for the development of an Individual for Social Change.**
- **Adult Education in Independent India: Objectives Target, efforts, achievements and causes for slow progress.**
- **National Literacy Mission - Aims, objectives and strategies.**

### **Unit - II: Teaching - Learning process in Adults**

- **Androgogy- Nature and Scope. Basic difference between Pedagogy and Androgogy.**
- **Agencies and Organizations: Local, State and Central level, their problems.**
- **Adult Learner — Characteristics, problems and motivation.**
- **Adult teaching — Different methods, Role of Mass media.**
- **Evaluation Techniques for Adult Learning.**
- **Adult Education, lifelong learning and continuing Education**
- **Adult Education and Continuing education**
- **Lifelong learning- A component of adult education**
- **Lifelong learning in IT age- Exploring ICT as a Tool**

### **Unit III: Population and AIDS Education**



- **Importance of Population Education – concept / meaning and objectives of population education**

**– factors affecting population explosion – importance of Family Life Education, with reference to Affect of Population Growth on: Economic Development, Social Development, Educational Development, Environmental and Natural Resources ,Health and Nutrition**

- **Symptoms of AIDS – causes, Prevention of AIDS – AIDS Education – meaning and objectives. Role of different agencies in promoting AIDS Awareness Education – [Local,National and International Agencies – 2 each]**

#### **Unit IV: Integrated Population Education**

- **Role of Government and Non-Govt. Agencies concerning Population Education.**
- **Integration of Population Concept in different School Subjects.**
- **Population Education through co-curricular activities.**
- **Role of the Teacher in Population Education Programs.**

#### **Practical Assignments/Field Engagement:**

**Conducting any one of the following surveys in the local area and prepare a report:**

- **Progress in the field of literacy**
- **AIDS awareness**

#### **Suggested Readings:**

- **Aggarwal, S. N., India's Population Problems, New Delhi, Tata McGraw Hill, Pub.House, 1985.**
- **Ambasht, N.K.(2014)., Foundations of Adult Education in adult and lifelong learning ,Indian Adult Education Association, New Delhi.**

- **Ghosh, B.N. (1978) Population Theories and Demographic analysis, MeenakshiPrakashan, New Delhi**
- **Jacobson Wellard JU,(1979) Population Education; A knowledge base, NY, Teachers College Columbia University.**
- **Mohankumar,V.(2014), Adult and lifelong learning: Selected articles Indian Adult Education Association.**
- **Sheshadri, C & J.L. Pandey (1991) Population Education: A national Source Book, ND,NCERT**
- **Shah, S.Y.(1999) Encyclopaedia of Adult Education, NLM, New Delhi.**

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#### **SEMESTER IV**

**Course Title: Work Education Credits:4**

**Course Code : BED-234      M.M:100**

#### **Objectives of the Course:**

- **To acquire knowledge of the various aspects of vocational education in India.**
- **To understand the dynamics of the development of vocational programmes in India with respect to those which play a significant role in increasing productivity.**
- **To develop healthy attitude towards vocational education.**
- **To appreciate the significant changes in the field of vocational education in India.**

**Course content:**

## **Unit–1: Concept and Historical Perspectives:**

- **Meaning and Concept of Nai Talim/Basic Education and debates around it.**
- **Historical perspectives: Macaulay’s Education Policy. Gandhi’s philosophy of Work Education, Wardha Commission report 1938, its recommendations .Nai Talim/Basic Education and National Movement built around it. Developments related to Work Education: pre and post independence.**
- **Institutions of Teacher Training: Pre and Post independence based on Gandhian Philosophy, their objectives and curriculum and current status**
- **Commissions and Education Policies and their recommendations on Work experience/ Work Education, post independence: Education Commission1964, Secondary Education Commission 1958, Ishwar bhai Patel Committee report (1977), NPE 1986 , POA 1990, NCF 2005 and current status.**
- **Concepts – Education and technical education – Need and importance. Human resources development – skilled manpower – productivity – Vocational Education –Meaning and Definition**
- **Work experience-concept – distinction between work experience andvocational education.**
- **Basic education – concept – merits – Criticism, need and importance, scheme of multipurpose schools.**
- **S.U.P.W. : Concept and Objectives**

## **Unit – II Psychological basis of Integrating Work in Education:**

- **Concept of work and Hands on activities.**
- **Concept of work and rationale for integration of work in Education**

- **Psychological basis for work in education: Dewey, Piaget, Vygotsky**
- **Constructivism and Work Education**

### **Unit 3: Objectives, Methods and Evaluation for Work Education**

- **Essential and Elective Work Education**
- **Techniques/ methods of Teaching work education.**
- **Objectives, Need and Significance and objectives of Work Education**
- **Concept of reduce, recycle and reuse and its significance**
- **Evaluating students work (Preparing Rating scales, check list, Anecdotal records)**
- **ITI and polytechnic–need and importance-classification, admission process– course of study – organization and administration at state level**
- **ITI, Polytechnics and para professional courses – salient features co–operation with industries and other organization – Apprenticeship Act 1961.**

### **Unit 4: Integrating Work Education with Curricular Subjects**

- **Theories of integrated education and its educational implications**
- **Pedagogy of teaching learning of work education**
- **Planning lessons integrating work in education**
- **Significance of integrating work in Education**
- **Linkages of community and school**

**Practical Assignments/Field Engagement (Any one):**

- **Integrating ICT: Preparing Posters, news letter, invitation cards, calendars, visiting cards using, MS publisher. Searching visuals through internet search for using them as learning aids.**
- **Preparing visual aids and Bulletin Boards related to curricular subject**
- **Preparing creative work for cultural activities in school.**
- **Visits to places of any one of the ,NGOs working in the field of Education, Small scale industries**

**/ polytechnics /employment exchanges etc**

#### **Suggested Readings:**

- **Banerjee N P (1995) Work Experience in General Education, Ambala,Associated Publishers**
- **Education commission (1964-66), Report of Government of India**
- **Kaul ML(1983) Gandhian Thoughts of Basic Education ; Relevance andDevelopment Journal of Indian Education 8(5) p 11-16**
- **Mahmood S (1996) Work Experience, Its Role in Educational Process in CoCurricular Activities edited by Farooqui SK and Ahmad I, New Delhi JamiaMillia Islamia, ND**
- **Position Paper National Focus Group On Work And Education, NCF 2005,NCERT**
- **Report National Policy on Education 1986 , Govt of India Government ofIndia,**
- **M.K. Gandhi (1927) The story of my experiments with truth, Navjivan Trust**
- **Tarun Rashtriya, Vocational Education(2005), APH Publishing Corporation,New Delhi,**

#### **Online Resources:**

- **<http://www.kkhsou.in/main/education/wardha.html>**

- **Concept Of Teacher Education,**

**[http://www.mu.ac.in/myweb\\_test/ma%20edu/Teacher%20Education%20-%20IV.pdf](http://www.mu.ac.in/myweb_test/ma%20edu/Teacher%20Education%20-%20IV.pdf)**

- **NCF 2005 ( focus group paper on work education) NCERT publications**
- **<http://cp.c-ij.com/en/contents/3158/disguise-mouse001f02/index.html>**
- **<http://notesfromtheblacklagoon.files.wordpress.com/2008/03/dsc00095.jpg>**
- **[http://www.ncert.nic.in/html/pdf/schoolcurriculum/position\\_papers/work&education.pdf](http://www.ncert.nic.in/html/pdf/schoolcurriculum/position_papers/work&education.pdf)**

#### **SEMESTER-IV**

**Course Title: Education of the Marginalised Groups Credits:4**

**Course Code : BED-235      M.M:100**

#### **Objectives of the Course:**

- **To acquaint the student-teachers of their constitutional rights and duties.**
- **To sensitise students towards the paradigm shift from welfare approach to development to the rights based approach to**
- **To understand the relevance of Right to Education as a tool for social empowerment of the marginalized sections of India.**

#### **Unit I-Marginalization in Indian Context**

- **Marginalization- Concept, Definitions and Implications for education**
- **Types of marginalization- Social, Political, Economic, Educational, Psychological**
- **Marginalization vs. Social Exclusion**
- **Marginalization, Discrimination and Disadvantage**

- **Individual Exclusion vs. Community/Group Exclusion**
- **Reasons of Marginalization- Disadvantage, Deprivation, Economic, Political**

## **Unit II- Educational Status of Marginalized Groups in India**

- **Foundation of composition of Indian Society and its multicultural multilingual nature**
- **Identification of Marginalized Groups- Scheduled Castes, Scheduled Tribes, ,OBCs, Primitive Groups, Religious and Linguistic Minorities, Women and Children, Economically Weaker Sections.**
- **Constitutional provisions against any kind of Dscrimination, Government Programmes, Schemes and Voluntary efforts to curb Discrimination.**
- **Five year Plans and progress made towards education of marginalized groups in India- Inclusive growth and Development of all, Empowerment of marginalized communities in India.**
- **RTE Act 2009, RMSA and RUSA and Provisions of the 12th Five Year Plan for education of the marginalized groups.**

## **Unit III Important International Treatise and International Laws for Protection of Human Rights**

- **Human rights in India, role of organizations working for it**
- **India's commitment at international level for protection of human rights**
- **India's Constitutional and legal framework for protection of fundamental rights and human rights**
- **Constitutional rights of women, minorities and those on Schedules (SC, ST)**
- **SCP and TSP plans and their achievements**

- States obligations for development of women, minorities, SCs, STs others-Plans and programmes

#### **Unit IV Issues, Concerns and Future Perspectives**

- Issues- Social security, educational development, vocational courses and avenues, contextualization of education, partnership in governance and decision making process
- Educational problems of marginalized groups- Enrolment, drop out, low achievement, assimilation, equal rights to work
- Human rights issues related with equity and equality
- Repercussions and Consequences- Health related problems, rise in crime and violence, disharmony, rise in terrorism, social conflicts.
- Coping strategies and interventions required for resolution of the consequences of Marginalisation.
- Future Perspectives and Policy directives in India

#### **Practical Assignments/Field Engagement(Any one):**

- The students shall be engaged with the community through projects where in they would look at the implementation of different aspects of RTE especially the clause on EWS.
- The students would also be engaged in conducting a bridge course for students lagging behind in academics due to any reasons.

#### **Suggested Readings:**

- Ahuja, Ram Rights of Women(1992), A Feminist Perspective, New Delhi: Rawat Publications.



- **Basu, D.D.(2003) Shorter Constitution, Prentice Hall, New Delhi.**
- **Centre for Development and Human Rights(2004), The Right to Development–A Primer, New Delhi: Sage Publications.**
- **Naila Kabeer (ed), Geetha B. Nambissan, Ramya Subramanian(2003) Child-Labour and the Right to Education in South Asia, New Delhi: SagePublications.**
- **UNDP Bank, Human Development Report, New Delhi, 2003.**

#### **SEMESTER-IV**

**Course Title: Life Skills Education Credits:4**

**Course Code : BED-236 MM:100**

**Objectives of the Course :**

- **To familiarize student-teachers in the theoretical foundations of Life SkillsEducation**
- **To prepare student-teachers in training methodologies and enable students to apply Life Skills in various spheres**
- **To develop professionals in Life Skills Education and enhance the ability to contribute as youth workers specialized in the area of Life Skills Education.**
- **To foster the spirit of social responsibility in students and enhance social and emotional well being**

#### **Unit - I: Introduction**

- **Life Skills: Concept, need and importance of Life Skills for human beings.**
- **Life Skills Education: Concept, need and importance of Life Skills Education for teachers.**

- **Difference between Livelihood Skills and Life Skills.**
- **Core Life Skills prescribed by World Health Organization.**
- **Key Issues and Concerns of Adolescent students in emerging Indian context.**

## **Unit - II: Process and Methods Enhancing the Life Skills**

- **Classroom Discussions**
- **Brainstorming and Role plays**
- **Demonstration and Guided Practice**
- **Audio and Visual activities, e.g. Arts, Music, Theatre, Dance**
- **Small Groups discussions followed by a presentation of group reports.**
- **Educational Games and Simulation**
- **Case Studies, Storytelling, Debates**
- **Decision making and mapping of using problem trees.**

## **Unit - III: Core Life Skills (I)**

- **Skills of Self awareness and Empathy: Concept, Importance for Teachers in particular, Integration with the teaching learning process, learning to live together with other living beings. acceptance of diversity in perspectives of different societies and cultures. Acceptance and importance of all living being as along ecological and psychological social structures.**
- **Skills of Coping with Stress and Emotion: Concept, importance for Teachers in particular and Integration with the teaching learning process.**
- **Skills of Building Interpersonal relationships: Concept, Importance for Teachers in particular and Integration with the teaching- learning process.**

## **Unit - IV: Core Life Skills (II)**

- **Skills of Critical thinking and Creative thinking: Concept, importance for educationists, Integration with the teaching learning process.**
- **Skills of Problem Solving and Decision making: Concept, importance for Educationists, Integration within the teaching -learning process.**
- **Skill of Effective Communication: Concept, importance for Human beings and Educationists, Integration within the teaching learning process.**

**Practical Assignments/Field Engagement (Any one):**

- **The activities listed in Unit II with respect to the process and methods of Life Skills will be taken up in workshops to initiate the student-teachers with respect to the dynamics of the same.**
- **The Core Life Skills will also be demonstrated through role plays on diverse issues in the form of workshops.**
- **The student-teachers shall also engage in reflection on different core Life Skills being displayed by children in schools during their field engagement.**
- **Human animal interface: Case of study of a domestic/institutional animal/with human being.**

**Suggested Readings:**

- **A Life Skills Program for Learners in Senior Phase. (2002). University of Pretoria.**

**Chapter in Thesis. Retrieved from:**

**<http://www2.ed.gov/offices/OVAE/AdultEd/OCE/SuccessStories/success.pdf>**

- **Life Skills Based Education. (2011). Wikipedia. Retrieved from:**  
**[http://en.wikipedia.org/wiki/Life\\_skills-based\\_education](http://en.wikipedia.org/wiki/Life_skills-based_education)**
- **Life Skills Based Education CCE. (2009). CBSE. Retrieved from:**  
**[http://www.cbse.nic.in/cce/life\\_skills\\_cce.pdf](http://www.cbse.nic.in/cce/life_skills_cce.pdf)**
- **Ministry of Education. (2006). Senior Secondary Phase. Republic of Namibia. Retrieved from: <http://www.nied.edu.na/publications>**

#### **SEMESTER IV**

**Course Title: School Leadership Credits:4**

**Course Code : BED-237      MM:100**

**Objectives of the Course :**

- **To develop a critical understanding of the notion of school organization and**
- **To develop a comprehensive understanding of context-specific notions of school effectiveness.**
- **To develop an understanding of school leadership and challenges to management.**
- **To help in making overt connections between field-based project work, educational leadership and change facilitation.**
- **To develop an understanding of the system of education, its relationship with school curriculum management in the context of the structures and processes of the education system and its impact on pedagogic processes in the classroom.**
- **Course Content:**

## **Unit I: Structures and Processes of the Indian Education System**

- **Types of schools within different administration bodies**
- **Roles and responsibilities of education functionaries**
- **Governance rules and financial management of different types of school.**
- **Relationships between support organizations(Affiliating, Regulating and Financing bodies) and the school.**
- **Understanding and interpreting educational policies that impact schools**
- **Concepts of school culture, organization, leadership and management.**
- **Role of school activities such as assemblies, annual days etc., in the creation of school culture.**

## **Unit II: School Effectiveness and School Standards**

- **School effectiveness -meaning and its assessment.**
- **Understanding and developing standards in education**
- **Classroom management effective communication and motivational skills.**
- **Learner- centred educational and inclusive Education.**

## **Unit III: School Leadership and Management**

- **Administrative and academic leadership**
- **Styles of leadership**
- **Team leadership**

- **Pedagogical leadership**
- **Leadership for motivation and change**
- **Desirable Change in management**
- **Conflict Management**

#### **Unit IV: Change Facilitation in Education**

- **Sarva Shiksha Abhiyan (SSA) experiences and RMSA**
- **Equity in Education • Incentives and schemes for girl child**
- **Issues in educational and school reform**
- **Preparing for and facilitating change in education through Teacher Education system as prime mover.**
- **Role and functions of IASEs, DIETs, CTE • Role, functions and networking of institutions like UGC, NCERT, NCTE, NUEPA, SCERT etc.**
- **Accountability and Continuous Professional Development**

#### **Practical Assignments/Field Engagement(Any one):**

- **The students shall be required to study the role of the supervisors and principals in a school.**
- **The students may look at the working of a school and prepare a school improvement plan.**

#### **Suggested Readings:**

- **Batra, Sunil (2003). From School Inspection to School Support. .**

- **Early, P. and D. Weindling (2004). A changing discourse: from management to leadership.**
- **Fullan, M. (1993) Making schools successful, synthesis of case studies of schools in Asian countries, ANTRIEP, NUEPA(2012).. Why Teachers Must Become Change Agents. In Educational Leadership, 50 (6)**
- **Govinda, R. (2001). Capacity Building for Educational Governance at Local Levels. Paper presented at the International Consultation on Educational Governance at Local Levels, Held at UNESCO, Paris 27-28 February 2001.**
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#### **SEMESTER IV PRACTICAL**

**Course Title :Reflection on School Experience Credits:2**

**Course Code:BED-230 MM:100**

**Reflection has many facets. For example, reflecting on work enhances its meaning. Reflecting on experiences encourages insight and complex learning. We foster our own growth when we control our learning, so some reflection is best done alone. Reflection is also enhanced, however, when we ponder our learning with others.**

**Reflection involves linking a current experience to previous learning(a process called scaffolding). Reflection also involves drawing forth cognitive and emotional information from several sources: visual, auditory, kinaesthetic, and tactile. To reflect, we must act upon and process the information, synthesizing and evaluating the data. In the end, reflecting also means applying what we've learned to contexts beyond the original situations in which we learned something.**

### **Valuing Reflection**

**The art of teaching is the art of assisting discovery.**

**—Mark Van Doren**

**Teachers who promote reflective classrooms ensure that students are fully engaged in the process of making meaning of their experiences. They organize Teaching-Learning so that students are the producers, not just the consumers, of knowledge. These teachers approach their role as that of "facilitator of meaning making by inculcating the habit of reflection in Students.**

**In the role of facilitator, the teacher acts as an intermediary between the learner and learning, guiding each student to approach the learning activity in a strategic way. The teacher helps each student monitor his/her own individual progress, construct meaning from the content learned and from the process of learning it, and apply the learning to other contexts and settings. Learning becomes a continual process of engaging the mind that transforms the individual into a self actualized human being.**

**Unfortunately, educators don't often ask students to reflect on their learning. Thus, when students are asked to reflect on an assignment, they are caught in a dilemma: "What am I supposed to do? How do I 'reflect'? I've already completed this assignment! Why do I have to think about it anymore?"**

**In response to our questions, students who are inexperienced with reflection offer simple answers such as "This was an easy assignment!" or "I really enjoyed doing this assignment." If we want**



students to get in the habit of reflecting deeply on their work—and if we want them to use Habits of Mind such as applying past knowledge to new situations, thinking about thinking (metacognition), and remaining open to continuous learning—we must teach them strategies to derive rich meaning from their experiences.

### Setting the Tone for Reflection

Most classrooms can be categorized in one of two ways: active and a bit noisy, with students engaged in hands-on work; or teacher oriented, with students paying attention to a presentation or quietly working on individual tasks. Each of these teaching environments sets a tone and an expectation. For example, when students work actively in groups, we ask them to use their "six-inch" voices. When we ask them to attend to the teacher, we also request that they turn their "eyes front." When they work individually at their desks, we ask them not to bother other learners.

Teachers must signal a shift in tone when they ask students to reflect on their learning. Reflective teachers help students understand that the students will now look back rather than move forward. They will take a break from what they have been doing, step away from their work, and ask themselves, "What have I (or we) learned from doing this activity?" Some teachers use music to signal the change in thinking. Others ask for silent thinking before students write about a lesson, an assignment, or other classroom task.

In the reflective classroom, teachers invite students to make meaning from their experiences overtly in written and oral form. They take the time to invite students to reflect on their learning, to compare intended with actual outcomes, to evaluate their metacognitive strategies, to analyze and draw causal relationships, and to synthesize meanings and apply their learning to new and novel situations. Students know they will not "fail" or make a

"mistake," as those terms are generally defined. Instead, reflective students know they can produce personal insight and learn from all their experiences.

The following Strategies would guide student - teachers along with their faculty mentors in engaging in reflection on their School Experience during all the three previous semesters too. (Records of the engagements in activities to be recorded in a Reflective Journal)

### **Guiding Student Reflection**

To be reflective means to mentally wander through where we have been and to try to make some sense out of it. Most classrooms are oriented more to the present and the future than to the past. Such an orientation means that students (and teachers) find it easier to discard what has happened and to move on without taking stock of the seemingly isolated experiences of the past.

### **Course Content:**

Teachers use many strategies to guide students through a period of reflection. We offer several here: discussions, interviews, questioning, and logs and journals.

- **Discussions**

Sometimes, encouraging reflection is as simple as inviting students to think about their thinking. Students realize meaning making is an important goal when reflection becomes the topic of discussion. For example, conduct discussions about students' problem-solving processes. Invite students to share their meta-cognition, reveal their intentions, detail their strategies for solving a problem, describe their mental maps for monitoring their problem-solving process, and reflect on the strategy to determine its adequacy. During these kinds of rich discussions, students learn how to listen to and explore the implications of each other's

metacognitive strategies. The kind of listening required during such discussions also builds the Habits of Mind related to empathy, flexibility, and persistence.

- **Interviews**

Interviews are another way to lead students to share reflections about their learning and their growth in the Habits of Mind. A teacher can interview a student, or students can interview classmates. Set aside time at the end of a learning sequence—a lesson, a unit, a school day, or a school year—to

question each other about what has been learned. Guide students to look for ways they can apply their learning to future settings. Interviews also provide teachers and students with opportunities to model and practice a variety of habits: listening with understanding and empathy, thinking and communicating with clarity and precision, and questioning and posing problems.

- **Questioning**

Well-designed questions—supported by a classroom atmosphere grounded in trust—will invite students to reveal their insights, understandings, and applications of their learning and the Habits of Mind. Here are possible questions to pose with each student:

As you reflect on this semester's work, which of the Habits of Mind were you most aware of in your own learning?

What meta-cognitive strategies did you use to monitor your performance of the Habits of Mind?

Which Habit of Mind will you focus on as you begin our next project?

What insights have you gained as a result of employing these Habits of Mind?

As you think about your future, how might these Habits of Mind be used as a guide in your life?

- **Logs and Journals**

Logs and journals are another tool for student reflection. Periodically ask students to reread their journals, comparing what they knew at the beginning of a learning sequence with what they

**know now. Ask them to select significant learning, envision how they could apply these learning to future situations, and commit to an action plan to consciously modify their behaviors.**

- **Modelling Reflection**

**Students need to encounter reflective role models. Many teachers find such models in novels in which the characters take a reflective stance as they consider their actions. A variety of novels and films may be used to design the element of reflection as the way to tell a story. Teacher Educators while engaging the learners in reflection exercises should make sure that the following three traits are inculcated while the student-teachers are involved in Reflecting on their school experience:**

- **Thinking flexibly.**
- **Managing impulsivity.**
- **Remaining open to continuous learning.**

## SCHEME FOR MASTER OF EDUCATION

M. ED			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MED-101	Historical & Political Perspectives of Education	4	0	0	4
2	MED-102	Educational Psychology	4	0	0	4
3	MED-103	Research Methodology in Education	4	0	0	4
4	MED-104	Educational Study	4	0	0	4
PRACTICAL						
1	MED-192	Communication& Expository writing	0	0	4	2
2	MED-193	Self-Development	0	0	4	2
		Total	16	0	8	20

M. ED			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	

1	MED-105	Philosophical foundations of Education	4	0	0	4
2	MED-106	Sociology of Education	4	0	0	4
3	MED-107	Curriculum Study of Education	4	0	0	4
4	MED-108	Teacher Education	4	0	0	4
<b>PRACTICAL</b>						
1	MED-194	Dissertation	0	0	4	2
2	MED-195	Internship In TEI	0	0	4	2
		<b>Total</b>	<b>16</b>	<b>0</b>	<b>8</b>	<b>20</b>

## SCHEME FOR MASTER OF EDUCATION

<b>M. ED</b>			<b>Semester</b>			<b>III</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	MED-209	Advance Research Methodology	4	0	0	4
2	MED-210	In Service Teacher Education in India	4	0	0	4
3		Specialization Courses-I(Any One of the following	4	0	0	4
4	MED-211	Elementary Education In India: Administration & Management	4	0	0	4
5	MED-212	Planning & Management at Secondary Level	4	0	0	4
6		Specialization Courses-II(Any One of the following	4	0	0	4
7	MED-213	Issue and Curricular Concerns at Elementary level	4	0	0	4
8	MED-214	Issues and Curricular Concerns at Secondary Level	4	0	0	4
<b>PRACTICAL</b>						
1	MED-296	Internship In School	0	0	4	2
2	MED-297	Dissertation (Progress Report)	0	0	4	2
3	MED-298	Academic writing	0	0	4	2

		<b>Total</b>	<b>32</b>	<b>0</b>	<b>12</b>	<b>38</b>
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## SCHEME FOR MASTER OF EDUCATION

<b>M. ED</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
<b>1</b>	<b>MED-216</b>	<b>Advance Curriculum Theory</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>2</b>		<b>Specialization Courses-III(Any One of the following</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>3</b>	<b>MED-217</b>	<b>Policy, Planning and Financing of Education</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>4</b>	<b>MED-218</b>	<b>Educational Technology</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>5</b>	<b>MED-219</b>	<b>Issues, Planning and Policies of Elementary Education</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>6</b>		<b>Specialization Courses-IV(Any One of the following</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>7</b>	<b>MED-220</b>	<b>Peace Education</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>8</b>	<b>MED-221</b>	<b>Educational, Vocational Guidance</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>9</b>	<b>MED-222</b>	<b>Inclusive Education</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

<b>10</b>	<b>MED-223</b>	<b>Environmental Education</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>PRACTICAL</b>						
<b>1</b>	<b>MED-299</b>	<b>Dissertation</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>4</b>
		<b>Total</b>	<b>32</b>	<b>0</b>	<b>8</b>	<b>36</b>

## SYLLABUS FOR MASTER OF EDUCATION

**Course Title: Educational Psychology**

**Course Code: MED-102**

**Credits: 3**

**Objectives:** The students will be able to

- ☐ ☐ Understand the relevance of psychological perspective of education.
- ☐ ☐ Get acquainted with the process of assessment of personality.
- ☐ ☐ Understand the dynamics of intelligence and learning.

### **Unit I: Psychological perspective of education**

-Nature, meaning and scope of educational psychology, methods of psychology, experimental, clinical and differential.

-Human Development: Concept, principles, sequential stages of development with special reference to Adolescence, factors influencing development and their relative roles, general characteristics.

-Problems of Indian Adolescent including Delinquency: theories and remedial steps.



## **Unit II: Relevance of Psychological Principles to Pedagogical Interventions**

- Concept and nature of personality.
- Role of heredity and environment in the development of Personality.
- Theories of personality with special references to developmental and factoranalytical approaches.
- Assessment of Personality: subjective, objective, and projective methods.
- Personality Inventories.
- Psychology of Adjustment: integrative and disintegrative adjustment; causes of disintegration and their control.

## **Unit III: Psychology of Learning and Intelligence**

- Learner and Learning:
  - (a) Nature, meaning and scope
  - (b) Approaches to learning: Behaviouristic, Cognitive, Humanistic and Neuropsychological.
  - (c) Constructivism and Learning, learning styles and their relevance to learning.
  - (d) Role and Function of Educational Technology for effective learning.

## **Unit IV:**

- Salient features of Pavlov's, Skinner's, Gestalt and Hebb's theories of learning.
- Detailed study of:
  - (a) The Social Cognitive Theory with special reference to Bandura, Dollard and Miller.
  - (b) The Information Processing Theory with special reference to Norman, Ausubel and Bruner.
  - (c) Piaget's Genetic Epistemological Approach to Cognitive Development.
  - (d) Gardner's Multiple Intelligence Theory.
- The role of environment-related factors in the development of intelligence.
- Measurement of Intelligence.
- Implications of Intelligence Testing.
- Ethical issues in psychological testing.

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**Course Title: Educational Psychology**

**Course Code: MED-102**

**Credit: 1**

**Practicum (any one of the following):**

- Administration & interpretation of an individual (performance) & group test of intelligence.

- Administration and interpretation of a personality or adjustment inventory and an anxiety scale.

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**Course Title: Historical and Political Perspectives of Education**

**Course Code: MED-101**

**Credits: 3**

**Objectives:** The students will be able to:

- Understand the pre-independence and post-independence development of education in India.
- Understand the factors from historical perspective that contributed to present education system.
- Explain the important features of various reports, commissions and policies of education during pre and post-independence development of Education - in India.
- Understand that development of Education is influenced by political forces of the time.
- Acquire knowledge of characteristics features of ancient, medieval and British system of education in India and of their strengths and limitations.

**Unit I: Historical perspectives of education in India till 1854**

-A brief study of the main characteristics of the Vedic, Brahmanic, Buddhist and Islamic systems of education with reference to their aims, features, curricula, methods, practices and agencies of education.

-Education under the East India Company up to 1854, with special reference to the motives of the Company.

-Development of Education from 1813 (Charter Act), 1835 Lord Macaulay's minutes and 1854 Woods Despatch, 1882 Hunter Commission to the end of the 19th Century, with reference to important landmarks in education, bringing out the political designs of the British rulers; and the impact of education on political, social, economic and the cultural life of the people and vice-versa.

**Unit II: Indian Education in 20th Century**

The growth of Education from 1901 to 1947, with reference to important landmarks (educational policies, Saddler Commission, Sargent Plan-their features, implications and impact on political, social and economic life) highlighting the British designs and bringing out the inter-relationship between education and political, social and economic life of the people.

-The growth of Education from 1947 onwards, with special reference to their reports of the University Education Commission, the Secondary Education Commission, the Education Commission: 1964-66, and the National Policy on Education 1986 and its review Committees.

*-A critical study of the problems related to the following:*

- i. Vocational Education
- ii. Adult Education
- iii. Professional Education
- iv. Women Education
- v. Education for Marginalized

### **Unit III: Political Perspectives of Education:**

- Colonial concept of Education & its implications for Current Educational Studies.
- State and Education.
- Provision of Equal Opportunity of Education to woman, Scheduled Castes, Scheduled Tribes & other disadvantaged sections including disabled children.
- Recent political developments and its impact on Indian Education System.
- International agencies such as UNESCO, World Bank, funding bodies etc. and their role in education.

### **Unit IV: Constitutional provisions regarding education**

- The Preamble to the Indian Constitution with its implications for education.
- Implications of Justice, Liberty & Equality in Education.
- Directive Principles of State Policies & Education (Part IV of Indian Constitution).
- Fundamental Rights with special emphasis on Right to Education, Article 21A along with impediments in the path of implementation of RTE.

### **References:**

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**Course Title: Historical and Political Perspectives of Education**

**Course Code: MED-101**

**Credit:1**

**Practicum (any one of the following):**

- Review of related literature to justify the role of Historical/Political foundations of education in shaping of education.
- Writing an analytical paper on one topic to perform one activity on the topics/activities decided by the concerned teacher. The student teacher will present their report in class.
- Writing an assignment on educational development in ancient India after classroom discussion.
- Research on two or three educational policies/ approaches/practices used in other countries but not in India with special focus on the problems in their implementation.

**Course Title: Educational Studies**

**Course Code: MED-104**

**Credits: 3**

**Objectives:** *The students will be able to:*

- understand the meaning, functions and aims of education
- Comprehend the nature of education studies and map the fields in present scenario.
- Introduce certain selected seminal educational texts representing the foundational perspectives.
- Get oriented to the institutions, systems and structures of education and flag the contemporary concerns of education policy and practice.
- Analyse educational issues systematically and logically.

Evaluate education policy vis-a-vis causes in education and find scope to accommodate new principles, knowledge and values.

**Unit I: Meaning of Education**

- Derivation of the term education- Indian & Western views.
- Meaning of Education- as a process and product.
- Education as a continuous reconstruction of experiences
- Education as acquisition of knowledge & skills.
- Education as a disciplinary, inter disciplinary and multi-disciplinary field.

## **Unit II: Aims of Education**

- Conservative and creative functions of education, education as methodicalsocialization, education as a means of socialization, education as a means of socialchange.
- Aim of Education- social & individual aims of education.
- Moral & Character building as aims of education.
- Views of some eminent educators such as Mahatma Gandhi, Vivekananda,Aurbindo, John Dewey, Paulo Freire etc. on moral & Character Building.
- Aims of Education as recommended by Indian education commission (1964-66),NPE (1986),& NCF (2005).

## **Unit III: Factors influencing aims of Education**

- Factors determining aims of Education- religion & *dharma understanding the concept and relevance of the purusharthas: (i) Dharma, (ii) Artha, (iii) Kama & (iv) Moksha*
- Islamic/Christian concept of education.**
- Factors influencing aims of education.
- Influence of schools of philosophies on aims of education.
- Influence of Pragmatism on aims of education.

## **Unit IV: Functions of Education**

- Functions of Education towards (i) The individual, (ii) Society (iii) Nation(iv) & Global.
- Achieving Social & National Integration- social & National services, internationalunderstanding.
- Development of appropriate language policies, ascertaining the process ofmodernization.
- cultivating social, moral & spiritual values.

## **References:**

- Mookerji, R.K. (1969) Ancient Indian Education. New Delhi: Motilal Banarsidas.
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**Course Title: Educational Studies**

**Course Code: MED-104**

**Credit:1**

**Practicum (any one of the following):**

- To compile articles from newspapers, magazines, and the internet on educational issues. Prepare a report with suggestion for solutions.
- Comparative study of educational contribution of Indian and western educationists

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**Course Title: Research Methodology in Education**

**Course Code: MED-103**

**Credits: 3**

**Objectives: The students will be able to**

- ☐ ☐ Get familiarized with the basic terms of research methodology.
- ☐ ☐ Develop understanding of concept of research in general and educational research in particular.
- ☐ ☐ Develop understanding of distinctive features of qualitative and quantitative research paradigms.
- ☐ ☐ Acquaint the students with respect to different techniques of research.



- ☐☐ Enable students to understand the dynamics of different research methods
- ☐☐ Understand the application of statistical techniques in Educational Research.

### **Unit I: Elements of Research**

*Nature of research: fundamental, applied and action.*

- Educational Research; Meaning, Nature, Types, Scope and limitations.
- Scientific Inquiry: concept and assumptions and their role, scope and limitations, the scientific method
- Positivist and Non-positivist paradigms, Qualitative Vs Quantitative
- Major orientations in educational research: Philosophical, Historical, Sociological and Psychological.
- Types of Educational Research: Descriptive, Evaluative, Historical, Philosophical, Developmental, Co relational research, Ethnographic Research, Experimental research, Ex-Post Facto Research, Action research etc.

### **Unit II: Research Methods**

- Sampling and Research Tool, Survey, Case Study, Experimental method etc.
- Use of technology in conducting research.
- Skills required for conducting research.
- Sources of research data: primary and secondary sources (interdisciplinary approach).
- Sampling techniques: concept, random sampling, random tables, purposive sampling, stratified random sampling, need, probability and non-probability samples, sampling errors and their control.
- Population and sample: concept and need, probability and non-probability sampling, sampling error.
- Tools and techniques of data collection: observation, interview, questionnaire, rating scale, inventory, check list, content analysis. Reliability and validity of tools.
- Case study method: advantages and limitations.
- Anecdotal method/research.
- Participatory research.

### **Unit III: Research Process**

- Formulating research proposal: identification of a research problem
- Review of related research, research questions, objectives and literature
- Formulation of hypotheses
- Research design and procedure
- Data analysis techniques

-Time scheduling

-Cauterization, Writing, Evaluating and Reviewing research reports and papers.

#### **Unit IV: Analysis and interpretation (elementary statistical methods) of data**

-Tabulation and graphical representation of data; Measures of Central Tendency and

Variability; Percentiles and Percentile Ranks.

-Normal probability curve- its important properties and simple applications.

Correlation and regression: product moments and rank difference co-efficient of correlation, regression equations.

-Inferential statistics: sampling distributions, hypotheses testing.

-Significance of sample statics: mean and coefficient of co- relation.

-Frequency comparison: chi-square test, t test, F test and ANOVA (one way analysis only).

-Analysis and interpretation of data, computer application (use of computer in statistical analysis).

#### **References:**

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- Johnson Burke, Larry Christensen (2012): Qualitative and quantitative research- amixedapproach.New York: Sage publications.
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- Mouly, George J. (1970) the Science of Educational Research 2nd Edition, New York, Van Nostrand Reinhold Company,
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- Turney, B.L. & George Robb (1971) Research in Education, Replinois, Dryde

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**Course Title: Research Methodology in Education**

**Course Code: MED-103**

**Credit: 1**

**Practicum (Any one of the following):**

- Reviewing a research paper, an M.Ed./M.Phil. Dissertation and a chapter from a research textbook.
- Formulating a research proposal as part of the course requirements.
- Selecting and/ or developing a need-based research tool or schedule for a technique.
- Writing and presenting assignments and papers and participation in discussion.

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**Course Title: Communication and Expository Writing**

**Course Code: MED-192**

**Credit: 2**

**Objectives:** The students will be able to:

- Listen, converse, speak, present and explain ideas in groups and before an audience.
- Use ICT in effective communication.
- Understand about writing skills and enhance their expository writing skills.
- Implement their knowledge of communication in classroom discussion and in daily life.
- Use virtual spaces for e-learning/blended learning.

**Communication skills:** Meaning, concept and components of effective communication.

- Strategies of effective communication.
- Role and usage of ICT in effective communication.
- Development of pre-academic skills (pre-reading, pre-writing and pre-presentation)

**Expository writing:** Meaning, concept, Types and indicators for effective expository writing.

Listening skills: meaning, concept and importance of listening skills. Academic listening- (lecturing) listening to talk and presentation. Asking for and giving information, giving instruction, listening and observing tone/mood and attitude at the other end, handling the situations especially trouble shooting, teleconferencing, tele- interviews handling.

**Practicum (any one of the following):**

- Workshop on establishing Language lab.
- Workshop on Development of Expository Writing skills.
- Workshop on Communication skills.

**Note:** - Mode of transaction of this course will be workshop.

**References:**

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- [www.ncte-india.org](http://www.ncte-india.org)
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- [www.education.nic.in](http://www.education.nic.in)
- [www.scribid.com](http://www.scribid.com)
- HNGU Handbook-I
- HNGU Handbook-II

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**Course Title: Self-Development**

**Course Code: MED-193**

**Credits: 2**

**Objectives:** The students will be able to:

- Understand what they are and what they want to be?
- Take responsibility for self- development, self-exploration and self-evolution.

- know oneself and through that knowing surroundings(including human and other living
- Beings.
- Recognize one's relation with every individual unit in existence and fulfilling the expectations and needs.
- Know human conduct, human character and to live accordingly.
- Develop skills essential for self-appraisal.
- Appreciate relations, co-existence and harmony.

### **Course Content:-**

- Themes such as gender, society and education, differently challenged abilities, psycho-social dimensions of exclusion and inclusive education.
- Concept of integrated personality and processes of its harmonious development.
- Mental and physical well-being (through modalities such as Yoga workshops for at least once in a week), Life skills in our daily life.
- Happiness, harmony: within me and with, others: society, nature, existence.
- Realization, understanding, desiring, thinking, *Shanti, Santosh, Anand*. Prosperity.
- Human Values:
  - *Swatantrata*
  - *Swarajya*
  - *Moksha*
- Concept of self: *Self-concept and self-esteem*
- Understanding and analysis of your own Strength, Scope for development, weakness, threats: constructive utilization towards self-development.
- Concept of intelligence (multiple intelligence), emotional intelligence, spiritual intelligence.
- Prayer, Meditation (as anti-dote to stress management)& Mental Piece.
- Interaction with theatre personality/musician/artist.
- Conducting theatre workshop
- Maslow's Need Hierarchy Theory and Self-actualization.

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### **(SEMESTER-III)**

**Course Title: Advance Research Methodology**

**Course Code: MED 209**

**Credits:3 (2L+1T)**

**Objectives:** The student will be able to:

- ☐ ☐ Understand concept, Characteristics & Themes of Qualitative & Quantitative Research.
- ☐ ☐ Examine different types of qualitative & quantitative research and their characteristics.
- ☐ ☐ Examine the concept of Qualitative & Quantitative Research.
- ☐ ☐ Develop a tool which allows for the evaluation and data collection of Qualitative & Quantitative Research.
- ☐ ☐ Design a framework or outline of Qualitative & Quantitative Research.
- ☐ ☐ Investigate appropriate methods of data analysis.
- ☐ ☐ Explain the processes of Qualitative & Quantitative Research
- ☐ ☐ Explain the planning the research project of Qualitative & Quantitative Research.

#### **Unit I: Introduction to Qualitative Research**

- Meaning, concept and types of Qualitative Research.
- Qualitative Research: Characteristics, issues, concerns & major approaches
- Relevance of Qualitative Research in education.
- Qualitative Research in education: Retrospect and prospect.
- Themes of Qualitative Research & research question.
- Ethnographic Approaches in Qualitative Research

#### **Unit II: Qualitative Research- Approaches & Data analysis**

-Qualitative research approaches-Phenomenology, Ethnography, Case studies and Grounded theory  
Ethnography: Meaning, types, purpose, steps and common terms used by Ethnographers  
Grounded theory: Goals, perspectives, Methods and steps of Ethnography theory.  
Participatory Research.

- Content & Trend analysis: Meaning, concept, assumption, and steps.
- Phenomenology & Historical Research: Meaning, concept, assumption, and steps.
- Issues of reliability and validity of Discourse analysis.
- Coding of qualitative data – Axial coding, Selective coding
- Participant Observation, Case Study as methods of Qualitative Research

- Methods of qualitative data analysis—content analysis, logical and inductive analysis, illustrative method analogies, meta-analysis & Triangulation of data.

### **Unit III: Introduction to Quantitative Research**

- Quantitative Research: Meaning, concept, steps and characteristics.
- Nature, scope and trends of quantitative research
- Relevance of Quantitative Research in education.
- Research Data: Nature, Sources, Collection and Organization.
- Sources of educational data: Individual, Institutions, Documents, Census, Journals, Books, Schools of thought etc.
- Sampling techniques: Concept, need, probability and non-probability samples, sampling errors and their control.
- Variables in experimental research independent, dependent and confounding variables; ways to manipulate an independent variable, purpose and methods of control of confounding variables.
- Techniques and Tools of data collection: Observation, interview, questionnaire, scale, inventory, checklist, content analysis, focus group discussions.

### **Unit IV: Quantitative Research Designs**

- Experimental Research designs: Single-Group Pre-test-Post-test Design, Pre-test-Post-test Control-Group Design, Post-test only Control-Group Design, and Factorial Design
- Quasi-Experimental Designs: Non-equivalent Comparison Group Design, and Time-Series Design
- Internal and external validity of research tools.
- Expost facto research-design and variables, Simple cases of Casual-Comparative and Correlational research; necessary conditions for causation.
- Techniques of control: matching, holding the extraneous variable constant and statistical control
- Classification by Time: Cross-sectional, Longitudinal (Trend and Panel studies), and Retrospective; and classification by research objectives Descriptive, Predictive, Explanatory and Triangulation.
- Synthesizing Qualitative and Quantitative Researches, Programme Evaluation.

### **References:**

- Best J.W. (2005) Research in Education, New Delhi: Prentice Hall of India Pvt. Ltd.
- Borg, W.R. and Gall, M.D. (1983) Educational Research – An Introduction, New York, Longman, Inc.

- Creswell, John W. (2007). Qualitative Inquiry and Research Design: Choosing Among Five Approaches. SAGE Publication.
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- Srivastava, G.N.P. (1994) Advanced Research Methodology, New Delhi: Radha Publications.
- Anfara, Vincent & Mertz Norma T. (2006). Theoretical Frameworks in Qualitative Research. SAGE Publication.

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**Course Title: Advance Research Methodology**

**Course Code: MED 209**

**Credit: 1**

**Practicum (any one of the following):**

- Preparation, administration and interpretation of any one tool i.e. observation, interview, questionnaire etc.
- Identify two quantitative research problems and prepare at least five research questions for each with clear research title.
- Conduct a training program on the use of library especially for secondary sources and reference material, such as dictionaries and encyclopaedias.



- Identify an experimental educational research problem and prepare their research designing with justification.
- Review of Quantitative research reports with regard to - Title or statement of the problem - Approach/Design - Research Hypothesis/Research Questions -Sampling - Tools - Statistical Techniques.

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### **Course Title: In-Service Teacher Education in India**

**Course Code: MED 210**

**Credits: 3(2L+1T)**

#### **Objectives**

- ☐ ☐ The students will be able to:
- ☐ ☐ Gain insight and reflect on the status of in-service teacher education.
- ☐ ☐ Reflect on the nature and objectives and components of in-service teacher education programmes
- ☐ ☐ Examine the existing teacher education curricula from the view point of policy, its relevance to the demands of present day school realities.
- ☐ ☐ Evaluate the existing teacher education programmes for in-service teachers from the view point of policy and their relevance to the demands of present day school realities
- ☐ ☐ Develop the ability to organise and evaluate in-service teacher education programme.

#### **Unit I: In-service Teacher Education in India – Policy, Structure and Concerns**

- Concept and need for continuing professional development of a teacher – areas of professional development
- In-service teacher education – meaning. National and state policies on in-service teacher education
- The structure for in-service teacher education – zonal, district, state, regional and national level agencies and institutions.
- Purpose of an in-service teacher education programme – orientation, refresher, workshop, seminar, on line teleconferencing.
- In-service teacher education programmes in the Post-Independent India: organization and implementation.

#### **Unit II: Organization and Evaluation of Foundation and Competency**

## **Development Courses**

- The teacher as an adult learner – characteristics, his/her content and pedagogical needs and expected role.
- Selection, organisation, transaction and evaluation of different components of teacher education curriculum – existing practices. Need for the academic calendar and time table.
- Transactional approaches for the reinforcement of foundation courses – Expository, Participatory, Collaborative, and Inquiry.
- Transitive approaches for the development of skills and capabilities, use of ICT – audio, video, presentation and multimedia technologies in in-service teacher education.

## **Unit III: Trends of Research and Practice in Teacher Education**

- Research on effectiveness of teacher education programmes – characteristics of an effective in-service teacher education programme.

- Methodological issues of research in teacher education – direct versus indirect inference, generalisability of findings, laboratory versus field research, scope and limitations of classroom observation, the role and scope of action research for teachers and teacher educators.
- Networking of institutions of teacher education – University, SCERT, NCTE, NCERT, UGC, IASE and DIETs for creating and strengthen in-service structure and programmes at various levels.
- Issue of duration, commercialization, irrelevance and poor quality in teacher education, curriculum renewal

## **Unit IV: Planning, Organizing and Evaluating an In-service Teacher Education**

- Planning an in-service teacher education programme – preliminary considerations of purpose, duration, resource requirements, and budget
- Designing an in-service teacher education programme – steps and guidelines assessment of training needs, formulation of training curriculum, preparation of course material
- Organizing an in-service teacher education programme – common problems faced by a teacher/teacher educator and guidelines for communication, arrangement, preparation, facilitating participation and collecting feedback and evaluation.
- Redefining the characteristics of an effective in-service teacher education programme.

**References:**

- Anderson, L.W. International Encyclopaedia of Teaching and Teacher Education (Second Edition). Elsevier Science Ltd. Oxford. 1995.
- Arora G.L. Teachers and their Teaching: Need for New Perspectives. Ravi Books: New Delhi. 2002
- Cohen L and Manion L. A Guide to Teaching Practice. Methuen: London. 1977 Walker R and Adelman C. A Guide to Classroom Observation. Routledge: London. 1990.
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- NCTE. Policy Perspectives in Teacher Education: Critique and Documentation. NCTE: New Delhi. 1998.
- Nizam Elahi: Teacher Education in India. APH: New Delhi. 1998.
- Panda B. N. and Tewari A. D. Teacher Education. APH: New Delhi. 1997.
- Sharma M. L. Educating the Educator. The Indian Publications: Ambala. 2001

Mohanty, S. B. Student Teaching. Ashok Publishing House: New Delhi. 1987.

- Singh L. C. and Sharma P. C. Teacher Education and the Teacher. Vikas Publishing House: New Delhi. 1997.
- Singh Y. K. Teaching Practice: Lesson Planning. APH Publishing Corporation: New Delhi. 2008.
- Tiwari D. Methods of Teaching Education. Crescent: New Delhi. 2006
- Web sites of NCERT, NUEPA, NCTE, SCERT, NAAC

**Course Title: In-Service Teacher Education in India**

**Course Code: MED 210**

**Credit: 1**

**Practicum (any one of the following):**

□□An in depth study of in-service teacher education programme at any level in terms of its components, weight age, duration, organization, transaction and assessment – document analysis.

□□“Study of the existing practices of teacher education” – Admission, staffing, planning, organization, transaction and evaluation practices of any one teacher education programme – Document analysis, observation, interview.

□□Critical study of an in-service teacher education programme in terms of its need and relevance, duration, planning, organization and outcomes –document analysis.

□□Case study of a teacher educator in terms of their educational and professional background, beliefs, insights, vision of in-service teacher education, perceived competencies, approaches followed, significant achievements and professional linkages – interview and observation

□□Interview of practicing teachers (at least three) to identify the nature of in-service teacher education received and the felt needs.

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### **Specialization Courses I:**

**Course Title: Elementary Education in India: Administration and Management**

**Course Code: MED 211**

**Credits: 3(2L+1T)**

#### **Objectives of the Course**

□□To sensitise the student teachers with the need and relevance of Elementary Education as a basic foundation stage.

□□To reflect on the various concerns of Elementary Education including Access, Enrolment, Retention & Achievement

□□To gain insight into factors promoting the Universalisation of Elementary Education

□□To develop a critical outlook towards measures taken for the achievement of quality at the Elementary Education stage

□□To appreciate the significance of policies and programmes launched for Universalisation of Elementary Education.

### **Unit-I Elementary Education: Concept and Provisions**

- □ Meaning and Scope of Elementary Education
- □ Constitutional Provisions to achieve UEE (Including RTE and its critique)
- □ Government Policies and Steps for UEE since Independence: Recommendations of Kothari Commission, NPE 1986, PoA 1992
- □ Relevance of MDGs (Millennium Development Goals) with respect to UEE in India

## **Unit-II Programmes and Initiatives to achieve UEE in India**

- □ District Primary Education Programme: Aim, Objectives, Strategies, Achievement
- □ Relevance of 73 rd and 74th constitutional amendment w.r.t. empowerment of PRIs
- □ Sarva Shiksha Abhiyan: Programme, Objectives, Interventions with respect to Access, Enrolment, Retention and Achievement
- □ Monitoring, Research, Evaluation of specific schemes like Mid- Day Meals, Operation Black board, and Establishment of VECs in India
- □ Recommendations of the 12th Five Year Plan on Elementary Education (Including the critiquing of the same with respect to allocated budget and Programme Interventions)

## **Unit- III Elementary Education in School: Issues and Concerns**

- □ Availability and Management of Resources:
  - Physical Resource Management – Management of the School plan
  - Human Resource Management – Management of the School Staff, Delegation of Roles and Responsibilities (Need and Relevance)
  - Financial Resource Management: Process and Procedure including Zero Budgeting and Performance Budgeting
- □ School Effectiveness: Parameters and Quality concern – Role of the School Head and Teachers in creating a Joyful learning environment
- □ Problems of Wastage and Stagnation in School: Concept and Remedies
- □ School Supervision: Need, Purpose; Role of Head, Teachers, Staff, PTAs, SMCs, MTAs and Students in Supervision

## **Unit- IV Elementary Education: Research and Innovation**

- □ Launch of Innovative Programmes to strengthen Elementary Education: Hoshangabad Vigyan Project, B. El. Ed. Programme, D. El. Ed. Laadli scheme

□ □ Financing of Education in India (Centre- State Relationship, Mobilisation of Resources): Perspective from Research Findings  
Critical Action Research Areas in School and the Classroom with respect to Elementary Education.

### **References:**

- Celin Richards (1984). The Study of Elementary Education and Resource Book. Vol. I.
- Government of India (1986) National Policy on Education, New Delhi, MHRD.
- Government of India (1987) Programme of Action, New Delhi: MHRD.
- Government of India (1987) Report of the Committee for Review of National Policy on Education, New Delhi, MHRD.
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- Lewis, Ramón (2008): Understanding Pupil Behaviour. Routledge Publications, U.K.
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- National Curriculum Framework (NCF)-2005 NCERT, New Delhi.
- Rao, V.K. (2007): Universatisation of Elementary Education. Indian Publishers, New Delhi.
- Rita Chemicals (2008): Engaging pupil voice to ensure that every child matters: A practical guide. David Fulton Publishers.
- Singhal, R.P. (1983) Revitalizing School complex in India, New Delhi.
- Sharma, Ram Nath (2002): Indian Education at the cross road. Shubhi Publications.
- Tilak, J.B. (1992): Educational Planning at grass roots, New Delhi.
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- NCERT (2005): National Curriculum Framework, New Delhi.
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- Singh, L.C. (Ed.) (1987): Teacher Education – A Resource Book, NCERT, New Delhi.
- The Study of Elementary Education – A Source Book, Volume I & II, 1984.
- Victor & Learner (1971): Readiness in Science Education for the Elementary School, McMillan Co., N.Y.

•UNESCO (2006): Teachers and Educational Quality: Monitoring Global Needs for2015.  
UNESCO Publication. Montreal.

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**Course Title: Elementary Education in India: Administration and Management**

**Course Code: MED 211**

**Credit:1**

**Practicum (any one of the following)**

☐ ☐ Visit any two elementary schools and find out innovative teaching methodologies. Prepare a detailed report.

☐ ☐ After surveying a Govt. & private school, prepare a report on how the nation and state agencies are really working for their betterment?

☐ ☐ Prepare a status report on elementary education in a chosen state or district with reference to classroom process, enrolment

☐ ☐ Retention/participation, dropout and learning achievement

☐ ☐ Evaluate a textbook of elementary class with reference to its adequacy and appropriateness in achieving expected learning outcomes in any subject

☐ ☐ Design an instructional plan of a unit in a subject at elementary level

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**Course Title: Planning & Management at Secondary Level**

**Course Code: MED 212**

**Credits: 3(2L+1T)**

**Objectives:** The students will be able to:

☐ ☐ Acquaint themselves with the need, scope and purpose of educational planning in terms of national and community needs.

☐ ☐ Determine and implement objectives of planning on the basis of individual needs of the students.

☐ ☐ Develop the skills in planning and implementing conventional administrative procedures.

- Develop the skills and attitudes to utilise human energy in getting the maximum work done.
- Understand the recommendations of different education commissions regarding secondary education commissions.
- Know different programmes and policies for realising the constitutional obligations related to secondary education in India.
- develop an idea about the structure of secondary education in India

### **Unit I: Introduction to Secondary & Senior Secondary Education**

- Meaning, aims, objective of secondary & Senior Secondary education
- Purpose, function & Indigenous system of Secondary education.
- Secondary Education in India – Historical Perspective, pre and post-independence.
- Constitutional Provisions and centre-state relationship in India.
- Recommendations of various committees and commissions: Secondary Education Commission, Kothari commission, Programme of Action, 1986, NPE, Ramamurti Review Committee Janardhan Reddy Committee, Yashpal, Committee, RMSA and NCF-2005.
- **Constitutional provisions** related to secondary education.

### **Unit II: Institution Planning**

- Concept, scope and nature of Institution Planning
- Need and importance of Institution Planning
- Types of Institution Planning
- Evaluation of Institutional Planning.
- Difference between inspection and supervision.

### **Unit III: Principles and techniques of Educational Planning**

- Formulation of aims and objectives.
- Methods and techniques of planning.
- Approaches to Educational Planning: Social demand approach, Man-power approach, Rate of Return of Investment approach.
- Concepts: Optimal analysis, Input and output, Marginal analysis, Programming, Target and control figures, Tools for Planning,
- New approach to planning: Planning, Adoption, Execution

### **Unit IV: Educational Management**



- Meaning, Concept and need for management at secondary to senior secondary school level.
- Management at Nation: MHRD, CABE, NCERT
- State, District, Sub-district level.
- Management of educational Institution at secondary school level.
- Type of Management, Effective management, Co-ordination, Supervision & Inspection.
- TQM in Education and Educational Administration
- Recent Trends in Research and Innovation in the field of Educational Management.

### **References:**

- Mudhopadhyay, Sudesh and Anil Kumar K (2001) Quality Profiles of secondary schools, NIEPA, New Delhi
- Govt. of India (1953) Report of Secondary Education Commission, New Delhi
- Govt. of India (1996) Indian Education Commission (1964-66) Report. New Delhi
- Govt. of India - (1986/1992) National Policy of Education, 1992 Modification and their POA's, MHRD, Dept. of Education
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- Yadav, M.S. & Lakshmi, T.K.S. (2003): Conceptual inputs for Secondary Teacher Education: The instructional Role. India, NCTE.
- Mohanty Jagannath, (1990), "Educational Administration, supervision and school Management", Deep & Deep Publications F-159, Rajouri Garden, New Delhi-110027

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**Course Title: Planning & Management at Secondary Level**

**Course Code: MED 212**

**Credit:1**

**Practicum (any one of the following):**

- To prepare a report with the help of documents/reports on major obstacles and challenges in universalization of secondary education.
- To study the annual report of RMSA/NCERT or any Govt. agency to identify issues of secondary education in India.

- To prepare a blue print of Process of Institution Planning in India.
- To prepare an annual school calendar for secondary/senior secondary school.
- To prepare a hypothetical institutional plan.

### **Specialization Courses II:**

**Course Title: Issues and Curricular Concerns at Elementary level**

**Course Code: MED 213**

**Credits: 3(2L+1T)**

**Objectives:** The students will be able to:

- ☐ ☐ Understand various schemes & programmes of Govt. for elementary education.
- ☐ ☐ Study effective practices with various curriculum transaction strategies.
- ☐ ☐ Find out research trends in elementary education.
- ☐ ☐ Select and use appropriate assessment practice to meet the needs of the students.
- ☐ ☐ Practice continuous assessment of students for all round development.
- ☐ ☐ Understand how various aspects of education are measured, evaluated interpreted and their results are recorded to help learners.
- ☐ ☐ Understand the concept of quality education at elementary level.
- ☐ ☐ Understand different programmes and agencies for ensuring the quality of elementary education in India

- ☐ ☐ develop an idea about the structure of elementary education in India
- ☐ ☐ Reflect upon different issues, concerns and problems of elementary education in India.
- ☐ ☐ Understand principles, aims and features of elementary school curriculum.

### **Unit I:-Issues & concerns of Elementary Education**

- Major quality dimensions of elementary education and Quality monitoring tools.
- Quality issues at upper elementary stage: - teacher qualification, competency, subject specific deployment in schools, training needs of teachers, classroom based support and supervision issues. Minimum Level of Learning, Quality Assurance.
- Alternative Strategies for achieving UEE and implementing RTE act.
- Dialect, drop out, socio-economic issues, inclusive education.
- Wastage, Stagnation, Culture, Capability Capacity, Reform Needs and improvement of the System; building accountability

### **Unit II: - Teachers and Curriculum Transaction Strategies**

- Thematic & Constructivism base of curriculum

- Joyful learning, Teachers and Pedagogical Attributes
- Research in curriculum
- Life skill education & creativity
- Analysis of Elementary Education Curriculum
- Role of I.C.T.
- Research Trends in Elementary Education

### **Unit III- Type of schools & Pedagogy**

- Child centered pedagogy: Process of knowledge construction for development of concepts, understanding, logical reasoning, critical thinking and problem solving.
- Type of school & their contribution to society
- Forms of learner's engagement: observing, exploring, discovering, analyzing, critical thinking and reflection, contextualization, multiple interpretations, collaboration.
- Pedagogical analysis of the subject contents: Critical Pedagogy. Critical analysis of the pedagogy prescribed in the educational thoughts of Socrates(dialogue), John Dewey, Tagore, Gandhi, J. Krishnamurthy, Sri Aurobindo, and Gijubhai with special reference to their relevance in teaching-learning.
- Innovative Educational Programmes in India

### **Unit IV:-Assessment Process**

- Pupil Assessment Techniques
- National Expert Group on Assessment in Elementary Education (NEGAEE)
- Concept of Evaluation & CCE
- Types of evaluation
- Diagnostic & remedial teaching
- Student records
- Cumulative records
- Progress reports, grading system, class school, School Grading.

### **References:**

- Aggarwal, J.C, (2005) "The Progress of Education in free India, "Man Singh Arya book Depot, Naiwala. Karol Bagh, New Delhi-110005
- Chaube, Dr. S.P, (2011), "History and Problems of Indian Education "Agrawal Publications, Jyoti Block Sanjay place, Agra-2

- Ronald c. Doll, (1978) “Curriculum Improvement Decision Making and Process, Allyn and Bacon, Inc., 470, Atlantic Avenue, Boston, Massachusetts 02210
- NCTE (2009) National Curriculum Framework for Teacher Education, New Delhi.
- NCERT (2005): Position paper on Teacher Education for Curricular Renewal, New Delhi.
- Report of the Education Commission (1964-66).
- Report of the National Commission on Teachers (1983-85).
- National Curriculum Framework on school education, NCERT (2005).

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**Course Title: Issues and Curricular Concerns at Elementary level**

**Course Code: MED 213**

**Credit: 1**

**Practicum (any one of the following):**

- Prepare unit-test, administrate the test, determine gaps in attainment of objectives and plan remedial instruction for non-masters.
- Make an Evaluation of assessment process in any school and write about its merit and demerits.
- To prepare a critical review on schemes and programmes to achieve UEE in the state.
- Conduct a survey in a school to assess quality issues, and make an action plan to resolve it.
- Find out the best learning engagement method of elementary level student, after school visit.
- Prepare a report after analysing the innovative educational programmes in India. Visit DIET of the district to review on types and trends of research, actual practices in the institution and prepare a report on variation, between national or international trend (if any).

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**Course Title: Issues & Curricular Concerns at Secondary level**

**Course Code: MED 214**

**Credits: 3 (2L+1T)**

**Objectives:** The student will be able to:

- ☐ ☐ Understand the problem and challenges related to secondary and senior secondary education.
- ☐ ☐ Examine the status of development of secondary and senior secondary education in India after Independence.
- ☐ ☐ Reflect on various issues related with secondary education
- ☐ ☐ Understand the interventions to solve the problems and issues related to alternative schooling at secondary schools.
- ☐ ☐ Identify the problems issues of secondary school teachers and visualize the impact of Rights of children to free and Compulsory Education Act, 2009 for universalization of Secondary Education
- ☐ ☐ Identify critical issues related to universalization of secondary education.
- ☐ ☐ Visualize the impact of Rights of children to free and Compulsory Education Act, 2009 for universalization of Secondary Education
- ☐ ☐ Understand the concept of quality education at secondary school level.
- ☐ ☐ understand different programmes and agencies for ensuring the quality of secondary education in India
- ☐ ☐ Reflect upon different issues, concerns and problems of secondary education in India.
- ☐ ☐ Understand principles, aims and features of secondary school curriculum.
- ☐ ☐ Examine the present school curriculum.
- ☐ ☐ Analyse the present evaluation system at secondary school level.

### **UNIT I: Quality in secondary Education**

- Concepts, indicators of quality, setting standards for performance.
- Continuous professional development of teachers.
- Teacher selection test CTAT, SAT etc. and in-service programme
- Privatization of secondary education.
- Present status of quality education in India (status and prospects) - Delor's - Commission Report regarding quality- Professional enrichment of secondary teachers (different in-service programmes for ensuring quality, - different agencies - SCERT – NCERT – CIET – NUEPA – IASE etc.

### **UNIT-II Issues & Concerns**

- Challenges related to Universalization of Secondary Education, RMSA.
- Problems and Strategies of Alternative Schooling at Secondary school Stage.

- Challenges / strategies / intervention in relation to access, enrolment, dropout, achievement and equality of Educational opportunities
- Problems of education for girls, disadvantaged and differently abled children and slow learners and interventions to solve the problems
- Type of schools and their contribution to society.
- Issues of quality in secondary and senior secondary education.
- Management system of secondary education - role of Department of Education, Directorate, Inspectorate and NGO's.

### **Unit III: - Teachers and Curriculum Transaction Strategies**

- Thematic & Constructivism base of curriculum
- Joyful learning, Teachers and Pedagogical Attributes
- Research in curriculum
- Life skill education & creativity
- Analysis of Elementary Education Curriculum • Role of I.C.T.
- Research Trends in Elementary Education.
- Critical appraisal of present Secondary School curriculum in the state.
- ICT, Blended learning.

### **UNIT IV: Assessment and evaluation in secondary school level.**

- Meaning, nature and functions of evaluation & assessment, difference between assessment and evaluation, testing, appraisal and examination, Types of assessment formative, diagnostic and summative assessment.
- New trends in evaluation – grading, internal assessment, semester system, CCE, On Demand Examination System.
- Critical appraisal of the present evaluation system at secondary school level.

### **References:**

- Aggarwal, J.C, (2005) "The Progress of Education in free India, "Man Singh Arya book Depot, Naiwala. Karol bag, New Delhi-110005
- Chaube, Dr. S.P, (2011), "History and Problems of Indian Education "Agrawal Publications, Jyoti Block Sanjay place, Agra-2
- Ronald c. Doll, (1978) "curriculum Improvement Decision Making and Process, Allyn and Bacon, Inc., 470, Atlantic Avenue, Boston, Massachusetts 02210
- NCTE (2009) National Curriculum Framework for Teacher Education, New Delhi.
- NCERT (2005): Position paper on Teacher Education for Curricular Renewal, New Delhi.
- NIOS: On Demand Examination System(2003).

- Report of the Education Commission (1964-66).
- Report of the National Commission on Teachers (1983-85).
- National Curriculum Frameworks for Teacher education, 2009
- National Curriculum Framework on school education, NCERT (2005).

**Course Title: Issues & Curricular Concerns at Secondary level**

**Course Code: MED 214**

**Credit: 1**

**Practicum (any one of the following):**

- Critical review on education management system of secondary school education -.
- Conduct a survey in a school to assess quality issues, and make an action plan to resolve it.
- Evaluation of assessment process in any school and write about its merit and demerits.
- Visit IASE of the district to review on types and trends of research, actual practices in the institution and prepare a report on variation, between national or international trend (if any)
- Visit secondary teachers training in the district to review on types and trends of research, actual practices in the institution and prepare a report on variation, between national or international trend (if any)

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## **PRACTICAL**

**Course Title: Internship in school**

**Course Code: MED 296**

**Credits: 4P**

**Objectives: The students will be able to**

- ☐ ☐ Experience and understand the academic and social environment of school as social Institution.
- ☐ ☐ Observe and list the developmental needs of students.
- ☐ ☐ Identify and workout practical solutions of different types of problems.
- ☐ ☐ Develop teaching competence through practice teaching and social modelling.
- ☐ ☐ Try out different content based and learner based methods of teaching.
- ☐ ☐ Frame and assign different types of questions viz knowledge, understanding, application, HOTS (analysis and synthesis) and Evaluation Questions.

**Select any two activities from each group given below:-**

**Group I:**

**Activity Marks**

Prepare a report after analysis of private/innovative/alternative schools which develop their own curricular or Co-curriculum activities/material or any innovation.

Working with community based on any project of social welfare.

(Submission of activity report)

Identify role and functions of key personnel like teachers, CRCs, BRCs, DIETs, community and others who will implement the programme and strategies for their capacity building.

Prepare a report on teacher/ community participation in material preparation and in developing a school vision with plan of action for enhancement of the participation.

Laying down of minimum levels of learning and their incorporation in curricula, textbooks and teaching process

**Group II:**

**Activity Marks**

Preparing a suggested comprehensive plan of action for some aspects of school improvement.

Prepare portfolio, including detailing of teaching-learning plans, resources used, assessment tools, student observations and records.

Analysis of text book from peace perspective

Analyze any one course curriculum /text book to find out whether the values enshrined in the Constitution of India and the National Policy on Education have been incorporated or not.

Analyse any one course curriculum /text book in the light of reflecting sensitivity to gender, caste and class parity, peace, health and needs of children with disabilities/ Link school knowledge in different subjects and children's everyday experiences.

**Group III:**

**Activity Marks**

Preparation, administration and analysis of diagnostic test (s) followed by remedial teaching.

Learning achievement surveys (baseline, midterm and end term) would be made to track children's performance over the period.

Collect information about the background of children, their learning difficulties, challenges related to their performance along with the total number of children to be covered.



Monitoring learner achievement vis-à-vis diagnostic test and action for improving attainment levels in any school subject.

**Group IV:**

**Activity Marks**

Exhibition of work done by the students during the internship programme.

Seeking reactions of students, headmasters/ principals/ cooperating teachers and supervisors with respect to the school environment.

Interaction with head teacher, management, teachers and non-teaching staff for preparation of a report on school environment.

**(Physical, psycho-social, and sustainability issues).**

Type of materials to be developed for students. Analyze quality and prepare a suggestive report.

Conduct a programme in school with/in association of local workmen in school activities.

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**Course Title: Dissertation**

**Course Code: MED 297**

**Credits: 2P**

To give the background of the problem, Review of the related literature, framing a research design, selection of tools, collecting and using data in a thought provokingly and in a convincing manner, analysis and tabulation of data. Writing of Research Reports with up to date references.

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**Course Title: Academic Writing**

**Course Code: MED 298**

**Credits: 2P**

**Objectives: The students will be able to**

- ☐ ☐ Reflect on their communicative behaviour.
- ☐ ☐ Improve their communicative behaviour performance
- ☐ ☐ Build capacities for self-criticism and facilitate self- growth.
- ☐ ☐ Enhance their listening & writing skills.
- ☐ ☐ Present effective class room lectures after enhancing their listening skills.
- ☐ ☐ Write or draft professional letters and mail etc.
- ☐ ☐ Use & differentiate different kinds of writings and writing styles according to Co-curricular activities.
- ☐ ☐ Reflect on essential requirements of academic writing & distinguish a good academic writing from others.
- ☐ ☐ Analyse academic sources and how to refer to them.
- ☐ ☐ Cite a source, paraphrase and acknowledge the source & edit one's own writing.

**Practicum (any one of the following):-**

- ☐ ☐ Prepare a programme on reflective thinking and negotiation skill and conduct it in NGO/School/Educational Institution.

- ☐ ☐ Workshop on listening, conversing, speaking, presenting, explaining and expositing ideas in groups and before an audience.
- ☐ ☐ Write a paragraph on any topic of interest, then acknowledge the source & edit one's own writing. Prepare a report on the entire programme.
- ☐ ☐ Attend a seminar/workshop or conference and write a report on entire programme.
- ☐ ☐ Workshop on academic writing skill and report writing.

**References:**

- ☐ ☐ [www.ugc.ac.in](http://www.ugc.ac.in)
- ☐ ☐ [www.ncte-india.org](http://www.ncte-india.org)
- ☐ ☐ [www.ngu.ac.in](http://www.ngu.ac.in)
- ☐ ☐ [www.education.nic.in](http://www.education.nic.in)
- ☐ ☐ [www.scribid.com](http://www.scribid.com)
- ☐ ☐ HNGU Handbook-I
- ☐ ☐ HNGU Handbook-II

# SEMESTER-II

**Course Title: Philosophical Foundations of Education**

**Course Code: MED-105**  
**(2L+1T)**

**Credits: 3**

**Objectives: The students will be able to**

- Understand the relevance of Philosophy as a liberal discipline and a critical inquiry process.
- Undertake Philosophical enquiry as the basis of all Educational endeavors.
- Sensitize students to the concerns of human beings and the contributions of Philosophy there in.
- Appreciate the contribution of Western philosophy and Indian Philosophy to Education.

**Unit I: Philosophy of Education- Its nature and function**

- Education as a disciplinary, interdisciplinary and multidisciplinary field.
- Functions of Philosophy: Speculative ,Analytic, Prescriptive
- Philosophical Methods used in Education: Analysis, Synthesis ,Induction, Deduction, Dialectical.
- Fundamental Philosophical Domains-Epistemology, Metaphysics, Axiology
- Indian Philosophy and Education: - Axiology and Education: Critical appreciation of the contribution made by Upanishads, *Bhagavad Gita*, Buddhism, Jainism, Christianity, Islam

,Sikhism, and to Education in terms of value development. Commonality of all religions in terms of human values.

### **Unit II: Epistemology of Education**

- Knowledge-Its meaning, nature, limits, origin, , types.
- Methods of acquiring valid knowledge with respect to analytical, dialectical & scientific approaches.
- Methods of acquiring valid knowledge with respect to Nyaya& Yoga.

### **Unit III: Recent Philosophical approaches to Education**

- Realism
- Logical Positivism
- Existentialism
- Phenomenology
- Humanism
- Critique of the Scientific Method in the context of Education
- Thinkers and their contributions to Education: Vivekananda, M.K Gandhi Aurobindo Ghose, Jiddu Krishnamurti, J.P. Naik, B.R Ambedkar, Madan Mohan Malviya, Immanuel Kant, Jean Paul Sartre, Henry Giroux, Israel Scheffler, David Carr.

### **Unit IV: Metaphysics and Education**

- Concept of human nature and its relation with society.
- Impact of philosophical suppositions on education made by some prominent schools of Indian philosophies viz Vedanta & Sankhya.
- A critical comparison of Indian & Western Schools of philosophies with respect to metaphysical implications of education.

### **References:**

- Giroux Henry (2011) On Critical Pedagogy, Continuum Press.
- Noddings Nel (2012) Philosophy of Education, WestView Press.
- Paulo Freire (1996) Pedagogy of the Oppressed, Penguin Books.
- Brubacher (1950) Modern Philosophies of Education, McGraw Hill Book Co. New York
- Gallnick D.M. & Chinn P.C. (1994) Multicultural Education in Pluralistic Society; N.Y. Merrill.
- International Education Commission Report (1997-98) Delors' Commission, UNESCO
- Kilpatrick W. (1967) Source book in Philosophies of Education an Introduction, MacMillan Company New York.
- Navratham R. (1958): New frontiers in east-west Philosophies of Education Orient, Bombay.
- Park Joe (1968) Selected readings in the Philosophy of Education, The Macmillan Co. London.
- Ross J. (1977) Groundwork of Educational Theory, Oxford University Press, Calcutta. Readings by Aurobindo, JP Naik, David Carr, Sartre

**Course Title: Philosophical Foundations of Education**

**Course Code: MED-105**

**Credit: 1**

**Practicum (Any one of the following):**

- Reflections on any two writings of:(chose any two of the following: Vivekananda, Aurobindo Ghose, J.Krishnamurti, J.P. Naik , David Carr, Jean-Paul, Sartre, Israel Scheffler, Henry Giroux, Immanuel Kant)
- Reflections on the Educational Philosophy of any philosopher of your choice

**Course Title: Sociology of Education**

**Course Code: MED-106**

**Credits: 3 (2L+1T)**

**Objectives:** The students will be able to

- Understand the social nature of education.
- Realize the need of studying education with sociological perspectives.
- Understand the relationship of different social institutions with education.
- Understand the role of education and change.
- Understand the relationship of education and national development.
- Understand the social foundation of education.
- Understand the role of school in creating and fostering the socialization process.

**Unit I: Education and Sociology**

- Need to understand education with sociological perspectives.
- Concept of educational sociology and sociology of education.
- Scope of sociology of education.
- Sociological perspective.
- Education, Culture and Socialization.
- Education as a sub system of social system.

**Unit II: Education and Social Structure**

- Concept of social unity, unity and diversity of caste, class, religion, human language, gender in society with specific reference to Indian society with respect to living together.
- Education for social unification.
- Concept of social equity and justice.
- Concept of Equality of Educational Opportunity.
- Relationship of education and social justice.
- Concept of inclusive education, inclusive schools and inclusive class rooms.

**Unit III: Education, National Integration and International Understanding**

- Education and politics.
- Education and India as a nation state.
- Education and globalization.
- Core values of Indian constitution and its inculcation.

**Unit IV: Education and Social Change**

- Concept of: social change, social development, sustainable development, economic development.
- Education as a means of social change: scope and limitations.
- Modernization and post-modernization, liberalization-privatization-globalization (LPG).
- Education for empowerment.

**References:**

- Ambasht, N.K.(1971).A Critical Study of Tribal Education. New Delhi: S. Chand & Company.

- Gore M.S. (1967) Papers in the Sociology: Education in India, NCERT, New Delhi.
- Gore M.S. (1994) Indian Education: Structure & Process Rawat Publications, New Delhi.
- Ruhela S.P. (1970) Sociological Foundation of Education in Contemporary India, DhanpatRai, Delhi. 29
- Shepard Jon M. (1981) Sociology, West Publishing Co. St. Paul.
- Shukla Sureshchandra (1985) Sociological Perspectives in Education A Reader, Chanakya Publication, Delhi.

**Course Title: Sociology of Education**

**Course Code: MED-106**

**Credit:1**

**Practicum (any one of the following):**

- Study of the concerns of the implementation of the RTE Act. Critical study of any social problem vis-a-vis the role of education

**Course Title: Curriculum Studies in Education**

**Course Code: MED-107**

**Credits: 3(2L+1T)**

**Objectives: The students will be able to**

- Explain the significance of curriculum as a field of study in Teacher Education.
- Get sensitized to curriculum as a process, product and praxis.
- Develop critical understanding on various issues of curriculum as a discipline and across disciplines.
- Acquaint students with the different aspects of curriculum evaluation.

**Unit I: Curriculum-Meaning and Foundations**

- Concept of Curriculum, syllabus/courses of study, domains of curriculum, curriculum objectives, course content, teaching learning experiences, evaluation.
- Curriculum as a field of study and its evolution
- Foundations of the curriculum: philosophical, sociological, psychological, and historical. Societal needs and the Curriculum.
- Components of curriculum
- Types of Curriculum with special reference to Hidden Curriculum.
- Social reconstructions curriculum: purpose, characteristics, role of teacher Humanistic Curriculum: Purpose, Characteristics, Role Teacher and Implications for Pedagogical practice, the class room.
- Curriculum change (Determinants and the role of a teacher)

**Unit II: Curriculum Planning and Designing**

- Curricula objectives: Sources and Formulation.
- Curriculum Planning Framework: Need and Relevance
- Brief overview of Curriculum Planning Frameworks in India with reference to NCFSE-2000, NCF-2005 and NCFTE 2009.
- Step of curriculum planning.
- Models of curriculum planning
- Community knowledge.
- Approaches to Curriculum Development-Subject centred, Learner centred, Community centred.

- Principles of Curriculum Development

### **Unit III: Curriculum Transaction**

- Concept of instruction, instructional design and instructional media.
- Role of Communication in Effective Curriculum Transactions (Verbal and Non Verbal)
- Qualitative and Competences of a Teacher to engage as a critical Pedagogue.
- Factors influencing Curriculum Transaction
- Approaches for Curriculum Transaction: Collaborative Learning, Cooperative Learning, Team Teaching.
- Need and Role of Challenge and Feedback in effective Curriculum Transaction

### **Unit IV: Assessment and Evaluation:**

- Curriculum Evaluation: Concept and Purpose
- Types: Formative and Summative
- Norm-referenced and Criterion -referenced.
- Continuous Comprehensive Evaluation
- Transparency and Objectivity in Evaluation

### **Techniques of Curriculum Assessment and Evaluation**

(i) Types of questions

(ii) Portfolios

(iii) Rubrics

(iv) Self-Assessment

(v) Peer Assessment

(vi) Content analysis

(vii) Grading

(viii) Computer Assisted Assessment

### **References:**

- Dewey, J. (1966). The Child and the Curriculum. The University of Chicago Press.
- Diamond Robert M. (1986) Designing and Improving Courses in Higher Education: A Systematic Approach, California, Jossey-Bass Inc. Publication.
- Joseph, P.B. et al; (2000): Cultures of Curriculum (studies in Curriculum Theory). New York. Teacher College Press.
- Oliva, Peter F. (1988) Developing the Curriculum. Scott, and Foresman and Co.
- Reddy, B. (2007): Principles of curriculum planning and development.
- NCERT (2000). National Curriculum Framework for School Education, NCERT, New Delhi.
- NCERT (2005). National Curriculum Framework-2005, NCERT, Sri AurobindoMarg, New Delhi.
- Arora, G.L. (1984): Reflections on Curriculum. NCERT.
- Dewey, John (1966). The Child and the Curriculum. The University of Chicago Press.
- McKernan, James (2007): Curriculum and Imagination: Process, Theory, Pedagogy and Action Research. Routledge. U.K.

**Course Title: Curriculum Studies in Education**

**Course Code: MED-107**

**Credit:1**

### **Practicum (any one of the following):**

- Critical Review of original documents i.e. National Curriculum Frameworks developed by NCERT (NCF-2000 and 2005) /NCFTE 2009, NPE-1986 (modified version 1992) POA on NPE-1986, 1992 and examine the same with respect to various aspects of foundation, critical comments be supplied for the same.
- Students will go through various definition of curriculum and will arrive at comprehensive definition of curriculum. They will identify various components of Curriculum.
- Prepare a rubric for evaluation of workshop/ seminar/one microteaching skill.

- Evaluation of a text book.

**Course Title: Teacher Education**

**Course Code: MED-108**

**Credits: 3(2L+1T)**

**Objectives:** The students will be able to

- Get sensitized to the aims and development of teacher education in India.
- Develop an understanding of the teacher education curriculum in India.
- Acquaint with the competencies essential for a teacher for effective transaction.
- Get equipped with the skills to become effective and efficient teachers and teacher-educators.

**Unit I: Teacher Education in India: Historical Perspective**

- Teacher Education – Concept, aims and scope; Need and significance of Teacher Education, Aims & Objectives of Teacher Education at various levels.
- Teacher Education in Ancient, Medieval and Modern India.
- Teacher Education in the Post-Independence Period
- Approaches to Teacher Education
- Recent Trends in Teacher Education and present scenario.

**Unit II: Teacher Education Programmes and Institutions in India**

- Teacher Education Programmes in India.
- Institutions and Agencies of Teacher Education its monitoring and implementation.
- Centrally Sponsored Schemes in Teacher Education-IASE, DIETs etc.
- Pre-service and In-service Teacher Education in India: Need, concept, objectives and techniques.
- Issues of teacher education.
- Issues related to in- service training and suggestions.
- Students teaching role, rationale and models of student teaching.

**Unit III: Teacher Education Curriculum and Transaction**

- Analysis of Teacher Education Curriculum at different stages Pre-primary, Elementary, Secondary and Higher Education: Approaches to Teacher Education—consecutive and integrated.
- Qualities of a good teacher- teaching skills.
- Competency-based teacher education: Quality assurance in teacher education.
- Initial and Continuing Education of Teachers and Teacher Educators.

**Unit IV: Teacher Education through Open and Distance Learning- Innovations and Research in Teacher Education**

- Open and Distance Learning: Need, Scope, Types and Characteristics.
- Use of Training Technology and Media& ICT in teacher education.
- Innovative Programmes for continuous professional development of school teachers
- Research in Teacher Education and scope of Action Research in teacher education.
- New development in teacher education: study of futuristic, innovations, experiments and researches in teacher education.

**References:**

- Desai D.M.: New directions in the Education of Indian teachers Baroda, M.S. University 1971.
- Gupta Arun K.: Teacher Education: Current & Prospects New Delhi, Sterling Publications 1984.



- India, Ministry of Education; Report of the Education Commission (1964-66) Education & National development New Delhi publication division 1966.
- Jangira N.K.: Teacher training & teacher effectiveness an experience in teacher, behaviour New Delhi, National Publishing House, 1979.
- Khan Mohd. Sharif: Teacher education in India & abroad New Delhi, Ashish Publishing House 1983.
- Kochar S.K.: Methods & techniques of teaching 2nd & rev & enlarged edition, New Delhi, Sterling Publishers 1985.

- NCF 2000, NCF 2005-NCERT Publication, New Delhi.
- NCFTE-2009-NCTE Publication, New Delhi.
- Regional colleges of: New dimensions in teachers Education, New Delhi, NCERT.
- Uday Shankar: Education of Indian Teachers, New Delhi, Sterling publishers, 1984.
- UNESCO: Regional office for Education in Asia, Bangkok, Exploring, New dimensions in Teacher Education, Bangkok, UNESCO, 1976:
- UNESCO: A System approach to teaching & learning procedures a guide for teacher Educators, Paris: UNESCO, 1981.
- Upasani N.K.: Effective college Teaching, Mumbai S.N.D.T Women's University, 1988.
- Upasani N.K.: Planning for better learning Mumbai, S.N.D.T. Women's University, 1988.

**Course Title: Teacher Education**

**Course Code: MED-108**

**Credit:1**

**Practicum (any one of the following) :**

- A survey of research in Teacher Education conducted during last two years on school teachers, or on higher education teachers, or on teacher educators.
- Preparation of facilitative resource materials in school education (on any teaching unit).
- A work study project related to teacher education, problems and improvement possibilities.
- Examining teaching competency and effectiveness of prospective teachers with reference to teaching methods and skills used.
- Preparing a "Peer Group Observation Performa", administer it and evaluate teaching materials and skills. Give feedback and suggestions for improvement.

**Course Title: Dissertation**

**Course Code: MED-194**

**Credits: 2P**

**Dissertation**

- Teacher educator will facilitate the areas of research related to educational issues.
- Students are expected to take up a research based project on an area of interest which is associated with optional/specialization course or challenges faced /recent needs and trends.
- Identification of the problem and its statement.
- Preparation of Synopsis/Research Proposal.
- Preparation of research proposal and its presentation, followed by viva.

**Course Title: Internship in Teacher Education Institutions**

**Course Code: MED-195**

**Credits: 4P**

Internship will be organized with deputation to both pre- service as well as in- service teacher education institutions setting for 3 weeks such as CBSE,NUEPA,NCERT, **SCERT,DIETs, IASE,NGOs, Curriculum Development Bodies, University Education**Departments, Colleges of Education etc. Necessary orientations to the students, teachers, concerned supervisor and teacher educators from the respective institutions of teacher education need to be provided before organizing the internship.

**Learning Outcomes:** The students will be able to

- Internalize the working of teacher training institution.
- Develop insight into the working of institution.
- Create an interface of theory and practice.

**Assessment (marks wise) is based on the following activities:**

### **Activities Marks**

1. Mode of transaction, giving suggestive plan for improvement.
2. Observation of day-to-day activities of the institution and report of an in- depth study of any two activities.
- 3.Participation and organization of Co-curriculum activities
  - a. Cultural
  - b. Literacy
  - c. Games & sports
  - d. Sharman.
4. Teaching work Five periods in any one compulsory paper of TEI and five periods in methodology of teaching.
- 5.Observation & supervision of five lessons in teaching subjects
6. Selecting two students and mentoring on psychology, social, academics and perspective, prepare a report.
7. Prepare reflective journal
8. Critical review with suggestions of lesson plan diaries, including supervisor's remarks
9. Participation in, any one, pre- or in- service teachers training programme for preparation of in-depth report on it.
10. Analyze nature & type of any one pre-or in-service teachers training programmeorganized by the institution
11. Prepare an evaluation Performa in pre- or in- service teachers training programme, apply it and prepare a report on its effectiveness of the programme with suggestive plan.
12. Prepare a module for pre- or in- service teachers training programme and find its affectivity.
13. Review new trends in research of teacher education and Draft a report.
14. Training report about arrangement of different departments of theschool like
  - a. Library management
  - b. Administration and scoring of any five psychological tests.
  - c. Science club.
  - d. Office Records and maintenance of attendance register, teacher's diary & stock Register.
  - e. Maintenance of technology department
15. Training report for evaluation process:-
  - a. Construction of question paper
  - b. Preparation for Examination.

c. Evaluation of answer books and preparation of result

**MASTER OF EDUCATION**

Semester - IV (Credits = 16) (Marks= 400)								
Course No.	course code	Course Title [THEORY]	Marks	Credit	Internal Assessment Weighage			External Assessment Weighage
					MSE-I	Project Work	TOTAL	TOTAL
1	MED-216	Advance Curriculum Theory	100	4	10	20	30	70
		<b>Specialization Courses-III(Any One of the following</b>						
2(a)	MED-217	Policy, Planning and Financing of Education	100	4	10	20	30	70
b)	MED-218	Educational Technology	100	4	10	20	30	70
(c)	MED-219	Issues, Planning and Policies of Elementary Education	100	4	10	20	30	70
		<b>Specialization Courses-IV(Any One of the following</b>						
3(a)	MED-220	Peace Education	100	4	10	20	30	70
(b)	MED-221	Educational, Vocational Guidance	100	4	10	20	30	70
(c)	MED-222	Inclusive Education	100	4	10	20	30	70
(d)	MED-223	Environmental Education	100	4	10	20	30	70
<b>PRACTICAL</b>								
1	MED-299	Dissertation	100	4			40	60

## **Semester IV**

**Course Title: Advance Curriculum Theory**

**Course Code: MED-216**

**Credits: 3(2L+1T)**

Objectives: The students will be able to

- Enhance quality of syllabus, after understanding of curriculum and concept of syllabus \analysis.
- Develop expertise/ specialize in curriculum theories, models and analysis of syllabus.
- Develop capabilities of theoretical understanding of curriculum as well as practical abilities to work in these areas.
- Understand appropriate text books, syllabus and other curriculum material.
- Understand the rationale behind teaching.

### **Unit I: Curriculum Theories**

- Major Characteristics of Curriculum Theory: - Logic Structure, conceptual structure, cognitive structure Empirical structure, Existential Structure.
- Meaning and nature of curriculum theory and curriculum models, difficulties in evolving curriculum theories.
- Approaches to curriculum theory: scientific- technical, humanistic, system.

- Models of curriculum development-inductive and deductive.
- Type of Curriculum in Elementary Level.
- Curriculum Theories: - Idealist, Realist, Naturalist, Pragmatic, Existential, conservatism Curriculum Theory.

### **Unit II: Analysis of Syllabus**

- Criteria for analyzing the syllabus
- Analysis of the syllabi for the elementary education in India
- Characteristics & Mechanism of the preparation of text book.

### **Pedagogical analysis, concept mapping.**

- Criteria for Text book Evaluation: - Physical Aspects, presentation of content and its organization in the text books

**a. Content and Organization of curriculum. 61**

**b. Methodology of development of curricular materials viz., textbooks, workbooks, teacher handbooks.**

### **Unit III: Model of Curriculum Evaluation**

- Objective model, Tradition Model, Illuminative Model, Decision-Making Model, Case study of portrayal Model, Research and Development Model, Professional Model.
- Parameters of Curriculum Evaluation- Curriculum Prescription, Evaluation Agency unit of evaluation, temporal context, Expected Impact of curriculum Evaluation.

### **Unit IV: Elementary Curriculums in India**

- Critical analysis of curriculum: concept, importance and process
- Study of different state (any three) curriculum
- Difference of curriculum among different type of school
- Curriculum Development in NCERT and SCERT

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  - W.F. Pinar (2004). *Understanding Curriculum*. New York, NY: Peter Lang Publishing, Inc., p. 78.
  - W.F. Pinar (2004). *Understanding Curriculum*. New York, NY: Peter Lang Publishing, Inc., p. 97.
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  - W.F. Pinar (2004). *Understanding Curriculum*. New York, NY: Peter Lang Publishing, Inc., p. 116-142.
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**Course Title: Advance Curriculum Theory**  
**Course Code: MED-216**

**Credit: 1**

**Practicum (any one of the following):**

- Critical study of existing school curriculum of state (at any level), preparing a training plan or design for the in service training or specified target group on a specified theme.
- Review of any school text book, in the light of physical aspects, presentation of content and its organization.
- Comparative study of status of elementary education in various state (at least four).
- Visit two schools, where different curricula are adopted and find out learning level or attain educational objective.

### **Specialization-III**

**Course Title: Policy, Planning and Financing of Education**

**Course Code: MED 217**

**Credits:**

**3(2L+1T)**

**Objectives of the Course:**

- To sensitize students to the factors affecting Educational Planning in India.
- To develop critical understanding of the dynamics of Educational Management.
- To examine the process and procedures related to financing of Indian Education.
- To analyze the recent trends in Educational Management in India.

**Unit I: Indian Education: Planning and Policy**

- Concept, Scope and Dimensions of Educational Planning
- Approaches to Educational Planning
- Educational Planning at the National, State, District and Institutional Level
- Policy Formulation :Process and Implementation Analysis, Issues and Policy change at national and state level affecting Indian Education 64

**Unit II: Management of Education: Meaning and Scope**

- Nature, Scope and Functions of Educational Administration and Management.
- Management Styles: Autocratic, Democratic, Lazes faire.
- Theories of Management and their Implications for Education.
- Total Quality Management in Education: Concept, Stages of TQM, Need andRelevance in Indian Education.

**Unit III: Financing of Education**

- Education as Investment
- Financing of Education in India since Independence
- Sources of Finance
- Budgeting of Education: Types and Procedures
- Provisions of Financing Education in the 12<sup>th</sup> Five Year Plan

#### **Unit IV: Recent Trends in Educational Management in India**

- Globalization and Internationalization and their Impact on Educational Policy
- Decentralized Planning and Management: Problems and Issues
- Institutional Autonomy and Accountability
- Assessment and Accreditation in Education: Concept Role of ISO, QCI, NAAC.

#### **References:**

- Blaug. Mark (1972): An Introduction to Economics of Education, Allen lane. London, Penguin. Cohn E and T.
- Gaske (1989), Economics of Education, Pregamon Press, London.
- Coombs, P.H and Hallak.J (1988) Cost Analysis in Education: A Tool for Policy and Planning, Baltimore: John Hopkins Press.
- G. Psacharopoulos (1987): Economics of Education: Research and Studies, NewYork: Pergamon Press.
- Mehrotra, Santosh(2006) The Economics of Elementary Education in India, The Challenge of public finance,private provision and household costs, sage publication,New Delhi.

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#### **Course Title: Policy, Planning and Financing of Education**

**Course Code: MED 217      Credits: 1**

#### **Practicum**

- Visit any Govt. / private school to study financial resources of the schools, giving suggestions for enhancement of the resources.
- Through internet surfing of literature review find out chronologically financial resources of elementary school/education.
- Analyze similarities & differences of thoughts of Indian & western economists on economics of education.
- Preparation of budget for a school
- Preparation of a blue print for expenditure control in a school.
- Preparing a report on the existing status of the secondary school teachers, method of recruitment and salary structure.
- Draft a report on Financial Contribution of community to school and prepare a suggestive action plan /strategy for enhancement.
- Seminar on Models of development based on free market economies.
- Poster designing competition on Central and state level expansion on Elementary Education & girl education

**Course Title: Policy, Planning and Financing of Education**

**Course Code: MED 217**

**Credits:**

**3(2L+1T)**

**Objectives of the Course:**

- To sensitize students to the factors affecting Educational Planning in India.
- To develop critical understanding of the dynamics of Educational Management.
- To examine the process and procedures related to financing of Indian Education.
- To analyze the recent trends in Educational Management in India.

**Unit I: Indian Education: Planning and Policy**

- Concept, Scope and Dimensions of Educational Planning
- Approaches to Educational Planning
- Educational Planning at the National, State, District and Institutional Level
- Policy Formulation :Process and Implementation Analysis, Issues and Policy change at national and state level affecting Indian Education 64

**Unit II: Management of Education: Meaning and Scope**

- Nature, Scope and Functions of Educational Administration and Management.
- Management Styles: Autocratic, Democratic, Laissez faire.
- Theories of Management and their Implications for Education.
- Total Quality Management in Education: Concept, Stages of TQM, Need and Relevance in Indian Education.

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- Education as Investment
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- Assessment and Accreditation in Education: Concept Role of ISO, QCI, NAAC.

**References:**

- Blaug. Mark (1972): An Introduction to Economics of Education, Allen lane. London, Penguin. Cohn E and T.
- Gaske (1989), Economics of Education, Pergamon Press, London.
- Coombs, P.H and Hallak.J (1988) Cost Analysis in Education: A Tool for Policy and Planning, Baltimore: John Hopkins Press.
- G. Psacharopoulos (1987): Economics of Education: Research and Studies, New York: Pergamon Press.
- Mehrotra, Santosh(2006) The Economics of Elementary Education in India, The Challenge of public finance,private provision and household costs, sage publication,New Delhi.

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**Course Title: Policy, Planning and Financing of Education**

**Course Code: MED 217 Credits: 1**

**Practicum**

- Visit any Govt. / private school to study financial resources of the schools, giving suggestions for enhancement of the resources.
- Through internet surfing of literature review find out chronologically financial resources of elementary school/education.



- Analyze similarities & differences of thoughts of Indian & western economists on economics of education.
- Preparation of budget for a school
- Preparation of a blue print for expenditure control in a school.
- Preparing a report on the existing status of the secondary school teachers, method of recruitment and salary structure.
- Draft a report on Financial Contribution of community to school and prepare a suggestive action plan /strategy for enhancement.
- Seminar on Models of development based on free market economies.
- Poster designing competition on Central and state level expansion on Elementary Education & girl education

**Course Title: Issues, Planning and Policies of Elementary Education**

**Course Code: MED219**  
**(2L+1T)**

**Credits: 3**

**Objectives: The students will be able to**

- Gain insight into the vision and mission of Elementary Education in the country.
- Develop understanding for enhancing learner's achievement.
- Reflect on various concerns of elementary education
- Gain insight into factors promoting success and participation in quality in elementary education.
- Develop understanding about quality dimensions of elementary education
- Promote understanding of vision and mission of elementary education.
- Examine the existing reports to gain insight into concerns of elementary education.
- Reflect on various issues related with elementary education.
- Understand about the policies and programmes of elementary education
- Contribute to reform the elementary education system of India.

**Unit I: Vision and mission**

- Vision and Mission of Elementary Education
- School Systems across the States
- 12th Five-Year Plans –Objectives, key issues and focus.
- Constitutional Provisions, Right to Education and its implications
- Quality Assurance in Elementary Education
- Constitutional provisions regarding role of central and State Govts. For providing elementary education.

**Unit II: Concerns in Elementary Education**

- School Effectiveness, Classroom Climate and Teacher Attributes, Joyful learning, Order and Discipline, Law and Order in the Society and its Effect on School, quantity & quality of trained teachers. Quality of Elementary Education.
- Problems of equity and equality of opportunities.
- Management of Resources: Manpower Planning, Recruitment; Budget Constraints Planning for School
- Inspection, Supervision and Monitoring.
- Innovative Approaches: Activity Based learning Experiment

**Unit III: Policies & Programs of Elementary Education**

- District Primary Education Programme-goals and strategies.
- Minimum Levels of Learning

- SarvaShikshaAbhiyan& RTE Act 2009- goals and specific programme interventions at national level and in respective states to improve access, enrolment, retention/participation and achievement. Problems of wastage and stagnation.
- Monitoring, research and evaluation of specific schemes like mid-day meals, establishments of VEC and different incentive schemes and achievement levels.

#### **Unit IV: Financing and Planning of Elementary Education**

- Meaning, nature and scope
- Economic development and financing of education
- Financing of education in India: Centre- State relationship, mobilization of resources
- Cost Benefit Analysis in Education
- RTE Act 2009-analysis and implications for curriculum planning, teaching methodology and evaluation.

#### **References:-**

- Bruns, Barbara; Minqat, Alain and Rakotomalala, Ramahatra (2003). Achieving Universal Elementary Education by 2015. A Chance for Every Child. World Ban Publications.
- De, Anuradha&Dreze, Jean (1999). Public Report on Basic Education In India. Oxford University Press. USA. 70
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- Singhal, R.P. (1983) Revitalizing School complex in India, New Delhi. 71
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- Tilak, J.B. (1992) Educational Planning at gross roots, New Delhi

**Course Title: Issues, Planning and Policies of Elementary Education**

**Course Code: MED-219**

**Credit: 1**

**Practicum (any one of the following):**

- Preparation of research design on a theme, discipline.
  - Students will be required to critically analyze any one of the following reports: Annual Status of Education Report (ASER); Achievement surveys; PROBE; Pastiche Report on Education; Global Monitoring; Report of UNESCO
  - Write a report on Criteria of resource mobilization and resource utilization
  - Cost analysis in Education
  - Each student is required to prepare and present in a seminar a status report on economic development & financing of education.
  - Visit a school for reporting on access, and enrolment/ retentions of girl students and give suggestions for improvement.
  - Critical Analysis of Research Studies on programs and policies related to elementary education.
  - Conduct a play in school to generate awareness among students & teachers on Child Right.
  - Case study of a school or some innovative practice under SSA.
- .....

**Course Title: Educational Technology**

**Course Code: MED-218**

**Credits: 3**

**(2L+1T)**

**Objectives: The students will be able to**

- Appreciate the relevance of Information and Communication Technology in education.
- Develop an understanding of Media Technology and Instructional System for use in education.
- Acquaint with the nature, forms, research trends and applications of Educational Technology.

**Unit -I: Instructional Technology**

- Educational Technology (E.T.): Historical development, Evolution, Concept, Types and Scope.
- Teaching: different concepts and their implications.
- Various levels of Teaching and Learning.
- Instructional Theory: Concept, nature and types, with special reference to Cognitive Construct Theories (Bruner and Ausubel), Task Analysis Theory, Systems Approach and Information Processing Theory.
- Instructional Procedures: Teaching of Concepts and Principles. Teaching for problem solving.
- Models of Teaching: Concept, nature and major types, with special reference to CAM, AOM, ITM (Suchman), Jurisprudential Inquiry.

**Unit- II: Instructional Media and Theory**

- Communication: (i) concept, process and components: Unidirectional and interactive communication. (ii) Teaching-learning as a communication process, factors influencing classroom communication.
- Media: Concept, characteristics, uses and limitations of various media. Media-selection and integration, Multi-media packages and their uses in formal, non-formal and distance education. Media development policy, programmes and strategies.

**Unit- III: Instructional Design**

- Instructional Design: Concept and components. Individualized Instruction (Programmed instruction, Keller's plan, Mastery learning), small-group instruction, Large-group instruction.
- Teacher Behavior Modification: Micro-teaching, Simulation, Interaction Analysis, Competency Based Teacher Education.
- Open/Distance learning systems –Concept, need characteristics and scope, nature of learning materials, evaluation and feedback.

#### **Unit IV: Recent Trends and Research in Educational Technology**

- Research in Educational Technology -trends and priority areas.
- Information Technology in Education
- Development of Teaching Learning Material, Development of self-learning material and audio video material
- Interactive multimedia and their use.
- Role of CIET, UGC, IGNOU etc. in promoting education technology

#### **References:**

- Alexis, Leon & others (1999). Fundamentals of Information Technology. New Delhi: Vikas Publishing House Pvt. Ltd.
- Babola, Danial T. (1998). Microsoft World. New Delhi: Prentice Hall of India Pvt. Ltd. 89
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- Kovalchick, Anna and Dawson, Kara (2005). Encyclopedia of Education and Technology: New Delhi. Vol 1 and 2 Pentagon Press.
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- Kumar, K. L., (1996). Educational Technology: New Delhi. New Age International (P) Ltd.
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#### **Course Title: Educational Technology**

**Course Code: MED 218**

**Credits: 1**

#### **Practicum (anyone of the following):**

- Designing an instructional programme based on Systems Approach.
- Preparation of instructional material based on CAM/ AOM/ITM/JIM.
- Preparation and use of instructional material for teaching at elementary/secondary/senior secondary levels of teaching and learning. Preparation of Instructional material for teaching of concepts/ principles/ problem solving for elementary/secondary/senior secondary levels.

#### **Specialization-IV**

**Course: Inclusive Education**

**Course Code: MED-222**

**Credits: 3(2L+1T)**

**Learning Objectives: The students will be able to**

- Understand concept, meaning and significance of inclusive education.
- Appreciate the need for promoting inclusive practice and the roles and responsibilities of the teachers.
- Develop critical understanding of the recommendations of various commissions and committees towards teacher preparation for inclusive education and special education
- Understand the nature of difficulties encountered by children
- Analyze special education, integrated education, mainstream and inclusive education practices.
- Identify and utilize existing resources for promoting inclusive practice.
- Develop a positive attitude and sense of commitment towards actualizing the right to education of all learners,
- Prepare a conducive teaching learning environment in varied school settings,
- Develop the ability to conduct and supervise action research activities,

#### **Unit I: Introduction, Issues& perspectives of Inclusive Education**

- Definition, concept and importance of inclusive education.
- Historical perspectives of inclusive education for children with diverse needs.
- Difference between special education, integrated education and inclusive education.
- Advantages of inclusive education for education of all children in the context of Right to Education.
- NCF-2005 and adaptation of teaching learning material

#### **Unit II: Policy Perspective**

- Recommendations of Indian Education Commission (1964-66).
- Scheme of Integrated Education for Disabled Children
- SSA
- Inclusive Education of Disabled at Secondary Stage (IEDSS).
- National Policy on Education (NPE, 1986-92).
- National Curriculum Framework, 2005 NCERT
- The Convention on the Rights of the Child (Article 23, 28, 29 a2, 3, 6 and 10 &12).
- The World Declaration on the Survival, Protection and Development of Children and the Plans of action (Outcome of the UNICEF World Summit for Children, (1990).
- Educational provisions in Person with Disability Act.
- Rehabilitation Council of India Act(1992).
- National Trust Act (1999).
- UN convention on the Rights of Persons With Disabilities.
- Promoting Inclusion Preventing Exclusion

- The National Trust for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act 1999.

#### **UNIT-III: Diversity in the classroom**

- Diversity -- Meaning and definition.
- Disability – Legal definition, discrimination.
- Giftedness.
- Concept, Nature, and Characteristics of Multiple Disabilities.
- Guidelines for adaptation for teaching/ practicing science, mathematics, social studies , languages, physical education yoga, heritage arts theatre, drama etc in inclusive settings.

- Utilization of records/ case profiles for identification, assessment, and intervention for inclusive classrooms.
- Techniques and methods used for adaptation of content , laboratory skills and play material

#### **Unit IV: Teacher Preparation and Inclusive Education**

- Review existing educational programmes offered in secondary school (general, special education).
- Skills and competencies of teachers and teacher educators for secondary education in inclusive settings.
- N.C.F 2005 and curriculum for teacher preparation and transaction modes.
- Roles, responsibilities and professional ethics of an inclusive education teacher and teacher educators.
- Evaluation and follow up programmes for improvisation of teacher preparation programmes in inclusive education programmes.
- Role of different national and international agencies {institutions, universities} in promoting inclusive education.

#### **References:-**

- Maitra,Krishna (2008):INCLUSION ISSUES AND PERSPECTIVES (For Teachers,Teachers' Educators and Parents) :Kanishka Publishers ,Distributors New Delhi-110002
- Ahuja. A, Jangira, N.K. (2002): *Effective Teacher Training; Cooperative Learning Based Approach: National Publishing house* 23 Daryaganj, New Delhi 110002.
- Jangira N.K. and Mani, M.N.G. (1990): *Integrated Education for Visually Handicapped*, Gurgaon, Old Subjimandi, Academic Press.
- Jha. M.( 2002) *Inclusive Education for All: Schools Without Walls*, Heinemann Educational publishers, Multivista Global Ltd, Chennai, 600042, India.
- RCI (2008).Status of Disability in India.New Delhi.
- Sharma, P.L. (1990) *Teachers handbook on IED-Helping children with special needs* N. C. E R T Publication.
- Sharma P.L (2003) *Planning Inclusive Education in Small Schools*, R .I E. Mysore

#### **Course: Inclusive Education**

**Course Code: MED 222 Credits: 1**

#### **Practicum (any one of the following):**

- Make a critical appreciation of Right to Education Act in the context of inclusive education.
  - Conduct a survey in the local area to ascertain the prevailing attitudes / practices toward social, emotional and academic inclusion of children with diverse needs.
  - Study & review any two national policies in the light of inclusive education.
  - Critical analysis of N. C. F 2005 for planning quality teacher preparation programme
  - Selecting appropriate areas of research.
  - Types of research needed for enhancement of learning.
  - Steps involved in planning and supervising research activities.
  - Recent trends in research - national and international level
  - Observation of inclusive teaching strategies and discussion.
  - Planning and conducting multi-level teaching in the DMS (two classes).
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- Identify suitable research areas in inclusive education.

- Visit to special schools for VI, HI, ID, CP, and Autism and prepare a list of tools for identification.
  - Observe an inclusive class at least five days and find out skills & competencies used by the teacher. Give suggestive strategy/plan of teaching for betterment.
  - Conduct a survey on the type of supportive service needed for inclusion of children with any disability of your choice and share the findings in the class.
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**Course Title: Peace Education**

**Course Code: MED 220**

**Credits:**

**3(2L+1T)**

**Learning Objectives:** The students will be able to

- Appreciate the current challenges of teacher education in context with the introduction of education for peace harmony.
- Develop skills among teacher trainees in human values, harmonious living with co-existence.
- Create awareness among student teachers for development of activities for peace and harmony education.
- Articulate and identify the activities & programmes for promoting peace and harmony.
- Understand Vedic Darshan of international work for promoting peace values.

**Unit I: Peace Education- Concept and Scope**

- Peace: Meaning, nature and its relevance relating to the present global scenario,
- Ideal vs Pragmatic definition of Peace.
- Different sources of peace: Philosophical, Religious, Social, Secular and Psychological.
- Classification and analysis of peace:- Individual and social, Positive and negative peace, concept, characteristics,
- Role of different organizations like UNESCO in Peace Education.
- Peace in the minds of men, culture of peace and non-violence, positive personality development.
- NCF 2005 recommendations on Peace Education : nurturing of knowledge, skills, attitude and values of a culture of peace for shaping individuals.

**Unit II: Peace Education- Agencies and Methods**

- Family and Home: first school of peace education
- Role of community, school, family and neighbors in peaceful values inculcation.
- Importance of co existence and harmonious living in pluralistic-multi cultural, multi religious and multi ethnic societies.
- Peace education –objectives, scope and its relevance: inculcating duty consciousness in individuals.
- Role of Peace educators as motivators, trainers and guides.
- Methods for peace education: introspection, imbibing values and application of principles in daily life.
- Ongoing researches in the field of peace education – present scenario and suggestions.

**Unit III: Education for International Peace & Understanding**

- Nationalism & Internationalism
- Needs for developing International Understanding & Peace.
- Guiding principles for education for International Understanding and peace: non-violence, conflict resolution, pacifism, international mediation and courts of justice and peace building.
- Barriers for developing International Understanding & Peace: just warism and terrorism.
- Recommendations of International Commission (Delor's Commission) on International Understanding & Education for Peace.

**Unit IV: Role of Educational Institutions in propagation of Peace Education**

- Schools programmes: United Nations programmes of peace in minds of men, culture of peace and learning ways to peace.
- Application of conflict resolution on individuals, society, national and international scenarios.
- Importance of Human rights as a duty
- Teaching about Human Rights.
- Teaching about other countries-History, Geography, Civics, Science& Literature.
- Co-curricular Activities- Drawing, Painting, Modelling, Handicrafts etc.
- Role of Teacher with respect to transaction of Peace Education

#### **References:**

- Bagchi, JyotiPrakash and Vinodteckchandani, (2005), "Value Education" University book House (P) Ltd. Chaura Rasta, Jaipur-302003
- Chitkara, M.G, (2009), "Education and Human values", A.P.H Publishing Corporation, Anrari Road, Darya Ganj, New Delhi-110002 .
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- Falk, Richard A.; Johansen, Robert C.; Kim, Samuel S., editors. Constitutional.
- Foundations of World Peace. Albany: State University of New York Press, 1993.
- Galtung, Johan. Peace by Peaceful Means: Peace and Conflict, Development and Civilization. London: SAGE Publications, 1996.
- Goldstein, Tara; Selby, David, editors. Weaving Connections: Educating for Peace, Social and Environmental Justice. Toronto: Sumach Press, 2000.
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- SathyaSai International Center for Human Values, New Delhi. Education for Human Values(2009).
- Singh, Dr. Suresh Pal, and AnyanaKaul and SaritaChoudary,(2010), " Peace and human rights education , A.P.H Publishing Corporation, Anrari Road, Darya Ganj, New Delhi-110002.
- UNESCO: Learning the treasure within, Delores Commission Report.

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**Course Title: Peace Education**

**Course Code: MED 220**

**Credit: 1**

**Practicum (Any one of the following):**

- Preparing a report on conflict management in a class room through peaceful negotiation.
- Analysis of the Delores's Commission report for conceptual understanding of the four the pillars.
- Reflecting and preparing a report on Conflict resolution in a classroom through Peaceful negotiation.
- Study of the Delors Commission Report for conceptual understanding of the four pillars.
- Preparing an activity chart for Primary/Secondary/Senior Secondary/Higher Education stage to impart Human Rights as a duty and peace education through the curriculum.
- A Book or Documentary Film review in the area of Peace and Human Rights education. Case study of a child suffering from bad habits.
- Observation of classroom situation and identification of factors promoting peace.
- Analysis of morning assembly programme of a school from the point of view of peace and harmony education.



- Debate on characteristics of teacher as peacemaker.
- Make your own programme (based on activities) to conduct cooperative games and education activities for inculcation of harmony in students.
- List out the resources for effective implementation of peace education programme.
- Workshop on *ChetnaVikasMulyaShiksha* for seven days. After workshop prepare a report on Human relationship in family and in community, classification of values.

**Course Title: Environmental Education**

**Course Code: MED 223**

**Credits: 3 (2L+1T)**

**Objectives: - The students will be to**

- Understand the relationship between Humans Beings and their Environment.
- Develop sensitivity towards Environmental Disaster Management.
- Acquire an understanding of the process of Environmental Education.
- Develop skills and competencies as teachers for Management of Environmental Awareness Programmes
- Acquire a critical understanding of the different curriculum transaction and evaluation strategies for environmental education.

**Unit- I: Environment, Initiatives for Protection and Disaster Management 96**

- Environment: Meaning & types Natural, Social & Economic environment: interdependence & interaction among them, Relationship between Man and Environment
- International Conferences For Environmental Protection:
- Stockholm Conference (1972), Rio Conference (1992) and Johannesburg Conference (2002)
- United Nations Environmental Programme (UNEP) –Objectives & Functions
- Environmental Disasters: meaning, natural & manmade disasters and their management, Natural Disasters and their Management: Earthquake, Volcano, Cyclones, Flood& Drought.
- Management of Pollution as a Manmade Disaster: Causes, effects & control of- Air pollution, Water pollution, Land pollution and Sound pollution

**UNIT-II: Education for Conservation of Natural Resources and Sustainable Development**

- Conservation of Natural Resources: Concept, need and Importance Ways of Conservation of Natural Resources: Refuse, Reuse, Recycle, Reduce, Replace, Restore, Regenerate, and Reshape.
- Environmental Movements: -*Chipko*, Silent Valley, *Narmada Bachao*.
- Role of Environmental Movements in Environmental Conservation
- Role of Education in Conservation of Natural Resources
- Sustainable Development: Meaning & dimensions ( natural, social & economic)
- Strategies For Sustainable Development: suggested in Agenda –Guiding Principles for Sustainable Development
- Environmental Impact Assessment (EIA) – meaning, steps, principles & importance of EIA in Sustainable Development
- Role of Environmental Education in Sustainable Development-Need of an Inter-disciplinary Approach.

**Unit -III: Environmental Education-Need and Scope**

- Environmental Education: Meaning, need and scope
- Need of Environmental Education for School Teachers and TeacherEducators

- Guiding Principles of Environmental Education
- Place of Environmental Education in National Curricular Framework (2000) given by NCERT and Environmental Education Curriculum Framework For Teachers and Teacher Educators (2005) given by NCTE.

#### **Unit -IV: Environmental Education- Transaction and Evaluation 97**

- Teaching – Learning Strategies For Environmental Education: Field visits, Experimentation, Demonstration, Observation, Group- Discussion, Dramatization and Games.
- Evaluation in Environmental Education Use of Observation,
- Self-reporting techniques (attitude scale, interview and questionnaire) and Projective Techniques in Environmental Education.
- Training For Environmental Education – (Preparing an Environmental Education Teacher), Major components of the Training Programme, Role of Central & State Government in Environmental Education
- Role of NGOs in Environmental Education (with reference to two National & two Local NGOs)
- Role of Media in Environmental Education – Print Media, Posters, Slides, Television, Radio and Computer (Internet)

#### **References:**

- DattaAmol K., (2000). Introduction to Environmental Science & Engineering. NewDelhi- 110 001: RajuPrimlani for Oxford & IBH Publishing, Co. Pvt. Ltd., 66, Janpath.
- Dayani, S. N., (1993). Management of Environmental Hazards. New Delhi: 110014.Vikas Publishing House, Pvt. Ltd. 576, Masjid Road, Jangpura.
- Iyer, Gopal (1996). Sustainable Development Ecological & Socio-cultural Dimension. New Delhi: Vikas Publishing House Ltd.
- James, George (1999). Ethical Perspectives on Environmental Issues in India. NewDelhi- 100 002: APH Publishing, Corporation, 5 Ansari Road, Darya Ganj,
- Karpagam, M. (1999). Environmental Economics. Sterling Publisher Pvt. Ltd.
- Mukherjee, Biswarp (1996). Environmental Biology, Tata-Mc-Graw, New Delhi: Hill, Publishing Co. Ltd.
- Nasrin, (1999). Environmental Education. New Delhi - 110 002: APH PublishingCorporation, 5 Ansari Road, Daryaganj.
- Rao, DigmurtiBhaskar (1998). Earth Summit, Discovery. New Delhi - 110 002.Publishing House, 4831/ 24, Ansari Road, Pralhad Street, Daryaganj.
- NCERT, (2000). National Curriculum Framework 2000. New Delhi: NCERT Press.
- NCTE, (2005). Environmental Education Curriculum Frame working for Teachers& Teacher Education. New Delhi: NCERT.

**Course Title: Environmental Education**

**Course Code: MED 223**

**Credit: 1**

**Practicum (any one of the following):**

- Preparation & use of an Evaluation Tool for measuring the attainment of the teaching objectives.
- Planning & Conducting an Environmental Awareness Programme for a class (5th to 12th std.) in any one school or college.

- Preparation and Use of a strategy for teaching Environmental Education at school level / college level.

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**Course Title: Educational, Vocational Guidance and Counselling**

**Course Code: MED 221**

**Credits: 3 (2L+1T)**

**Objectives: The students will be able to**

- Understand the basic principles of guidance & counseling and the application of the same to the process of education.
- Develop practical knowledge of the various techniques used in counselling.

#### **UNIT- I: Nature of Guidance**

- Concept, importance and areas of guidance –educational guidance, vocational guidance and personal guidance.
- Organization of guidance services in schools-need, principles and mechanism of organizing guidance functions, ethical and legal guidance.
- Guidance services.
- Occupational information- meaning and need, method of imparting occupational information, sources of occupational material in India.

#### **UNIT- II Planning and Organizing Guidance Programme**

- Group Guidance: Meaning, Scope, Principles, Types.
- Guidance for promoting self-discipline in a school: Causes for indiscipline, Anger Control, Yoga and Meditation for Self-Discipline, Self-Management.
- Understanding Programme Management: Personal, Finance and Facilities.
- Developing Guidance programme at Primary level, Middle level and Secondary & Senior Secondary level. 99
- Guidance for Children with Diversity: Children within Sensory and Motor Disabilities, Children with Learning Difficulties, Exceptional Children, Gifted Children, Children with Divergent Socio-Cultural Background.

- Guidance for Human Development and Adjustment.

#### **UNIT-III: Career Development and Vocational Guidance**

- Understanding the concept of work, career and vocation: preparing for future.
- Career development meaning and importance.
- Super's theory of career development.
- Theories of Career Choice and Development (Trait Theory, Theory of Occupational Choice).
- Career Development of Women: Current Status, educational Needs and problems, factors, process.
- Assessment and appraisal for Career development: Meaning, Purpose, Principles and Process.
- Job Analysis: Meaning, types and purposes of job Analysis.
- Placement Services: Meaning, functions and principles
- Follow up Service: Meaning, purposes and characteristics.

#### **UNIT -IV : Counseling-Meaning, Tools and Techniques of Assessment**

- Counseling-Meaning, Need and Principles
- Directive Counseling: Concept, Procedure, advantages and limitations.
- Non-Directive Counseling: Concept, Procedure, advantages and limitations.
- Eclectic Counseling: Concept, Procedure, advantages and limitations.

- Study of the individual, data collecting techniques of information.
- Standard and Non-standardized Techniques, Biographies, Rating Scale, Case Study, Questionnaire, Observation, Interview and Cumulative Records.

#### **References:**

- Agrawal J.C.: Educational Vocational Guidance and Counselling, Doaba House, NaiSarak, Delhi.
- Anatasi Anne: Psychological testing, New York, Mac Millan 1982
- Mennet M.E.: Guidance and Counselling in Groups, McGraw Hill book Company, 1963.
- Crites J.O.: Vocational psychology, New York, GMC Grow Hill Book Company 1968. 100
- Directorate general of Employment and Training (Occupational information Unit) Ministry of Labor, Employment and Rehabilitation, govt. of India, Co, New Delhi.
- Directorate General of Employment and Training Ministry of labor, Govt. of India, New Delhi.
- Gupta S.K.: Guidance and Counselling in Indian Education, Mittal Publication Pvt. Ltd.
- Swedish Mohan: Readings for Careers Teachers, NICER 1985.
- Kocheher S.K.: educational and Vocational Guidance in Secondary Schools, Sterling Publisher (P) Ltd. Delhi.
- Jones A.J.: principles of Guidance, McGraw Hill Book Co., New York.
- Jayawal S.R.: Guidance and Counselling. Prakashan Kendra Lucknow.
- Rogers C.R.: Client Centered Therapy, Mifflin.
- Rao, S.N: Counselling and Guidance, Tata McGraw Hill, Delhi.
- Central Institute for Research and Training in Employment Service (C.E.D.G.E. & T), Ministry of Labor and Rehabilitation, Govt. of India, New Delhi,- Handbook in Vocational Guidance,1972.
- Sarswat. K.R. Gaul, J.S.: Manual for Guidance Counsellors, NCERT, Delhi, 1993.

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#### **Course Title: Educational, Vocational Guidance and Counselling**

**CourseCode: MED 221 Credits: 1**

#### **Practicum (any one of the following):**

- Maintenance of Self -Appraisal reports with respect to Guidance Programme at Elementary/Secondary level.
- Conduct a Guidance and Counseling Programme at Elementary/Secondary level.
- Organizing a Job Fair/Career Fate for school children.

- Preparation and administration of any two tool that is Observation, Interview, Questionnaire etc. with respect to Guidance services at Elementary/Secondary level.
  - Preparation of Job resume for Self-enrichment.
- .....

#### **Compulsory Course Work**

**Course Title: Dissertation**

**Course**  
**Credits:4**

**Code:**

**MED-299**

- **Components of dissertation:-**writing of final report and submission of final Dissertation. Presentation and viva will be taken on submission of the final report.

# SCHOOL OF ELECTRONICS & ELECTRICAL ENGINEERING

## SCHEME FOR B. TECH. (EEE)

B. TECH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101B	Applied Mathematics – I	3	1	0	4
2	PH-103B	Applied Physics	3	1	0	4
3	CS-105B	Computer Programming	3	0	0	3
4	EN-107B	Communication Skills – I	3	0	0	3
5	CE-109B	Environmental Science and Ecology	2	0	0	2
6	EL-111B	Basics of Electrical and Electronics Engg	3	1	0	4
7	PH-151B	Applied Physics Lab	0	0	2	1
8	EN-153B	Communication Skills Lab – I	0	0	2	1
9	CS-155B	Computer Programming Lab	0	0	2	1
10	EL-157B	Basics of Electrical and Electronics Engg Lab	0	0	2	1
11	ME-159B	Workshop Practice – I	0	0	4	2
<b>Total</b>			<b>17</b>	<b>3</b>	<b>12</b>	<b>26</b>

B. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102B	Advanced Mathematics and Numerical Methods	3	1	0	4
2	EN-104B	Communication Skills – II	3	0	0	3
3	BA-106B	Engineering Economics and Industrial Management	3	0	0	3
4	EC-108B	Digital Electronics	3	1	0	4
5	CS-110B	Data Structures and Algorithm	3	0	0	3
6	EC-112B	Electrical Engineering Materials and Semi-Conductor Devices	3	0	0	3
7	MA-150B	Applied Numerical Methods Lab	0	0	2	1
8	EC-154B	Digital Electronics Lab	0	0	2	1
9	CS-156B	Data Structures and Algorithm Lab	0	0	2	1
10	EC-158B	Electrical Engineering Materials and Semi-Conductor Devices Lab	0	0	2	1
11	PD-191A	Co- Curricular Activities And Hobby Club	0	1	0	1

		<b>Total</b>	<b>18</b>	<b>3</b>	<b>8</b>	<b>25</b>
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### SCHEME FOR B. TECH. (EEE)

<b>B. TECH.</b>			<b>Semester</b>			<b>III</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	CS-114B	Data Base Management System	3	0	0	3
2	CS-201B	Object Oriented Programming using C++	3	1	0	4
3	EC-201B	Electro Mechanical Energy Conversion	3	0	0	3
4	EC-203B	Electromagnetic Theory	3	1	0	4
5	EC-205B	Analog Electronics & Circuits	3	1	0	4
6	EC-207B	Network Theory	3	1	0	4
7	CS-251B	OOPS using C++ Lab	0	0	2	1
8	EC-251B	Electro Mechanical Energy Conversion Lab	0	0	2	1
9	EC-255B	Analog Electronics & Circuits Lab	0	0	2	1
10	EC-257B	Network Theory Lab	0	0	2	1
11	HOT-201B	Hands on Training	0	0	4	2
		<b>Total</b>	<b>18</b>	<b>4</b>	<b>12</b>	<b>28</b>

<b>B. TECH.</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	EC-202B	Digital & Analog Communication	3	0	0	3
2	CS-202B	Computer Networks	3	1	0	4
3	EC-204B	Electronics Measuring Instruments	3	0	0	3
4	EC-206B	Signals and Systems	3	1	0	4
5	EC-208B	Control System	3	1	0	4
6	EC-210B	MOS IC's & Technology	3	0	0	3
7	EC-252B	Digital & Analog Communication Lab	0	0	2	1

8	CS-252B	Computer Networks Lab	0	0	2	1
9	EC-254B	Electronics Measuring Instruments Lab	0	0	2	1
10	EC-258B	Control System Lab	0	0	2	1
11	EC-260B	MOS IC's & Technology Lab	0	0	2	1
12	PD-293	Intra & Inter Personal Skills	0	0	2	1
<b>Total</b>			<b>18</b>	<b>3</b>	<b>12</b>	<b>27</b>

### SCHEME FOR B. TECH. (EEE)

<b>B. TECH.</b>			<b>Semester</b>			<b>V</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	EC-301B	Digital Signal Processing	3	1	0	4
2	EC-303B	Microprocessor & Microcontroller	3	0	0	3
3	EC-305B	Digital System Design	3	0	0	3
4	EC-307B	Microwave and Radar Engineering	3	0	0	3
5	EC-309B	Antenna & Wireless Communication	3	0	0	3
6	CS-305B	Python Programming	3	0	0	3
7	EC-351B	Digital Signal Processing Lab	0	0	2	1
8	EC-353B	Microprocessor & Microcontroller Lab	0	0	2	1
9	EC-355B	Digital System Design Lab	0	0	2	1
10	EC-357B	Microwave and Radar Engineering Lab	0	0	2	1
11	EC-360B	Minor Project	0	0	2	1
12	CS-355B	Python Programming Lab	0	0	2	1
<b>Total</b>			<b>18</b>	<b>1</b>	<b>12</b>	<b>25</b>

<b>B. TECH.</b>			<b>Semester</b>			<b>VI</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	EC-302B	Scientific Computing	3	0	0	3
2	EC-304B	Probability Theory and Stochastic Process	3	0	0	3
3	EC-306B	Broadband Network	3	0	0	3



4	EC-312B	Internet of Things	3	0	0	3
5	EC-314B	Digital Image and Video Processing	3	0	0	3
6	EC-322B	Real Time System	3	0	0	3
7	EC-362B	Internet of Things Lab	0	0	2	1
8	EC-364	Digital Image and Video Processing Lab	0	0	2	1
9	EC-356B	Broadband Network Lab	0	0	2	1
10	PD2-392B	Problem Solving Skills	0	0	2	1
<b>Total</b>			<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>

### SCHEME FOR B. TECH. (EEE)

<b>B. TECH.</b>			<b>Semester</b>			<b>VII</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	ECEL-403B	Electronics System Design	3	0	0	3
2	ECEL-413B	Energy Harvesting Technologies & Power Management for IOT devices	3	0	0	3
3	ECEL-417B	IOT Using RFID and microcontroller	3	0	0	3
4	ECEL-421B	Satellite Communication	3	0	0	3
5	ECEL-415B	Smart Grid Technologies	3	0	0	3
6	ECEL-453B	Electronics System Design Lab	0	0	2	1
7	ECEL-457B	IOT Using RFID and microcontroller Lab	0	0	2	1
8	ECEL 471B	Satellite Communication Lab	0	0	2	1
9	OEL CS-303C	BA-271A Human Resource Management/ (CS-303C Artificial Intelligence)	3	0	0	3
10	ECEW-403B	Electronics Workshop	0	0	4	2
11	EC-491B	Major Project	0	0	8	4
12	PDP-492	Professional Career Skill	0	0	2	1
<b>Total</b>			<b>18</b>	<b>0</b>	<b>20</b>	<b>28</b>

<b>B. TECH.</b>			<b>Semester</b>			<b>VIII</b>
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SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-483B	INTERNSHIP	0	0	32	16
2	EC-484B	SEMINAR	0	0	2	1
3	EC-485B	5G Technology	3	0	0	3
		<b>Total</b>	<b>3</b>	<b>0</b>	<b>34</b>	<b>20</b>

MA-101B	APPLIED MATHEMATICS-I	L-T-P	Credits
		3-1-0	4

**Objective-**The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Outcome:**

- CO1. Learn to apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- CO2. Learn the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- CO3. Learn the tool of power series and Fourier series for learning advanced Engineering Mathematics.
- CO4. Learn to deal with functions of several variables that are essential in most branches of engineering. The essential tool of matrices and linear algebra in a comprehensive manner.
- CO5. Understand the multivariable differential Calculus.

**UNIT 1Matrices:** Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, Skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

**UNIT 2Sequences and series:** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

**UNIT 3Calculus:** Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

**UNIT 4Calculus:** Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

**UNIT 5Multivariable Calculus (Differentiation):** Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

**TEXT BOOK/REFERENCE BOOKS:**

G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

PH-103B	APPLIED PHYSICS	L-T-P	Credits
		3-1-0	4

**Objective:** The core objective is to provide a coherent foundation of physics for all majors that are usually necessary to work in areas such as computer science, electronic industry, mechanical domains and communication technologies. The contents are based on the static and dynamic state of elementary physics resulting in the field theory and wave mechanics the matter.

**Course Outcomes:**

CO1: The students will learn scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, and lasers.

CO2: learn about generation of electromagnetic field.

CO3: Student will the application of laser technology

CO4: Learn the application of wave optics.

CO5: Learn the concepts of quantum mechanics

**1. ELECTROSTATICS AND MAGNETOSTATICS (12 lectures)**

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential, Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

**2. MECHANICS (8 lectures)**

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical Coordinates

**3. QUANTUM MECHANICS (8 lectures)**

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

**4. WAVE OPTICS (10 lectures)**

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.

Fraunhauffer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

**5. LASERS (8 lectures)**

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO<sub>2</sub>), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: monochromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

**SUGGESTED TEXT/REFERENCE BOOKS**

- (i) David Griffiths, Introduction to Electrodynamics.
- (ii) W. H. Hayt and J. A. Buck. Engineering Electromagnetics.
- (iii) Engineering Mechanics, 2nd ed. — MK Harbola.
- (iv) Introduction to Mechanics — MK Verma
- (v) Eisberg and Resnick, Introduction to Quantum Physics
- (vi) D. J. Griffiths, Quantum mechanics.
- (vii) A. Ghatak, Optics
- (viii) O. Svelto, Principles of Lasers

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

CS-105B	COMPUTER PROGRAMMING	L-T-P	Credits
		3-0-0	3

**OBJECTIVE:** To give basic knowledge of Computer Hardware, Software systems & internets

- 1. COMPUTER SYSTEMS:** Overview of Computer Systems, Evolution of Computer Systems, Generations of computers, Characteristics of Computer: speed, storage, Accuracy, Categories of computer: Micro Computers, Mini Computers, Main Frames, Super Computers, Computer Organization: Central processing unit, Arithmetic and Logic Unit, Control Unit, Memory System: Primary memory, secondary memory and Data Representation in a Computer System. Number system : decimal, Binary, Octal, Hexadecimal representation and conversion
- 2. PROGRAMMING LANGUAGES & OPERATING SYSTEM BASICS:** Software Basics: Application software, System Software, Utility Software, Programming languages: Low level languages, Machine language, Assembly language, Limitations of Low level languages, High Level languages, Translator, Assembler, Interpreter, Compiler, Operating System: Need of Operating System, Function of Operating System, Types of Operating System
- 3. NETWORK SYSTEMS, INTERNET & WEB:** Introduction to networking, Local and Wide Area Networks, communication media: wired and wireless, Network Topologies: Star, Ring, Bus, Networking devices: Switch, Hub, Bridge, Internet overview, Internet Architecture, The idea of hypertext and hyper media; how the browser works: MIME types, plug-ins and helper applications; XML, XHTML, XSLT and the W3C, Hosting and Domains:
- 4. HYPERTEXT MARKUP LANGUAGE:** The anatomy of an HTML document; marking up for structure and style: ordered and unordered lists, Structuring content with HTML using natural divisions, Marquee, Anchor Tag, Email Link; embedding

images and controlling appearance, table creation: Frames and Nesting, iframes, forms, Semantic elements of HTML5, HTML5 Form elements, Media tags in HTML5, HTML5 Data Storage

**5. COMPUTER SECURITY:** Security Threats: Intruders, Password Cracking, Different types of malicious Software: Virus, Worms, Trojan Horse, Prevention from malicious Software: Antivirus (Introduction)

**TEXT BOOKS:**

Computer Fundamentals: P. K. Sinha, BPB pub.

1. Fundamentals of Computer Science and Programming with C: A. K. Sharma, Dhanpat Rai Pub.
2. Uttam K. Roy, "Web Technology", Oxford Publication

**REFERENCE BOOKS:**

1. Computing Fundamentals & C Programming: E. Balaguruswamy, TMH.
2. Fundamentals of Computers: V Rajaraman, PHI

**COURSE OUTCOMES:**

On successful completion of this course students will be able to:

- Identify different application areas of computers.
- Distinguish hardware and software components of the computer system.
- Use Ms-windows operating system. Make use of the basic Microsoft office applications for office use.
- Identify information resources and services available on the Internet.
- Make use of search and retrieval services on subjects of their interest.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

EN-107	COMMUNICATION SKILLS-I	L T P	Cr
		3-0-0	3

**Objective-** Recognized different styles of communication and how to improve understanding and build rapport with others. Reflected on different methods of communication and decided when each is most suitable. Appreciated the role of body language and voice tone in effective communication. Communicated their message in an effective and engaging way for the recipient.

**Course Outcome:**

- CO1: Students will be able to understand and apply knowledge of human communication and language processes.
- CO2: Students will be able to understand and evaluate key theoretical approaches used in the interdisciplinary field of communication.
- CO3: students will be able to explain major theoretical frameworks, constructs, and concepts for the study of communication and language, summarize the work of central thinkers associated with particular approaches, and begin to evaluate the strengths and weaknesses of their approaches.
- CO4: Students will be able to understand the research methods associated with the study of human communication, and apply at least one of those approaches to the analysis and evaluation of human communication.
- CO5: Students will be able to communicate effectively orally and in writing.

**UNIT 1Vocabulary Building:** The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms and standard abbreviations.

**UNIT 2Basic Writing Skills:** Sentence Structures, Use of phrases and clauses in sentencesImportance of proper punctuation, creating coherence, organizing principles of paragraphs in documents, Techniques for writing precisely, Jane Austen: *Pride and Prejudice* (novel)

**UNIT 3Identifying Common Errors in Writing:** Subject-verb agreement Noun-pronoun agreement Misplaced modifiers, Articles, Prepositions, Redundancies Clichés

**UNIT 4Nature and Style of sensible Writing:** Describing, Defining, Classifying, Providing examples or evidence, writing introduction and conclusion

**UNIT 5Writing Practices:** Comprehension Précis Writing, Essay Writing, Charles Dickens: *Oliver Twist* (novel).**Oral Communication:** (This unit involves interactive practice sessions in Language Lab) Listening Comprehension Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues communication at Workplace, InterviewsFormal Presentations

#### Suggested Readings:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS13	PSO14
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1

CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-
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CE-109B	ENVIRONMENTAL SCIENCE AND ECOLOGY										L T P		Cr
											2 -0 -0		2

**Objective-** Creating the awareness about environmental problems among people. Imparting basic knowledge about the environment and its allied problems. Developing an attitude of concern for the environment. Motivating public to participate in environment protection and environment improvement.

**Course Outcomes:**

- CO1. Enable to analyze the national and global environmental issues relating to atmosphere, water, soil and land use, biodiversity, and natural resources (global warming, climate change, mineral extraction and energy resources, environmental impact assessment and environmental audit)
- CO2. Enable to understand environmental politics in contemporary India, and issues in global environmentalism
- CO3. Investigate the agenda of environmental agencies
- CO4. Demonstrates the relationship between types of contaminants and effect on human health.
- CO5. Learn skills to analyze case studies on, industrial pollution and global warming.

**UNIT 1THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

**UNIT 2NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**UNIT 3ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

**UNIT 4BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.



**UNIT 5 ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management –floods, earthquake, cyclone and landslides.

**UNIT 6 SOCIAL ISSUES AND THE ENVIRONMENT:** Water conservation, rain water harvesting, watershed management; climate change, global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

**UNIT 7 HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, population explosion – family welfare programmes; role of information technology in environment and human health; case studies, Chipko movement, Sardar Sarovar dam, mining and quarrying in Udaipur, salinity and water logging in Punjab, Haryana and Rajasthan, Bhopal gas tragedy, Chernobyl nuclear disaster, arsenic pollution in ground water.

#### TEXT BOOK

1. Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition, New Age International Publishers, 2004

#### REFERENCE BOOKS

1. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
2. Bharucha Erach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
3. Brunner R. C., “Hazardous Waste Incineration”, 1st Edition McGraw Hill Inc., 1989.
4. Clark R.S., “Marine Pollution”, 1st Edition Clanderson Press Oxford, 1989
5. Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., “Environmental Encyclopedia”, 2nd Edition, Jaico Publ. House, 2001.
6. De, A. K., “Environmental Chemistry”, 2nd Edition, Wiley Eastern, 1989
7. Jadhav, H. and Bhosale, V.M., “Environmental Protection and Laws”, 1st Edition, Himalaya Pub. House, Delhi, 1995.
8. McKinney, M.L. and Schocl. R.M., “Environmental Science Systems & Solutions”, 2nd Edition, Web enhanced edition, 1996.
9. Rao M.N. and Datta, A.K., “Waste Water Treatment”, 2nd Edition, Oxford & IBH Publ.Co., 1987.
10. Sharma B.K., “Environmental Chemistry”, 2nd Edition, Goel Publ. House, Meerut, 2001
11. Trivedi R.K. and Goel, P.K., “Introduction to Air Pollution”, 2nd Edition, Techno-science Publications, 1996

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Cos														
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1

CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-
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EL-111B	BASIC OF ELECTRICAL AND ELECTRONICS ENGINEERING	L T P	Cr
		3-1-0	4

**OBJECTIVE:** To understand and analyze basic electric and magnetic circuits

To study the working principles of electrical machines and power converters.

To introduce the components of low voltage electrical installations.

**COURSE OUTCOMES:**CO1: Students are able to understand and analyze basic electric and magnetic circuitsCO2: Students are able to understand the working principles of electrical machines and power convertersCO3: Learn the application of Power convertors.

**Unit 1: DC Circuits Electrical** circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton and maximum power transfer Theorems.

**Unit 2: AC Circuits** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real

power, reactive power, apparent power, power factor. Analysis of single-phase ac circuitsconsisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phasebalanced circuits, voltage and current relations in star and delta connections.

**Unit 3: Transformers**Construction, working principle of transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and its comparison with ordinary transformer.

**Unit 4: Electrical Machines**Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

**Unit 5: Power Converters & Electrical Installations** DC-DC converters and AC-DC converters, Switches, Fuses, MCBs, Earthing and its types, Important Characteristics for Batteries and battery backup. Elementary calculations for energy consumption, power factor improvement.

#### **Suggested Text / Reference Books**

(i) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

(ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

(iii)L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press,2011.

(iv) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

(v) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

#### LEARNING OBJECTIVES:

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

PH-151B	APPLIED PHYSICS LAB	L-T-P	Credits
		0-0-2	1

**Course Objective** The present course is aimed to offer a broad aspect of those areas of Physics, which are specifically required as an essential background to all engineering students for their studies in higher semesters.

#### Course Outcomes:

CO1: The students will have sufficient scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, and lasers.

CO2: Learn about resolving power of Microscope.

CO3: Learn about applications of optical fiber.

CO4: Learn about LCR circuit applications.

#### LIST OF EXPERIMENTS:

- 1) To study response curve of a series LCR circuit.
- 2) To determine the Planck's constant using LEDs.
- 3) To determine the Rydberg's constant of Hydrogen atom.
- 4) To find the refractive index and Cauchy's constants of a prism.
- 5) To find the wavelength of light by Newton's rings experiment.
- 6) To determine the thickness of a thin wire by interference.

- 7) To determine the wavelength of LASER using diffraction grating.
- 8) To determine the resolving power of a telescope.
- 9) To find the numerical aperture of an optical fiber cable.
- 10) To find the wavelength of light using Michelson's interferometer.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

EN-153B	COMMUNICATION SKILLS LAB-I	L T P	Cr
		0-0-2	1

**OBJECTIVE:** To expose the students to a variety of self-instructional learnerfriendly modes of language learning. To enable them to learn better pronunciation through stress on word accent, Intonation and rhythm and to increase vocabulary

#### **COURSE OUTCOMES:**

- CO1. Students learn to use the basic concepts of communication in an organised set up and social context
- CO2. Learn resume /CV preparation, report writing, format making etc. and to improve writing skills.
- CO3. **Learn** body language a presenter
- CO4. Learn to create network at meetings, college, or social activities.
- CO5. Learn levels of concentration and improves the conversational abilities of the reader.

#### **LIST OF PRACTICALS:**

1. Self-Introduction
2. Reading Skills
3. Speaking Skills
4. Comprehension
5. Pronunciation, Intonation, Stress and Rhythm
6. Common Everyday Situations: Conversations and Dialogues communication at Workplace
7. Interviews
8. Formal Presentations
9. Personality Development
10. Telephonic Conversation

**ORALCOMMUNICATION** (This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension

- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues communication at Workplace
- Interviews
- Formal Presentations

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<b>3</b>	<b>2</b>	2	2	1	-	-	-	-	-	2	2	1	1
CO2	<b>2</b>	<b>3</b>	1	1	1	-	-	-	-	-	1	2	1	-
CO3	<b>3</b>	<b>2</b>	3	1	-	-	-	-	-	-	2	2	-	-
CO4	<b>1</b>	<b>2</b>	1	2	-	-	-	-	-	-	2	1	2	1
CO5	<b>2</b>	<b>3</b>	3	3	-	-	-	-	-	-	1	2	-	-

<b>CS-155B</b>	<b>COMPUTER PROGRAMMING LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

EL-157B	BASIC OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L T P	Cr
		0-0-2	1

**Objective:** The objective of this course is to build basic concepts of electrical circuits. To understand network theorems and to build fundamental concepts in the design and implementation of different electrical circuit. To build basic concepts for the understanding of different electrical components and devices.

#### COURSE OUTCOMES:

- CO1. The Students will be able to learn Basic concepts of electrical circuits  
CO2. The Students will be able to learn Implementation of network theorems.  
CO3. Learn Characteristics of different electrical components  
CO4. Learn Application of circuit theory in electronics circuit

#### List of experiments / demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi – meter, oscilloscope. Resistors, capacitors and inductors.
2. Demonstration of cut – out sections of machines :
3. Torque speed characteristic of dc motor.
4. Parallel operation of single phase Transformer.
5. Open circuit & short circuit test on single phase transformer.
6. To verify the Thevenin's & Norton's theorem.
7. To verify the Superposition theorem.
8. To study frequency response of series & parallel RLC Circuit.
9. Load test on D.C. Shunt generator
10. Torque – speed characteristics of three phase Induction motor & direction reversal by change of phase sequence of connection.
11. To plot field current Vs Armature voltage characteristics of synchronous generator.

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

ME-159	WORKSHOP PRACTICE-I	L T P	Cr
		0-0-2	1

**OBJECTIVE** To provide an overview of the basic production techniques and allied / supporting techniques used to produce finished products from raw materials. In addition to theory, students will be given practical training on various basic production techniques. After going through this course, the students will be in a position to understand the working of a mechanical workshop.

1. **INTRODUCTION:** Basic manufacturing processes and safety in workshop.
2. **ENGINEERING MATERIALS:** Classification of materials—their general mechanical properties and their selection
3. **CASTING PROCESSES:** Sand casting process; pattern making; types of moulding sands, cores, mould making, melting and pouring of metal; Casting defects.
4. **MACHINING PROCESSES:** Production of components involving turning; facing; taper turning; milling; shaping; planning and drilling operations.
5. **METAL FORMING PROCESSES:** Sheet metal forming operations; shearing, bending, punching and blanking, forging processes as upsetting, drawing down, bending etc.
6. **JOINING PROCESSES:** Metal arc welding; gas welding; resistance welding; soldering and mechanical fastening processes.
7. **FITTING AND MAINTENANCE:** Study of fitting tools, marking tools and measuring instruments like micrometer, Vernier calipers and height gauge; introduction to some basic maintenance techniques/processes.

**TEXT BOOK** Raghuwanshi, B.S., “A course in Workshop Technology, Vol. I & II”, Dhanpatrai & Co.

**REFERENCE BOOK** Hazra & Chaudhary, “Workshop Technology Vol. I & II”, Asian Book Co.

## **NOTES**

1. In all sections of workshop, students will study about the tools used, different operations performed and main parts of the machine
2. Term final evaluation will be done on the basis of doing a practical job and viva-voce. There will be no theory paper on this subject.

### **JOBS TO BE DONE**

#### **A. Machine Shop**

1. To prepare a job on a lathe involving facing, turning, taper turning, step turning, radius making and parting off.
2. To prepare horizontal surface/ vertical surface/ curved surface/ slot or v-grooves on a shaper / planer.
3. To prepare a job involving side and face milling on a milling machine.
4. To prepare a job involving drilling and tapping of holes.

#### **B. Sheet Metal Work**

1. To draw layout, do marking and prepare a rectangular tray of sheet metal.
2. To draw layout, do marking and prepare a funnel of sheet metal.

#### **C. Foundry**

1. To prepare a single piece pattern mould, put metal in the mould and fettle the casting.
2. To prepare a split piece pattern mould.

#### **D. Welding**

1. To prepare joints (Lap and butt) by metal arc welding
2. To prepare welded joint by resistance welding

#### E. Fitting and Maintenance Jobs

1. Fitting jobs involving, chipping, filing, marking and measuring with precision instruments.
2. Maintenance and repair of common domestic appliances such as desert cooler, LPG stove, room heater, water tap, flush system, electric iron, scooter etc.

### SECOND SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	MA-102B	Advanced Mathematics and Numerical Methods	3-1-0	4
2	EN-104B	Communication Skills – II	3-0-0	3
3	BA-106B	Engineering Economics and Industrial Management	3-0-0	3
4	EC-108B	Digital Electronics	3-1-0	4
5	CS-110B	Data Structures and Algorithm	3-0-0	3
6	EC-112B	Electrical Engineering Materials and Semi-Conductor Devices	3-0-0	3
7	MA-150B	Applied Numerical Methods Lab	0-0-2	1
8	EC-154B	Digital Electronics Lab	0-0-2	1
9	CS-156B	Data Structures and Algorithm Lab	0-0-2	1
10	EC-158B	Electrical Engineering Materials and Semi-Conductor Devices Lab	0-0-2	1
11	PD-191A	Co- Curricular Activities And Hobby Club	2-0-0	2
				<b>26</b>

Course Code	Course Name	L-T-P	Credit
MA-102B	Advanced Mathematics & Numerical Methods	3-1-0	4

**Unit-1 Interpolation and Approximation** Newton forward interpolation, Newton backward interpolation for equal intervals, Lagrange's interpolation and Newton divided differences interpolation for unequal intervals. Gregory-Newton forward, Gregory-Newton backward, Stirling and Bessel interpolation for central differences.

**Unit-2 Numerical Differentiation and Integration** Numerical Differentiation for unequal, equal and central differences formula, Numerical Integration by Trapezoidal methods, Simpson 1/3 rule, Simpson 3/8<sup>th</sup> rule, Gauss Quadrature formula.

**Unit-3 Solution of Ordinary Differential equations** Picard's method, Euler's method, Euler's, modified method, Runge-Kutta method, Milne P-C method, Adams-Bashforth method.



**Unit-4 Solution of system of linear equations** Direct methods (Cramer rule, Gauss elimination method, Gauss Jordan method, Doolittle's method, crout's method) Partition method, iteration method (Jacobi method, Gauss Seidel iteration method).

**Unit-5 Solution of nonlinear equation in one variable** Bisection method, Secant method, Regula falsi method, Newton Raphson method and their rate of convergence, Descartes Rule of signs, Birge-Vita method, Bairstow method for solution of polynomial equations.

**LIST OF RECOMMENDED BOOKS:**

1. Numerical Methods-Jain Iyenger Jain.
2. Numerical Analysis-Goyal-Mittal, Pragati Prakashan.

Course Code	Course Name	L-T-P	Credit
EN-104B	Communication Skills – II	3-0-0	3

**Unit-1:** Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

**Unit-2:** Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, localization.

**Unit-3:** Self Development and Assessment- Self assessment, Awareness, Perception and attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

**Unit-4:** Communication and Technical Writing- Public speaking, Group discussion, Oral presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

**Unit-5:** Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

**Text/Reference Books:**

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)

6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.

7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

Course Code	Course Name	L-T-P	Credit
BA-106B	Engineering Economics & Industrial Management	3-0-0	3

**Unit- 1: Introduction to Economics:** Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity.

**Unit-2: Theory of Production** production function, meaning, factors of production (meaning & characteristics of Land, Labor, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical

**Unit- 3 : Macro-Economic Indicators** Macro-Economic Indicators, Changes in the Gross Domestic Product (GDP), Gross National Product (GNP), Inflation, Employment & Unemployment Indicators, Currency Strength, Interest rates, Corporate Profits, Balance of Trade, Agricultural Production, Current Account balance, Foreign exchange, Foreign Trade, Industrial Production Index, Wholesale Price Index (WPI), Retail Price Index (RPI), Consumer Price Index (CPI).

**Unit-4 : Introduction to Management** Definitions, Nature, scope Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory.

**Functions to Management:** Planning, Organizing, Staffing, Directing, Controlling ( meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization.

**Unit-5: Introduction to Marketing & Production Management** Marketing Mix, concepts of marketing, demand forecasting and methods, market segmentation Introduction to Finance Management; meaning, scope, sources, functions

**Production Management: Definitions**, objectives, functions, plant layout-types & factors affecting it, plant location- factors affecting it. Introduction to Human Resource Management; definitions, objectives of manpower planning, process, sources of recruitment, process of selection

#### Reference Books:

1. Engineering Economics, R.Paneerselvam, PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
3. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
4. Principles and Practices of Management by L.M.Prasad.

EC-108B	Digital Electronics	LTP	Cr
		3-1-0	4

**OBJECTIVE** Modern world deals with digital conditioning of various signals. Digitally manipulating signals or using digital circuits have many advantages in terms of accuracy etc. This subject introduces concept of basic digital electronics: gates; combinational and sequential circuits and their designing

**Unit-1. Fundamentals of digital techniques:** Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess3; Gray; EBCDIC; ASCII; Error detection and correction codes.

**Unit 2. Combinational design using gates:** Design using gates; Karnaugh map and Quine Mccluskey methods of simplification. Combinational design using msi devices: Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers for display devices.

**Unit 3. Sequential circuits:** Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.

**Unit 4. Digital logic families:** Switching mode operation of p-n junction; bipolar and MOS. devices. Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

**Unit-5. A/D and D/A converters:** Sample and hold circuit; weighted resistor and R -2 R ladder D/A Converters; specifications for D/A converters. A/D converters: successive approximation; counting type. Programmable logic devices: ROM; PLA; PAL; PEEL; GAL; FPGA and CPLDs.

**TEXT BOOK** Jain, R.P., “Modern Digital Electronics”, 4th Ed.; Tata McGraw Hill, 2003

#### REFERENCE BOOKS

1. Taub and Schilling, ”Digital Integrated Electronics”, Tata McGraw Hill,1997
2. Malvino and Leach; ”Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006
3. Mano, Morris, “Digital Design”, 3rd Edition, Prentice Hall of India,1994
4. Gupta and Singhal, “Digital Electronics”, 2nd Edition, Dhanpat Rai and Sons, 2000.
5. Wakerly, John F, ”Digital Design Principles and Practices”, 4th Edition, Prentice Hall of India, 2005

POsC os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

CS-110B	Data Structure & Algorithms	LTP	CR
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		<b>3 0 0</b>	<b>3</b>
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**Objective:** To relay the theoretical and practical fundamental knowledge of most commonly used algorithms.

**Course Outcomes:**

- CO1. Ability to analyze algorithms and algorithm correctness.
- CO2. Ability to summarize searching and sorting techniques
- CO3. Ability to describe stack, queue and linked list operation.
- CO4. Ability to have knowledge of tree and graphs concepts.

**UNIT-1 Introduction to data structures and running time:** Definition of data structures and abstract data types; linear vs. non-linear data structure; primitive vs. non-primitive data structure; static and dynamic implementations; arrays, 1,2-dimensional arrays, insertion & deletion in 1-D array; examples and real life applications. Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion.

**UNIT-2 Stacks and queues:** Stacks: definition, array based implementation of stacks,; examples: infix, postfix, prefix representation; conversions, applications; definition of queues, circular queue; array based implementation of queues.

**UNIT-3 Linked lists:** Lists; different type of linked Lists; implementation of singly linked list, linked list implementation of stacks and queues; implementation of circular linked list; applications.

**UNIT-4 Trees and graphs:** Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees: searching, insertion & deletion. Definition of undirected and directed graphs; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; graph traversal: breadth first traversal, depth first traversal; implementations and applications.

**UNIT-5 Sorting and searching algorithms:** Introduction, selection, insertions, bubble sort, efficiency of above algorithms; merge sort, merging of sorted arrays and algorithms; quick sort algorithm analysis, heap sort, searching algorithms: straight sequential search, binary search (recursive & non-recursive algorithms)

**TEXT BOOK**

1. A.K. Sharma – Data structure Using C, 2<sup>nd</sup> edition pearson 2013
2. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++ , Prentice Hall of India, 2009.

**REFERENCE BOOKS**

1. Aho A. V., Hopcroft J. E. and Ullman T. D., —Data Structures and Algorithms, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
2. Horowitz Ellis and Sahni S artaj, —Fundamentals of Data Structures, Addison-Wesley Pub, 1984.
3. Horowitz, Sahni and Rajasekaran, —Fundamentals of Computer Algorithms, 2007.

4. Kruse Robert, —Data Structures and Program Design in C, Prentice Hall of India, 1994
5. Lipschetz Jr. Seymour, —Theory & Problems of Data Structures, Schaum's Outline, Tata McGraw Hill
6. Weiss Mark Allen, —Data Structures and Algorithms Analysis in C, Pearson Education, 2000
7. Cormen T. H. et al., —Introduction to Algorithms, 2nd Edition, Prentice Hall of India, 2001.
8. Dasgupta Sanjay, Christos P. and Vazirani Umesh, —Algorithms, Tata McGraw Hill, 2008

#### WEB REFERENCES

[http://www.cs.auckland.ac.nz/software/AlgAnim/ds\\_ToC.html](http://www.cs.auckland.ac.nz/software/AlgAnim/ds_ToC.html)

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

EC-112B	Electrical Engineering Materials and Semiconductor Devices	LTP	Cr
		3-0-0	3

**OBJECTIVE:-**The objective of this course is to introduce the student to basic concept of semiconductor device operation based on energy bands and carrier statistics. It also provides the operation of p-n junctions and metal-semiconductor junctions. It extends this knowledge to descriptions of bipolar and field effect transistors, and other microelectronic basic devices. This course is intended for students who plan to study in the area of microelectronics or just have an interest in that area. This course emphasizes the fundamentals of materials and device operation. It is expected that the students taking this course will include ECE and non-EE majors. In this course, one will study semiconductor devices from a fundamental point of view emphasizing a thorough understanding of the mechanisms of device operation. It is expected that students who successfully complete the course will have an understanding of basic semiconductor devices sufficient to design transistors and diodes to particular specifications.

**Unit-1. Conducting materials:** Drift velocity, collision time; Mean free path; mobility; conductivity; relaxation time; factors affecting conductivity of materials; types of thermal conductivity; Wiedemann-Franz law; Super conductivity; applications.

**Unit-2 Dielectric materials:** Behavior of dielectric materials in static electric field; Dipole moments; Polarization; Dielectric constant; Polarizability, Susceptibility; mechanisms of polarization; behavior in alternating field; dielectric loss; loss tangent types of dielectric and insulating materials; electrostriction; Piezo-electricity.

**Unit-3 Magnetic materials:** Permeability; Magnetic susceptibility; magnetic moment; origin of magnetic dipole moment; angular momentum; Magnetization; Classification of magnetic materials-Para; Dia, ferro, antiferro; and ferri; Langevin's theory of dia; Curie-Weiss law; spontaneous magnetism; domain theory; Magnetosriction; eddy current and hysteresis losses; applications.

**Unit-4 Semiconductors:** Review of Si and Ge as semi-conducting materials; Continuity Equation; PN junction; Drift and Diffusion; Diffusion and Transition capacitances of P-N junction; breakdown mechanisms; ZENER diode. **OPTICAL PROPERTIES OF MATERIALS:** Optical properties of metals; semiconductors and insulators;

Phosphorescence; Luminescence; Phosphors for CRO; display material for LCD; LED; solar cells and photo-detectors.

**Unit-5 Semiconductor devices:** Brief introduction to Planar Technology for device fabrication; BJT; JFET; MOSFETS. POWER DEVICES: Thyristor; IGBT; VMOS; UJT; GTO; their working principles and characteristics.

**TEXT BOOK**

Dekker, A.J., “Electrical Engineering Materials”, 3rd Ed. Pentice Hall of India; 2009

**REFERENCE BOOKS**

1. Boylested and Nashelsky, “Electronic Devices and Circuit Theory”, Pearson. Education, 2009
2. Dutta Alok, “Semiconductor Devices and Circuits”, Oxford University Press, 2008
3. Streetman and Banerjee, “Solid State Electronic Devices”, Pearson, 2010
4. Millman and Halkias, “Electronic Devices and Circuits”, McGraw Hill, 1996
5. Gupta, J.B., “Electrical Engineering Materials and Semiconductor Devices”, Katsons, 2006

Course Code	Course Name	L-T-P	Credit
MA-150B	Applied Numerical Methods Lab	0-0-2	1

**List of Experiments: (Using C++ Software)**

1. Bisection Method.
2. Newton Raphson Method.
3. Secant Method.
4. Regulai Falsi Method.
5. LU decomposition Method.
6. Gauss-Jacobi Method.
7. Gauss-Siedel Method.
8. Lagrange Interpolation or Newton Interpolation.
9. Simpson’s rule.
10. Trapezoidal Rule

Course Code	Course Name	L-T-P	Credit
EC-154B	Digital Electronics Lab	0-0-2	1

**LIST OF EXPERIMENTS**

1. Study of TTL gates – AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR.
2. Design and realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer and Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R; J-K; T and D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design and verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.

9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
10. To design and realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND and NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

Course Code	Course Name	L-T-P	Credit
CS-156B	Data Structure and Algorithm Lab	0-0-2	1

#### LIST OF EXPERIMENTS

##### ARRAY OPERATIONS

25. Write a program to insert an element at given position in linear array
26. Write a program to insert an element in sorted array.
27. Write a program to delete an element from given position in linear array
28. Perform following operations on matrices using functions only
  - a) Addition b) Subtraction c) Multiplication d) Transpose

##### SEARCHING

29. Search an element in a linear array using linear search.
30. Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method

##### RECURSION

31. Write a program to compute factorial of given number using recursion
32. Write a program to solve Tower of Hanoi problem using recursion
33. Write a program to find power of given number using recursion

##### STACK & QUEUE

34. Write a program for static implementation of stack
35. Write a program for dynamic implementation of queue
36. Write a program for static implementation of circular queue
37. Write a program for dynamic implementation of queue
38. Write a program to evaluate a postfix operation

##### LINKED LIST

39. Create a linear linked list & perform operations such as insert, delete at end, at beg & reverse the link list
40. Create a circular linked list & perform search, insertion & delete operation
41. Create a doubly linked list & perform search, insertion & delete operation

##### TREE & GRAPH

42. Write program to implement binary search tree. (Insertion and Deletion in Binary Search Tree)
43. Write program to simulate the various tree traversal algorithms
44. Write program to simulate various graph traversing algorithms.

### **SORTING ALGORITHMS**

45. Write program to implement Bubble, Insertion & selection sort.
46. Write program to implement quick sort
47. Write program to implement merge sort
48. Write a program to implement heap sort

### **TEXT BOOK**

3. A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
4. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++ , Prentice Hall of India, 2009.

### **REFERENCE BOOKS**

4. R. S. Salaria -Data Structure Using C
5. Kruse Robert, —Data Structures and Program Design in C , Prentice Hall of India, 1994
6. Lipschitz Jr. Seymour, —Theory & Problems of Data Structures , Schaum's Outline, 2nd Edition, Tata McGraw Hill.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

Course Code	Course Name	L-T-P	Credit
EC-158B	Electrical Engineering Material and Semiconductor Devices Lab	0-0-2	1

### **LIST OF EXPERIMENTS**

1. To study V-I characteristics of diode, and its use as a capacitance.
2. Study of the characteristics of transistor in Common Base configuration.
3. Study of the characteristics of transistor in Common Emitter configuration.
4. Study of V-I characteristics of a photovoltaic cell.
5. Study of characteristics of MOSFET/JFET in CS configuration.



6. To plot characteristics of thyristor.
7. To plot characteristics of UJT.
8. To plot characteristics of diac & Triac.
9. Study of loss factor in a dielectric by an impedance bridge.
10. Study of photo-resist in metal pattern for planar technology.

Course Code	Course Name	L-T-P	Credit
PD-191B	Co-curricular Activity/Hobby Club	0-0-2	1

#### ABOUT THE CLUB

The Green club is a part of academic curriculum scheme of Lingaya's Vidyapeeth and taken up by the students of First Year so that they could get the first-hand knowledge of Environment and its sustainability. This club is born with a vision to make the campus green and Eco-friendly and educate the youth about the importance of sustainable development, outside of the campus.

**OBJECTIVE**

To make the Environment clean and green and pollution free.

#### ACTIVITIES OF THE CLUB

1. Colour coded dustbins for Recyclable and Non-Recyclable.
2. Work on renovating a unusual waste area/dump to provide value to the region.
3. Recycling of waste.
4. Create Blog of "Simply Green".
5. Water conservation day.
6. Reduce water usage.
7. Recycle waste water.
8. Reduce Power Consumption.
9. Cook Using Solar Cooker.
10. Rain Water Harvesting.
11. Tree planting.
12. Practical solution of ozone depletion.
13. Speech by a notable speaker/local environmentalist.
14. Quiz and GD on environmental issues
15. Debate on environmental issue
16. Collaborate with municipality and organic clean day.

17. Green march/marathon.

18. Cycle rally.

19. Zero food wastage awareness drive.

20. Writing articles and publicity them in the local newspapers.

21. Establishing link with local NGO's and works with them to save the degraded environment. 22. Zero waste campus.

### THIRD SEMESTER

SN	Course No.	Course Name	L-T-B	Credits
1	CS-114B	Data Base Management System	3-0-0	3
2	CS-201B	Object Oriented Programming using C++	3-1-0	4
3	EC-201B	Electro Mechanical Energy Conversion	3-0-0	3
4	EC-203B	Electromagnetic Theory	3-1-0	4
5	EC-205B	Analog Electronics & Circuits	3-1-0	4
6	EC-207B	Network Theory	3-1-0	4
7	CS-251B	OOPS using C++ Lab	0-0-2	1
8	EC-251B	Electro Mechanical Energy Conversion Lab	0-0-2	1
9	EC-255B	Analog Electronics & Circuits Lab	0-0-2	1
10	EC-257B	Network Theory Lab	0-0-2	1
11	HOT-201B	Hands on Training	0-0-4	2
				<b>28</b>

CS-114B	Data Base Management System	L T P	CR
		3 0 0	3

#### **OBJECTIVE:**

To provide knowledge about various organizations and management information systems, keeping in view the aspects of share ability, availability, evolvability and integrity

#### **PRE-REQUISITES**

Knowledge of data structures, discrete mathematical structure

#### **COURSE OUTCOMES:**

- CO1. Students will be able to solve mathematical equations.
- CO2. Students will be able to apply numerical methods in engineering.
- CO3. To know how to find the roots of transcendental equations.
- CO4. To learn how to interpolate the given set of values
- CO5. To understand the curve fitting for various polynomials

**Unit-1 Introduction:** What is database, Purpose of database system; advantages of using DBMS; database concept and architecture; data abstraction; data models; instances and schema; data independence; schema architecture; database languages; database administrator; database users

**Unit-2 Data modeling:** Entity sets attributes and keys, relationships (ER); database modeling using entity; type role and structural constraints, weak and strong entity types; enhanced entity-relationship (EER), ER diagram design of an E-R database schema; specialization and generalization

**Unit-3 Relational model:** Relational model: relational model -basic concepts, enforcing data integrity constraints, Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators; extended relational algebra operations, Calculus: Tuple relational calculus, Domain relational Calculus; Codd's rules.

**Unit-4 Database design and sql:** Database design process; relational database design, anomalies in a database; functional dependencies membership and minimal covers normal forms, multi-valued dependencies, join dependencies, inclusion dependencies; reduction of an E-R schema to tables; effect of de-normalization on database performance, Query-by-example (QBE), Introduction to SQL, basic queries in SQL, advanced queries in SQL, functions in SQL; basic data retrieval, aggregation, categorization, updates in SQLs; views in SQL.

**Unit-5 Transaction processing:** Desirable properties of transactions, implementation of atomicity and durability; consistent model, read only and write only model; concurrent executions, schedules and recoverability; serializability of schedules concurrency control; serializability algorithms; testing for serializability; precedence graph; concurrency control, deadlock handling - detection and resolution.

#### TEXT BOOK/ REFERENCE BOOKS:

1. Silberschatz A., Korth H. F. and Sudarshan S., "Database System Concepts", 6th edition, McGraw-Hill, International Edition, 2010
2. Steven Feuerstein, Bill Pribyl, "Oracle PL/SQL", O'Reilly Media, 4th Edition, 2005
3. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
4. Elmasri R. and Navathe S. B., "Fundamentals of Database Systems", 6th edition, Addison-Wesley, Low Priced Edition, 2010
5. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition, 2003
6. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
7. Hansen G. W. and Hansen J. V., "Database Management and Design", 2nd edition, Prentice- Hall of India, Eastern Economy Edition, 1999
8. Majumdar A. K. and Bhattacharyya P., "Database Management Systems", 5th edition, Tata McGraw- Hill Publishing, 1999
9. Looms, "Data Management & File Structure", Prentice Hall of India, 1989.

CS-201-B	Object Oriented Programming Using C++	L T P	CR
		3 1 0	4

#### OBJECTIVE:

Providing a sound conceptual understanding of the fundamental concepts of computing hardware, software, networking and services; build programming logic and thereby developing skills in problem solving using C++ programming language; Introduce the concept of object orientation and on how to handle data in different forms; Emphasize the concepts and constructs rather than on language features..

#### COURSE OUTCOMES:

- CO1. Understanding about conducting materials and their behaviour
- CO2. Study of dielectric and magnetic material and their losses and application
- CO3. Understand the current voltage characteristics of semiconductor devices,
- CO4. Study the optical properties of the materials
- CO5. Understand the characteristics of power devices

**UNIT-1 OBJECT ORIENTED CONCEPTS & INTRODUCTION TO C++:** Introduction to objects and object oriented programming, difference between procedure oriented & Object oriented programming; main feature of Object oriented programming: Class, Object, encapsulation (information hiding); Polymorphism: overloading, inheritance, overriding methods, abstract classes, access modifiers: controlling access to a class; method, or variable (public, protected, private, package); other modifiers; Basics of C++, Simple C++ Programs, preprocessors directives, Namespace, Memory management operators in C++, Inline function, default arguments, & reference types

**UNIT-2 CLASSES AND DATA ABSTRACTION:** Introduction; structure definitions; accessing members of structures; class scope and accessing class members; separating interface from implementation; controlling access function and utility functions, initializing class objects: constructors, using default arguments with constructors; using destructors; classes : const(constant) object and const member functions, object as member of classes, friend function and friend classes; using this pointer, dynamic memory allocation with new and delete; static class members & function; container classes and integrators; **UNIT-3 OPERATOR**

**OVERLOADING, TEMPLATE & EXCEPTION HANDLING:** Introduction; fundamentals of operator overloading; restrictions on operators overloading; operator functions as class members vs. as friend functions; overloading, <<, >> overloading unary operators; overloading binary operators. Function templates; overloading template functions; class template; class templates and non-type parameters; basics of C++ exception handling: try, throw, catch, throwing an exception, catching an exception, re-throwing an exception

**UNIT-4 INHERITANCE, VIRTUAL FUNCTIONS AND POLYMORPHISM:** Introduction, inheritance: base classes and derived classes, protected members; casting base-class pointers to derived-class pointers; using member functions; overriding base-class members in a derived class; public, protected and private inheritance; using constructors and destructors in derived classes; implicit derived-class object to base-class object conversion; composition vs. inheritance; virtual functions; abstract base classes and concrete classes; polymorphism; new classes and dynamic binding; virtual destructors; polymorphism; dynamic binding.

**UNIT-5 FILES AND I/O STREAMS:** Files and streams; creating a sequential access file; reading data from a sequential access file; updating sequential access files, random access files; creating a random access file; writing data randomly to a random access file; reading data sequentially from a random access file; stream input/output classes and objects; stream output; stream input; unformatted I/O (with read and write); stream manipulators; stream format states; stream error states.

## TEXT BOOK

1. Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008.
2. Scheldt, Herbert —C++: The Complete Reference , Tata McGraw Hill, 3rd Ed, 2008.

## REFERENCE BOOKS

1. Kamthane, —Object Oriented Programming with ANSI and Turbo C++ , Pearson Education.

2. Lafore, Robert, —Object Oriented Programming in Turbo C++ , The WAITE Group Press, 1994.
3. Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008.
4. Bhawe, —Object Oriented Programming with C++ , Pearson Education.

EC-201-B	ELECTRO MECHANICAL ENERGY CONVERSION	L T P	CR
		3 0 0	3

#### OBJECTIVE:

To study the working of different electrical machines.

#### COURSE OUTCOMES:

- CO1. Students learn to analyze three phase networks
- CO2. Students learn to analyze magnetic fields and circuits
- CO3. Students learn to analyze principles of electromechanical energy conversion
- CO4. Students learn to analyze performance of transformers
- CO5. Students learn to analyze performance of synchronous generators
- CO6. Students learn to analyze performance of induction motors

**UNIT-1 Magnetic Circuits and Induction:** Magnetic Circuits, Magnetic Materials and their properties, static and dynamic EMFs, force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses.

**UNIT-2DC MACHINES :** Basic theory of DC generator, brief idea of construction and working, EMF equation, load characteristics, basic theory of DC motor, concept of back EMF, torque and power equations, load characteristics, starting methods and speed control of DC motors, applications.

**UNIT-3SYNCHRONOUS MACHINE:** Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage Regulation. **SYNCHRONOUS MOTOR:** Starting methods, Effect of varying field current at different loads, V- Curves.

**UNIT-4Three Phase Transformer & Induction Machine:** Review of Single phase transformer. Three Phase transformer: Basics & operation. **Induction Machine:** Constructional features, Rotating magnetic field, Principle of operation Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, Induction generator & its applications.

**UNIT-5Introduction of Single phase Induction Motor, Repulsion motor. AC Commutator Motors:** Universal motor, single phase a.c. series compensated motor, stepper motors, servo motor.

#### Text Books:

1. D.P.Kothari & I.J.Nagrath, "Electric Machines", Tata Mc Graw Hill
2. Ashfaq Hussain "Electric Machines" Dhanpat Rai & Company

**Reference Books:**

1. P.S.Bimbhra, "Electrical Machines", Khanna Publisher
2. Fitzgerald, A.E., Kingsley and S.D. Umans "Electric Machinery", MC Graw Hill.

EC-203-B	ELECTROMAGNETIC THEORY	L T P	CR
		4 0 0	4

**OBJECTIVE:**

Equip the students with the fundamental understanding of electro-magnetic wave system. To lay the foundations of mathematical Maxwell equations, electrodynamic wave propagation and transmission lines.

**Course Outcomes**

- CO1. Explain and apply vector calculus to static and time varying electric-magnetic fields in different engineering situations.
- CO2. Explain and able to solve Electromagnetic Relation using Maxwell Formulae
- CO3. Examine the phenomena of electrodynamic wave propagation in unbounded media and its interfaces.
- CO4. Analyze and generalized the concepts of guided structures like transmission lines and their characteristics.
- CO5. Analyze wave propagation on metallic waveguides in modal form.

**Unit-1 Introduction:**

Vector Relation in rectangular; Cylindrical; Spherical and general curvilinear coordinate system, Concept and physical interpretation of gradient; Divergence and curl; Gauss's Divergence and Stoke's theorems.

**Unit-2 Electrostatics:**

Electric field intensity; flux density and polarization; Electric field due to various charge configurations. Potential functions and displacement vector, Gauss's law; Poisson's and Laplace's equation and their solution in rectangular coordinates; Uniqueness theorem; Capacitance and electrostatics energy; methods of electrostatics images; boundary conditions.

**Unit-3 Magneto statics:**

Magnetic field vector; Magnetic field intensity; flux density and magnetization, Bio-Savart's law; Ampere's law; Magnetic vector potential; Energy stored in magnetic field; Boundary conditions; Analogy between electric and magnetic field.

**Unit-4 Time varying fields:**

Faraday's law; Displacement currents and equation of continuity. Maxwell's equations; Uniform plane wave in free space; Reflections; refraction and polarization of UPW; surface impedance; standing wave ratio, Poynting theorem and power considerations.

**Unit-5 Electromagnetic fields:**

Generation – Electro Magnetic Wave equations – Wave parameters, Waves in free space, lossy and lossless dielectrics, conductors and Magnetic Materials and Skin effect.

**Theory of Transmission Line** -Transmission line as a distributed circuit; transmission line equation and parameters; characteristic impedance, smith chart.

### TEXT BOOK

1. Sadiku MH, “Principles of Electromagnetics”, Oxford University Press Inc, New Delhi, 2009

### REFERENCE BOOKS

1. Krauss, J.D., [Electromagnetics], Tata McGraw Hill, 5th Edition, 2005.
2. Jordan and Balmain, [Electromagnetic Waves and Radiating Systems], 4th Ed., Prentice Hall of India, 2004
3. William H Hayt and Jr John A Buck, “Engineering Electromagnetics” , Tata Mc Graw-Hill Publishing Company Ltd, New Delhi, 2008

EC-205-B	ANALOG ELECTRONICS & CIRCUITS	LTP	CR
		400	4

### OBJECTIVE

To show the students the physical picture of the internal behavior of semiconductor diode and its different type of circuit. Among these are rectifier; clipper; clamper; and filter. Also gives knowledge of internal behavior of transistor; FET and its application. Regulated power supplies. Step knowledge from semiconductor physics to devices; model; circuit and system .

### Course Outcomes:

At the end of this course students will demonstrate the ability to:

- CO1. Understand the characteristics of diodes and transistors
- CO2. Design and analyze various rectifier and amplifier circuits
- CO3. Design sinusoidal and non-sinusoidal oscillators
- CO4. Understand the functioning of OP-AMP and design OP-AMP based circuits Design ADC and DAC.

**UNIT-1 SEMICONDUCTOR DIODE:** Diode as a rectifier; switching characteristics of diode; Diode as a circuit element; the load-line concept.

**SEMICONDUCTOR DIODE CIRCUITS** : Half-wave and full wave rectifiers; clipping circuits; clamping circuits; filter circuits; peak to peak detector; voltage doublers and voltage multiplier circuits.

**UNIT-2 TRANSISTOR AT LOW FREQUENCIES:** Bipolar junction transistor :  $\pi$  characteristics; Ebers-moll model of transistor; hybrid model; h-parameters (CE; CB; CC configurations); analysis of a transistor amplifier circuits using h-parameters; emitter follower; Miller's Theorem ;Effect of Emitter by pass capacitor on low frequency response; Step response of an amplifier; frequency response of R-C coupled amplifier; pass band of cascaded stages; Multi stage CE Amplifier.

**UNIT-3TRANSISTOR AT HIGH FREQUENCIES:** Hybrid model; CE short circuit current gain; frequency response; alpha; cutoff frequency; gain bandwidth product; emitter follower at high frequencies.

**TRANSISTOR BIASING:** Operating point; bias stability; collector to base bias; self-bias; emitter bias; bias compensation; thermistor and sensistor compensation; thermal runaway.

**UNIT-4FIELD EFFECT TRANSISTORS:** Junction field effect transistor; MOSFET Enhancement and Depletion mode; V-MOSFET; Common source amplifier; source follower; biasing of FET; applications of FET as a voltage variable resistor (V V R).

**UNIT-5REGULATED POWER SUPPLIES:** Series and shunt voltage regulators; power supply parameters; three terminal IC regulators; SMPS.

### TEXT BOOK

1. Millman and Halkias, «Integrated Electronics», 2nd Edition, Tata McGraw Hill, 1998.

### REFERENCE BOOKS

2. Neamen, D.A., —Electronic Circuit Analysis and Design», 2nd Edition, Tata McGraw Hill, 2004.
3. Malvino, —Electronics Principles», 6th Edition McGraw Hill, 2003.
4. Schilling, Donald L. and Boylestad, Charles Belove and Nashelsky, —Electronics Circuits», 8th Edition, McGrawHill, 2005.
5. Bell, David A., —Electronic Devices and Circuits», 3rd Edition, Prentice Hall of India, 2007.
6. Motorstad, «Electronics Devices and Circuits», 2nd Edition, Prentice Hall of India, 2004.

EC-207-B	NETWORK THEORY	L T P	CR
		4 0 0	4

### OBJECTIVES:

Network Theory is a successful technique frequently used to plan, monitor and control the projects involving thousands of activities. To minimize project cost. . To minimize the project time. . To ensure optimum utilization of human and other resources. To ensure minimum conflicts and unnecessary delays.

**Course Outcomes:** At the end of this course students will demonstrate the ability to

- CO1.Understand basics electrical circuits with nodal and mesh analysis.
- CO2.Appreciate electrical network theorems.
- CO3.Apply Laplace Transform for steady state and transient analysis.
- CO4.Determine different network functions.
- CO5.Appreciate the frequency domain techniques.

### Unit 1:

Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactances, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.

### Unit 2:

Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.



**Unit 3:**

Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

**Unit 4:**

Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and Two four port network and interconnections.

**Unit 5:**

Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters.

**Text/Reference Books:**

1. Van, Valkenburg.; “Network analysis”; Prentice hall of India, 2000
2. Sudhakar, A., Shyammohan, S. P.; “Circuits and Network”; Tata McGraw-Hill New Delhi, 1994
3. A William Hayt, “Engineering Circuit Analysis” 8th Edition, McGraw-Hill Education

CS-251-B	OOPS Using C++ Lab	L T P	CR
		0 0 2	1

**Objectives:**

The objectives of the course are to have students identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.

**Course Outcomes:**

- CO1. Creating simple programs using classes and objects in C++.
- CO2. Implement Object Oriented Programming Concepts in C++.
- CO3. Develop applications using stream I/O and file I/O.
- CO4. Implement simple graphical user interfaces.
- CO5. Implement Object Oriented Programs using templates and exceptional handling concepts

**LIST OF EXPERIMENTS:****BASIC CONCEPT OF C++**

Write a program to show the concept reference type, call by reference & return by reference in C++

Write a program to show the concept of default arguments in C++

Write a program to show the concept of inline function

Write a program to show the concept of dynamic memory management in C++

Write a program to show the concept of function overloading

**CLASS & OBJECTS**

Write a C++ program to show the concept of class & object

Write A C++ program showing function taking objects as a arguments and function returning objects

Write C++ programs to show the concept of static data member & static member function

Write C++ program to show the concept of friend function

Write C++ program to show the concept of different type of constructor

Write C++ program to show the concept of destructor

### **OPERATOR OVERLOADING**

Write a C++ program showing overloading of unary operator using member function & friend function

Write a C++ program showing overloading of binary operator using member function & friend function

Write a C++ program showing overloading of << and >> operators

### **INHERITANCE**

Write a C++ program to show the concept of multilevel inheritance

Write a program to show the concept of multiple inheritance

Write a C++ program to show the concept of hybrid inheritance

Write a program to show the concept of virtual base class

### **DYNAMIC BINDING & VIRTUAL FUNCTION**

Write a C++ to show the concept of virtual function to implement dynamic binding

Write a C++ program to show the concept of pure virtual function & abstract class

### **FILES HANDLING**

Write C++ programs for creating, reading& writing sequential access file

Write C++ programs for creating, reading & writing random access file

### **TEMPLATES**

Write a C++ program to show the concept of class template

Write a C++ program to show the concept of function template

### **TEXT BOOK**

Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008

Schildt, Herbert —C++: The Complete Reference , Tata McGraw Hill, 3rd Ed, 2008.

## REFERENCE BOOKS

Kamthane, —Object Oriented Programming with ANSI and Turbo C++ , Pearson Education

Lafore, Robert, —Object Oriented Programming in Turbo C++ , The WAITE Group Press, 1994

Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008

Bhave, —Object Oriented Programming with C++, Pearson Education.

EC-251-B	Electro Mechanical Energy Conversion Lab	L T P	CR
		0 0 2	1

### Objectives:

To give information about conversion of electrical energy into mechanical energy and vice versa using electromagnetic fields, to explain different machines and generators, working principles, to build basis for more advanced studies in electrical machines and to introduce renewable energy resources.

### Course Outcomes:

CO1. Can explain the transformation of electrical energy into mechanical energy or vice versa using electromagnetic fields.

CO2. Explain the operation of DC motors and generators and analysis.

CO3. Explain the operation of transformers.

CO4. Know the operation of induction machines and generators.

CO5. Know the basic principles of renewable alternate current energy production.

### List of Experiments:

1. To perform no load and blocked rotor tests on a three phase squirrel cage induction motor and determine equivalent circuit.
2. To perform load test on a three phase induction motor and draw: (i) Torque -speed characteristics (ii) Power factor-line current characteristics
3. To perform no load and blocked rotor tests on a single phase induction motor and determine equivalent circuit.
4. To study speed control of three phase induction motor by Keeping V/f ratio constant
5. To study speed control of three phase induction motor by varying supply voltage.
6. To perform open circuit and short circuit tests on a three phase alternator and determine voltage regulation at full load and at unity, 0.8 lagging and leading power factors by (i) EMF method (ii) MMF method.
7. To determine V-curves and inverted V-curves of a three phase synchronous motor.
8. To determine  $X_d$  and  $X_q$  of a three phase salient pole synchronous machine using the slip test and draw the power-angle curve.
9. To study synchronization of an alternator with the infinite bus by using: (i) dark lamp method (ii) two bright and one dark lamp method

EC-255-B	ANALOG ELECTRONICS & CIRCUITS Lab	L T P	CR
		0 0 2	1

**OBJECTIVES:**

The objective of this laboratory is to link the theoretical concepts of different analog electronics circuits with practical feasibility thereby giving them a scope to learn basic electronics circuits and their different electrical characteristics in a better way.

**COURSE OUTCOMES:**

- CO1. Acquire basic knowledge of physical and electrical conducting properties of semiconductors.
- CO2. Develop the Ability to understand the design and working of BJT / FET amplifiers. 3. Able to design amplifier circuits using BJT s And FET's. and observe the amplitude and frequency responses of common amplifier circuits
- CO3. Observe the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies.
- CO4. Observe the effect of positive feedback and able to design and working of different Oscillators using BJTS.
- CO5. Develop the skill to build, and troubleshoot Analog circuits.

**LIST OF EXPERIMENTS**

1. Study the effect of voltage series; current series; voltage shunt; and current shunt feed- back on amplifier using discrete components.
2. Design and realize inverting amplifier; non-inverting and buffer amplifier using 741 Op Amp.
3. Verify the operation of a differentiator (ideal and practical) circuit using 741 op amp and show that it acts as a high pass filter.
4. Verify the operation of a integrator circuit (ideal and practical) using 741 op amp and show that it acts as a low pass filter.
5. Design and verify the operations of op amp adder and subtractor circuits.
6. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.
7. Design and realize using op amp 741; Sine wave oscillator.
8. To design and realize using op amp 741; triangular wave generator.
9. To design and realize using op amp 741; logarithmic amplifier and VCCS.
10. Study of Timer circuit using NE555 and configuration for nonstable and astblemultivibrator.
11. Realization of a V-to-I and I-to-V converter using Op-Amps.
12. To Study and construct class-A and class-B Power amplifier
13. To study and construct Active filters using Op amps.

EC-257-B	NETWORK THEORY Lab	L T P	CR
		0 0 2	1

**OBJECTIVES:**

To equip the students with the knowledge and techniques of analyzing Three phase electrical circuits. Students learn the concepts of Two-port Network parameters. . To introduce the concept of DC and AC transient analysis.

### **COURSE OBJECTIVES:**

- CO1. Learner will be able to apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
- CO2. Analyze AC and DC transient response of resistance, inductance and capacitance in terms of impedance.
- CO3. Analyze three phase circuits.
- CO4. Understand, and calculate the initial conditions of RL, RC circuits.
- CO5. To formulate, solve the differential equations for RL, RC, and RLC circuits and carry out the transient analysis.
- CO6. Understand, analyze and design prototype LC filters.

### **LIST OF EXPERIMENTS**

1. To calculate the 'Z' parameters of given two port network and verify the result experimentally
2. To calculate the 'Y' parameters of given two port network and verify the result experimentally
3. To calculate the 'ABCD' parameters of given two port network and verify the result experimentally
4. To calculate the 'Y' parameters of given two port network and verify the result experimentally
5. To verify the frequency response of low pass filter circuit.
6. To verify the frequency response of high pass filter circuit.
7. To plot a frequency response of Band pass filter and determine the 3 - db Bandwidth
8. To study the frequency response of a series R-L-C circuit
9. To study the frequency response of a series R-L-C circuit
10. Introduction to PSPICE.

<b>HOT-201B</b>	<b>Hands On Training</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>2</b>

**OBJECTIVES:** Toengage students in the learning process. As a result, students' attention and focus increases and they develop critical thinking skills and active participation in the learning process results in a much higher retention of learning.

### **COURSE OUTCOME:**

- CO1. More program material is retained
- CO2. Simulated learning is an engaging environment
- CO3. A hands-on learning environment develops critical thinking skills
- CO4. Real-world experience and knowledge from an instructor can go a long way
- CO5. Use of materials and equipment used on the job

### **ROBOTICS**

1. Introduction to Robotics.
2. Introduction to basic components of Robot.
3. Introduction to Basics of Electronics.
4. Introduction to Micro Controller & its features.
5. Introduction to PCB & Soldering techniques.
6. Demonstration & Hands on soldering of PCB.
7. Assembling of Robot of your choice

#### FOURTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	EC-202B	Digital & Analog Communication	3-0-0	3
2	CS-202B	Computer Networks	3-1-0	4
3	EC-204B	Electronics Measuring Instruments	3-0-0	3
4	EC-206B	Signals and Systems	3-1-0	4
5	EC-208B	Control System	3-1-0	4
6	EC-210B	MOS IC's & Technology	3-0-0	3
7	EC-252B	Digital & Analog Communication Lab	0-0-2	1
8	CS-252B	Computer Networks Lab	0-0-2	1
9	EC-254B	Electronics Measuring Instruments Lab	0-0-2	1
10	EC-258B	Control System Lab	0-0-2	1
11	EC-260B	MOS IC's & Technology Lab	0-0-2	1
12	PD-293	Intra & Inter Personal Skills	0-0-2	1

EC-202B	Digital & Analog Communication	L T P	CR
		3 0 0	3

**Unit 1:** Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

**Unit 2:** Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.

**Unit 3:** Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

**Unit 4:** Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

**Unit 5:** Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

#### **Text/Reference Books:**

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.

3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., "Principles of Communication Engineering" John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., "Digital Communication", Kluwer Academic Publishers, 2004.
6. Proakis J.G., "Digital Communications", 4th Edition, McGraw Hill, 2000.

**Course Outcomes:** At the end of this course students will demonstrate the ability to

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance.

<b>CS-202B</b>	<b>Computer Networks</b>	<b>L T P</b>	<b>CR</b>
		<b>4 0 0</b>	<b>4</b>

## OBJECTIVE

To have a fundamental understanding of the design, performance and state of the art of wireless communication systems, Topics covered include state of the art wireless standards and research and thus changes substantially from one offering of this course to the next

**PRE-REQUISITES:** Knowledge of computers hardware and software

**Unit1 OVERVIEW OF DATA COMMUNICATION AND NETWORKING:** Introduction; Data communications: components, data, direction of data flow, Protocols, Networks: type of connection, topology: Star, Bus, Ring, Mesh, Tree, categories of network: LAN, MAN, WAN: Internet: brief history, Layered architecture of networks, OSI reference model, Functions of each layer, services and protocols of each layer, TCP / IP reference model.

**Unit-2 PHYSICAL AND DATA LINK LAYER:** Transmission media: Guided media, unguided media switching: Circuit switching, packet switching, datagram switching. Error Detection and Correction: Types of errors, detection vs correction, cyclic codes, checksum. Framing: Flow and Error Control, Protocols: Stop &wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ.

**Unit3 MEDIUM ACCESS SUBLAYER** Random access: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Controlled Access: Reservation, Polling, Channelization: FDMA, TDMA, CDMA, IEEE Standards, Standard Ethernet, Changes in the standard, Fast Ethernet, Gigabit Ethernet

**Unit4 NETWORK LAYER:** Network Devices: Active and Passive Hubs, Repeaters, Bridges, Two and Three layer switch, Gateway. Internet Protocol, Transmission Control Protocol, User Datagram Protocol; IP Addressing, IP address classes, subnet addressing, DNS, Internet control protocols: ARP, RARP, ICMP.

**Unit5 TRANSPORT LAYER :** Process to process delivery, user datagram protocol, TCP services, features, TCP Connection, flow control, error control and congestion control; Congestion control, Quality of Service, WAN Technologies: Synchronous Digital Hierarchy (SDH) / Synchronous Optical Network (SONET); Asynchronous Transfer Mode (ATM) Frame Relay.

## TEXT BOOK

Tanenbaum Andrew S, —Computer Networks , 4th Edition, Pearson Education/Prentice Hall of India, 2003.

## REFERENCE BOOKS

1. Forouzan Behrouz A., —Data Communications and Networking , Tata McGraw Hill 2006.
2. Stallings William, —Data and Computer Communication , 5th Edition, Prentice Hall of India, 1997.
3. Fred Halsall, —Data Communications, Computer Networks and Open Systems , 4th edition, Addison Wesley, Low Price Edition, 2000
4. Fitzgerald Jerry, —Business Data Communications , Wiley, 2009.
5. Peterson Larry L. and Davie Bruce S., —Computer Networks – A System Approach , 3rd Edition, Morgan Kaufmann, 2003.
6. Tittel E. D., —Computer Networking , Tata McGraw Hill, 2002
7. Kurose James F. and Ross Keith W., —Computer Networking: A Top-Down Approach Featuring the Internet , 2nd Edition, Pearson Education, 2003.
8. Keshav S., —An Engineering Approach to Computer Networking , Addison-Wesley, 1997.
9. Comer D. E., —Internetworking with TCP/IP , Volume 1, 3rd Edition, Prentice Hall of India, 1995.

EC-204B	Electronics Measuring Instruments	L T P	CR
		3 0 0	3

**Course Objectives:** To present a problem oriented introductory knowledge of Electronic measurement techniques. To focus on the study different Instruments used for Electronic measurements.

### UNIT-1 MEASURING SYSTEM FUNDAMENTALS:

S.I. units, Absolute standards (International, Primary, Secondary & Working Standards), True Value, Errors (Gross, Systematic, Random); Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution & threshold). Classification of Instruments (Absolute and Secondary; Indicating, Recording and Integrating Instruments, Based Upon principle of operation); Block diagram and description of block of generalized instrument; 3 forces in electromechanical Indicating Instrument (Deflecting, Controlling and Damping forces).

### UNIT-2 ANALOG & DIGITAL MEASURING INSTRUMENTS:

Classification of analog instruments; Constructional details and principle of operation of various analog instruments; Introduction to digital meters; Instruments for measurement of voltage, current and other parameters; frequency measurements.

### UNIT-3A.C. BRIDGES:

Classification of resistances, resistance – Measurements by Wheat Stone Bridge ,Kelvin's double bridge method and their limitation General Balance Equation, Circuit Diagram, Phasor Diagram, Advantage and Disadvantages, Application of Maxwell's Inductance, Inductance – Capacitance, Hay's, Anderson's, Owen's, De-Sauty's, Schering and Wein's Bridges, Shielding and Earthing.

### UNIT-4 GENERATION AND ANALYSIS OF WAVEFORMS:



Block Diagram of Oscilloscope, pulse-generator; Signal generators; Function Generators; Wave analyzer; Distortion Analyzers; Spectrum analyzer; Harmonic Analyzer; Power Analyzer, Sampling & Digital storage Oscilloscope.

#### UNIT-5INSTRUMENTATION:

Transducers; classification and selection of transducers; strain Gauges; Inductive and Capacitive transducer; Piezo-electric and Hall-Effect transducers; Thermistors and hermo couples; Photo-Diode and Photo- transistors; Encoder type digital transducer; Signal conditioning, Telemetry and Data Acquisition system.

#### TEXT BOOK

Sawhney, A.K, "Electrical / Electronic Measurement and Instrumentations", Danpath Rai and Sons, 2003.

#### REFERENCE BOOKS

1. Gupta, J.B, "Electrical / Electronic Measurement and Instrumentations", Kataria & Sons, Year Jan 2007-08
2. Cooper, W. D. & Helfriek, A. D, "Electrical Measurement", Prentice Hall of India, 1999
3. Doebelin, E. O, " Measuring System", Tata McGraw Hill,2000
4. Golding, E. W, "Electrical Measurement", Wheeler Publishing, 1999.
5. Bhargave N. N., "Basic Electronics and Linear Circuits", Tata McGraw Hill, 2007
6. Salivahan, "Electronics Devices and Circuits", Tata McGraw Hill, 3rd Edition, 2003.

**Course Outcomes:** At the end of this course students will demonstrate the ability to:

- CO1. Classify the Instrumentation and Measurement system and various measurement errors.
- CO2. Analyze and design voltmeter circuits, AC electronic voltmeter, digital frequency meter and current measurement with electronic instruments.
- CO3. Evaluate various resistance and impedance measuring methods using Bridges and Q-meter. Analyze fundamental operation of CRO and some special type of oscilloscopes like DSO, Sampling oscilloscope.
- CO4. Demonstrate calibration method to calibrate various instruments and classify transducers like for force, pressure, motion, temperature measurement etc.

EC-206B	Signals &Systems	L T P	CR
		4 0 0	4

#### Course Objectives:

To introduce students, the concept and theory of signals and systems needed in electronics and telecommunication engineering fields.

To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain

### **Unit -1 Introduction to signals**

Signals: Definition, types of signals and their representations: continuous-time/discrete-time, periodic/non-periodic, even/odd, energy/power, deterministic/ random, one-dimensional/multi-dimensional; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables).

### **Unit- 2 Fourier Transform**

Fourier Transforms (FT): (i) Definition, conditions of existence of FT, proper ties, magnitude and phase spectra, some important FT theorems, Parseval's theorem, Inverse FT

### **Unit – 3 Introductions to Sytems**

Impulse response characterization and convolution integral for CT LTI system, signal responses to CT - LTI system, properties of convolution, LTI system response properties from impulse response. Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT

**Unit -4- Laplace Transform**Laplace-Transform (LT): (i) One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC) (ii) One sided and Bilateral Z-Transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping .

**Unit – 5 Z- Transform**Z-transform (ZT): Regions of convergence (ROC) (ii) One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using One-sided ZT, s- to z-plane mapping. **Text Books:**

Signal and Systems' I J NAGRATH, R. RANJAN & Sharan, 2009 Edn., TMH, New Delhi

### **Reference Books:**

1. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, 'Signals & System', PEARSON Education, Second Edition, 2003.
2. Schaume Series on Signals & Systems, HSU & RANJAN, TMH, India
3. DSP –A Practical Approach –Emmanuel C. Ifeachor, Barrie. W. Jervis, 2ndEd., Pearson Education.

### **Course Outcomes:**

- CO1. Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them,
- CO2. Understand use of transforms in analysis of signals and system in continuous and

discrete time domain.  
 CO3. Observe the effect of various properties and operations of signals and systems.  
 CO4. Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behavior of electronic

EC-208B	Control System	L T P	CR
		4 0 0	4

**OBJECTIVE** Providing sound knowledge about the various control system techniques required for the operation and accurate controls of Industrial processes and other strategies for complicated processes and efficient control.

#### UNIT-1 INTRODUCTION TO CONTROL PROBLEM:

Industrial control examples; Transfer function models of mechanical; electrical and thermal systems, system response; control hardware and models: synchros; dc and ac servomotors; tachogenerators; servomotors; closed-loop systems, Block diagram and signal flow graph analysis; transfer function.

#### UNIT-2 BASIC CHARACTERISTICS OF FEEDBACK CONTROL SYSTEM:

Stability; steady-state accuracy; transient accuracy; disturbance rejection; insensitivity and robustness. Basic modes of feedback control: proportional; integral and derivative. Feed-forward and multi-loop control configurations, standard input signals; response of 1<sup>st</sup> and 2<sup>nd</sup> order systems; time domain specifications i.e.; rise time; peak time; delay time; peak overshoot; settling time; steady state error etc.; Different types of feedback systems; steady state errors for unit ramp; unit step and unit parabolic inputs.

#### UNIT-3 TIME DOMAIN STABILITY ANALYSIS:

Introduction; concept of stability; conditions for stable system; asymptotic; relative and marginal stability; Routh-Hurwitz criterion for stability and various difficulties with Routh-Hurwitz criterion. Introduction; concepts of root locus; construction of root loci and various rules pertaining to locus diagram development.

#### UNIT-4 FREQUENCY DOMAIN ANALYSIS AND STABILITY:

Introduction; relation between time and frequency response for 2<sup>nd</sup> order system; Bode plot; construction Procedure for bode plot; gain cross over and phase cross over frequency; gain margin and phase margin; Nyquist plot and Nyquist stability criterion.

#### UNIT-5 STATE-VARIABLE ANALYSIS:

Concept of state; state variable; state model; state models for linear continuous time functions; diagonalization of transfer function; solution of state equations; concept of controllability and Observability.

#### TEXTBOOK

Nagrath and Gopal, "Control System Engineering", New Age International, 2005

## REFERENCE BOOKS

1. Ogata .K. "Modern Control Engineering", Pearson Education, 2000
2. Gopal Madan "Control System – Principles & Design" Tata McGraw Hill, 1998
3. Dorl.R. C. & Bishop "Modern Control Engineering", Addison Wesley, 1999.
4. Kuo, B. C. "Automatic control System", John Wiley & Sons, 1998
- 5.

### Course Outcomes:

- CO1. Apply systems theory to complex real world problems in order to obtain models that are expressed using differential equations, transfer functions, and state space equations
- CO2. Predict system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain
- CO3. Analyze the behavior of closed loop systems using tools such as root locus, Routh Hurwitz, Bode, Nyquist, and Matlab
- CO4. Design controllers using classical PID methods, root locus methods, and frequency domain methods.
- CO5. Devise a safe and effective method of investigating a system identification problem in the lab

EC-210B	MOS IC's & Technology	L T P	CR
		3 0 0	3

**OBJECTIVE** The objective of this course is to introduce the students to the concepts in VLSI circuits. The course also aims to provide students with the knowledge required to design, implement, and test digital VLSI circuits through nMOS, pMOS, and CMOS and BiCMOS technologies and to integrate those VLSI circuits in complex digital systems.

1. **FUNDAMENTALS OF MOS TECHNOLOGY:** Introduction to IC technology; MOS Transistor - Enhancement and Depletion mode operations; Introduction to Fabrication; CMOS and BiCMOS Devices. Equivalent circuit for MOSFET.
2. **MOS TRANSISTOR THEORY:** MOS Device Design Equations; MOS Transistor; Evaluation aspects of MOS Transistor; Threshold voltage; MOS Transistor Trans-conductance; Figure of Merit; Determination of Pull-up to Pull-down Ratio for an n-MOS inverter driven by another n-MOS inverter and by one or more pass transistor; alternative forms of Pull-up; CMOS and Bi-CMOS-inverters. Latch up in CMOS circuitry and BiCMOS Latch up susceptibility.
3. **MOS CIRCUITS AND LOGIC DESIGN:** Basic Physical Design of simple logic gates using n-MOS; p-MOS and CMOS; CMOS logic gate design considerations; CMOS logic structures.

4. **CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION:** Resistance estimation; Capacitance estimation; Inductance; Switching characteristics; Voltage Transfer Characteristics (VTC) of Resistor Load n-MOS and Comparison with CMOS Inverter, Noise Margin Estimation, CMOS Gate Transistor Sizing; Power Dissipation. **DESIGN EXAMPLE USING CMOS :** ; Clocking Strategies, Incrementer/ Decrementer; Left/Right Shift Serial/Parallel Register; Comparator for two n-bit number; a two-phase non-overlapping clock generator with buffered output on both phases; design of an event driven element for EDL system.
5. **VLSI FABRICATION:** Extraction of Silicon from Sand/Silica, Purification, Crystal growth and Chemical Cleaning Processes, Wafer preparation and orientations; Epitaxy; Oxidation; Lithography; Etching; Diffusion; Dielectric and Poly-silicon Film Deposition; Ion Implantation; Metallization. Yield and Reliability

#### TEXT BOOK

Sung-Mo Kang, Yusuf Leblebici, "CMOS Digital Integrated Circuits", Tata McGraw-Hill Education, 2003

#### REFERENCE BOOKS

1. Sze, S.M., "VLSI Technology", 2<sup>nd</sup> Edition, Tata McGraw Hill, 2001.
2. Sze, S.M., "Physics of Semiconductor Devices", Wiley
3. Sorab K. Ghandhi, "VLSI Fabrication Principles" 1994
4. Botkar, K.R., "Integrated Circuit", 4<sup>th</sup> Edition, Prentice Hall of India, 2000
5. Weste, N.H.F and Eshraghian, "Principal of CMOS VLSI Design", 2<sup>nd</sup> Edition, John Wiley & sons, 2000
6. Pucknell, Douglas A., "Basic VLSI Design", Kamsan Eshraghian, 5<sup>th</sup> Edition, Prentice Hall of India, 2005.
7. Wolf, Wayne, "Modern VLSI Design", Prentice Hall.

#### Course Outcomes:

- CO1. to acquire qualitative knowledge about the MOS transistors fabrication
- CO2. to develop the layout of any logic circuit which helps to understand and estimate parasitical effects.
- CO3. to develop Structures of logical gates using CMOS inverter and analyze their transfer characteristics.
- CO4. to develop Structures of logical gates using CMOS inverter and analyze their transfer characteristics.
- CO5. to design simple logic circuit using Array memories and to acquire Knowledge on testing and testability of a system.

EC-252B	Digital & Analog Communication Lab	L T P	CR
		0 0 2	1

## LIST OF EXPERIMENTS

1. Study of Amplitude Modulation and determination of Modulation index.
2. Study of Frequency Modulation and determination of Modulation index.
3. Study of Phase Modulation.
4. Study of Pulse Amplitude Modulation.
5. Study of Pulse Width Modulation.
6. Study of Pulse Frequency Modulation.
7. Study of Pulse Code Modulation.
8. Study of frequency Shift Keying.
9. Study of ASK and QASK.
10. Study of PSK and QPSK.
11. Project related to the scope of the course.

<b>CS-252B</b>	<b>Computer Networks Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

### List of Experiments:

1. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
2. Study of Network Devices in Detail.
3. Study of network IP.
4. Connect the computers in Local Area Network.
5. Study of basic network command and Network configuration commands.
6. Configure a Network topology using packet tracer software.
7. Configure a Network topology using packet tracer software.
8. Configure a Network using Distance Vector Routing protocol.
9. Configure Network using Link State Vector Routing protocol.

<b>EC-254B</b>	<b>Electronics Measuring Instruments Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

## LIST OF EXPERIMENTS

1. To measure power and p.f. by 3-ammeter method in a single phase circuit.
2. To measure power and p.f. by 3-voltmeter method in a single phase circuit
3. To measure power and p.f in 3-phase circuit by 2-wattmeter method.
4. To measure inductance by Maxwell's bridge.

5. To measure capacitance by De Sauty's bridge.
6. To calibrate an energy meter with the help of a standard wattmeter and a stop watch.
7. To study the use of LVDT or displacement transducers.
8. Measurement of temperature using R.T.D.
9. Measurement of temperature using Thermocouple.
10. Measurement of pressure using Piezo-electric pickup.
11. To measure frequency by Wien's bridge.
12. To measure the power with the help of C.T and P.T.

**Course Outcomes:**

- CO1. Recognize the evolution and history of units and standards in Measurements.
- CO2. Identify the various parameters that are measurable in electronic instrumentation.
- CO3. Employ appropriate instruments to measure given sets of parameters.
- CO4. Practice the construction of testing and measuring set up for electronic systems.
- CO5. To have a deep understanding about instrumentation concepts which can be applied to Control systems.
- CO6. Relate the usage of various instrumentation standards.

<b>EC-258B</b>	<b>Control System Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

**LIST OF EXPERIMENTS:**

1. To study A.C. Servo-motor and to plot its torque-speed characteristics
2. To study magnetic amplifier and to plot its load current v/s control current characteristics for (a) Series connected mode (b) Parallel connected mode
3. To implement a PID controller for temperature control of a pilot plant
4. To study different components of process control simulator kit
5. To study A.C. Motor position control through continuous command
6. To study Synchro transmitter and receiver and to plot stator voltage v/s rotor angle for synchro transmitter
7. To study lead, lag, lead-lag compensator and to draw their magnitude and phase plot
8. To study D.C. Servo-motor and to plot its torque-speed characteristics
9. To study simple open loop and closed loop control system with disturbance and without disturbance using process control simulator kit
10. To study (PD), PI, PID controllers.
11. To study a stepper motor and control the speed by 8085 microprocessor kit

**ADDITIONAL EXPERIMENTS**

12. Obtain the unit step response of a second order system with given zeta and  $\omega_n$  using MATLAB.
13. Determine the unit step response of a given close loop transfer function using MATLAB.
14. Determine the damping ratio, undamped natural frequency of oscillation and percentage overshoot of a unity feedback open loop transfer function to a unit step input using MATLAB.

**Course Outcomes:**

- CO1. Understand the basics of Matlab and familiarize with control system tool box for

designing various LTI systems.

CO2. Design, analyze various models of the systems in time domain and evaluate different response parameters

CO3. Analyze stability from root locus of the given model of the system.

CO4. Design, analyze various models of the systems in frequency domain and evaluate different response parameters.

<b>EC-260B</b>	<b>MOS IC's &amp; Technology Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

### LIST OF EXPERIMENTS

1. Introduction to the Simulation software PSPICE.
2. To obtain the drain current of the enhancement PMOS using PSPICE. Also compare with the theoretical value.
3. To obtain the noise margin of a CMOS inverter using PSPICE.
4. To obtain dynamic power dissipation of a CMOS inverter using PSPICE.
5. To obtain propagation delay of CMOS NAND gate using PSPICE.
6. To plot voltage transfer characteristics of a depletion load MOSFET with substrate connected to ground.
7. Evaluation of transient response of enhancement MOSFET and comparison.
8. Evaluation of frequency response of CMOS amplifier.
9. To study the effect of change in temperature on CMOS inverter.
10. To study the effect of change in W/L ratio on CMOS inverter.
11. Study of power dissipation in Pseudo-NMOS inverter and comparison with CMOS inverter using PSPICE.
12. Evaluation of electrical parameters of an OPAMP

<b>PD-293</b>	<b>Intra &amp; Inter Personal Skills</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

### FIFTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	EC-301B	Digital Signal Processing	3-1-0	4
2	EC-303B	Microprocessor & Microcontroller	3-0-0	3
3	EC-305B	Digital System Design	3-0-0	3



4	EE-301B	Power System Engineering – I	3-0-0	3
5	EE-303B	Electrical Machines	3-0-0	3
6	CS-305B	Python Programming	3-0-0	3
7	EC-351B	Digital Signal Processing Lab	0-0-2	1
8	EC-353B	Microprocessor & Microcontroller Lab	0-0-2	1
9	EC-355B	Digital System Design Lab	0-0-2	1
10	EE-353B	Electrical Machines Lab	0-0-2	1
11	EC-360B	Minor Project	0-0-2	1
12	CS-355B	Python Programming Lab	0-0-2	1
				25

EC-301B	Digital Signal Processing	L T P	Cr
		4 0 0	4

## OBJECTIVE

- To induce a thorough understanding of theory of DSP.
- To get in-depth knowledge of various applications- Filters, MultiMate DSP, DSP to speech & Radar, Transforms etc.

**Unit-1. DISCRETE-TIME SIGNALS AND SYSTEMS:** Signal classifications; frequency domain representation; time domain representation; representation of sequences by Fourier transform; properties of Fourier transform; discrete time random signals; energy and power theorems. System Classification; properties; time invariant system

**Unit-2. Z-TRANSFORM:** Introduction, properties of the region of convergence; properties of the Z-transform, inversion of the Z-transform, applications of Z-transform. DFT & FFT

**Unit-3. BASICS OF DIGITAL FILTERS:** Fundamentals of digital filtering; various types of digital filters; design techniques of digital filters: window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP; DSP algorithm implementation consideration. Applications of DSP.

**Unit-4. ERRORS IN DIGITAL FILTERING:** Errors resulting from rounding and truncation, round-off effects in digital filters. Finite word length effects in digital filter.

**Unit-5. MULTIRATE DIGITAL SIGNAL PROCESSING:** Introduction to multirate digital signal processing; sampling rate conversion; filter structures; multistage decimator and interpolators; digital filter banks.

## TEXT BOOKS:

- Digital Signal Processing: Principles, Algorithms & Applications J.G.Proakis& D. G.Manolakis, 4thEd., PHI.
- Discrete Time Signal Processing Alan V Oppenheim & R. W Schaffer, PHI.
- DSP –A Practical Approach –Emmanuel C. Ifeachor, Barrie. W. Jervis, 2<sup>nd</sup>Ed., Pearson Education.

**REFERENCE BOOKS:**

1. Modern Spectral Estimation: Theory & Application –S. M .Kay, 1988, PHI.
2. Multi Rate Systems and Filter Banks –P.P.Vaidyanathan –Pearson Education.

**Course Outcomes:** At the end of this course students will demonstrate the ability to

1. Represent signals mathematically in continuous and discrete time and frequency domain
2. Get the response of an LSI system to different signals
3. Design of different types of digital filters for various applications.

<b>EC-303-B</b>	<b>Microprocessors and Microcontroller</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 1 0</b>	<b>3</b>

**OBJECTIVE** This subject introduces the concept of Microprocessors to the students. It covers 8 bit (8085) and 16-bit (8086) Microprocessors: their architecture, assembly language programming and interfacing with peripheral devices

**UNIT-1 THE 8085 PROCESSOR:**

Introduction to microprocessor; 8085 microprocessor: Architecture; Pin Diagram; instruction set; interrupt structure; Addressing modes and assembly language programming.

**UNIT-2 THE 8086 MICROPROCESSOR ARCHITECTURE:**

Architecture; block diagram of 8086 with details of sub-blocks; memory segmentation and physical address computations; program relocation; addressing modes; pin diagram and description of various signals; Interrupt Structure.

**UNIT-3 INSTRUCTION SET OF 8086:**

Data transfer instructions; arithmetic instructions; branch instructions; looping instructions; NOP and HLT instructions; flag manipulation instructions; logical instructions; shift and rotate instructions; directives; programming examples.

**UNIT-4INTERFACING DEVICE:** The 8255 PPI chip: Architecture; control words and modes; interfacing and programming with 8085.

**DMA:** Introduction to DMA process; 8257 pin diagram; architecture; operation; command words; interfacing and programming with 8085.

**UNIT-5PROGRAMMABLE INTERRUPT CONTROLLER:**

8259 pin diagram; architecture; initialization command words; operational command words.

**PROGRAMMABLE INTERVAL TIMER:** 8253 pin diagram; architecture; modes.

**TEXT BOOK**

Gaonkar, Ramesh S., —Microprocessor Architecture: Programming and Applications with 8085, 5th Edition, Prentice Hall of India, 1995

**REFERENCE BOOKS**

1. Brey, The Intel Microprocessors 8086- Pentium Processor, 4th Edition, 2005
2. Hall, —Microprocessors and interfacing, Tata McGraw Hill, 3rd Edition, 2003
3. Liu Yu-Chang and Gibson Glenn A., —Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, Prentice Hall of India, 2003
4. Ray A. K. and Burchandi, —Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing, Tata McGraw Hill, 2002
5. Rafiquzzman, —Microprocessor based System Design UBS, Wiley-Interscience, 5th Edition, 2005

**Course Outcomes:**

CO1 Demonstrate the various features of microprocessor, memory and I/O devices including concepts of system bus.

CO2 Identify the hardware elements of 8085/8086 microprocessor including architecture and pin functions and programming model including registers, instruction set and addressing modes.

CO3 Select appropriate 8085/8086 instructions based on size and functions to write a given assembly language program.

CO4 Design a given interfacing system using concepts of memory and I/O interfacing.

CO5 Demonstrate the features of advance microprocessors.

EC-305-B	<b>Digital System Design</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

**OBJECTIVE**

This course provide student with a foundation in digital system. The course will explore the essential topic related to the design of modern digital circuit and to go about designing complex, high speed digital system and implement such design using programmable logic.

**UNIT-1 INTRODUCTION:** Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL; data objects; classes and data types; Operators; Overloading; logical operators. Types of delays, Entity and Architecture declaration. Introduction to behavioral; dataflow and structural models.

**UNIT-2 VHDL STATEMENTS:** Assignment statements; sequential statements and process; conditional statements; Generate statement; case statement Array and loops; resolution functions; concurrent statements. Packages and Libraries; Subprograms: Application of Functions and Procedures; Structural Modelling; component declaration; structural layout and generics; Configuration Statements

**UNIT-3 COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN:** VHDL Models and Simulation of combinational circuits such as Multiplexers; Demultiplexers; encoders; decoders; code converters; comparators; implementation of Boolean functions etc.

**UNIT-4 FINITE STATE MACHINES:** Introduction to FSM; Melay & Moore Machines, Test Benches; ALIAS; Generate statement.

**UNIT-5 PROGRAMMABLE LOGIC DEVICES:** PAL, PLA, CPLD & FPGA

#### TEXT BOOK

1. Brown and Vranesic, [Fundamentals of Digital Logic with VHDL Design], Tata McGraw Hill, 2nd Edition, 2000
2. Bhasker, "A VHDL Primer", 2nd Edition, Star Galaxy, 1998.

#### REFERENCE BOOKS

1. IEEE Standard VHDL Language Reference Manual, 1993.
  2. Chang, K.C., —Digital Design and Modelling with VHDL and Synthesis], 1st Edition, Wiley-IEEE Computer Society Press., 1999
  3. Roth, Charles. H., —Digital System Design Using VHDL], PWS, 1998.
  4. Navabi, Z, "VHDL-Analysis and Modelling of Digital Systems], 2nd Edition, McGraw Hill, 1998.
  5. Douglas, Perry L., —VHDL] IV Edition, Tata McGraw Hill, 2008
  6. Ercegovac, Lang and Moreno, [Introduction to Digital Systems], PWS, 2000.
- Jain, R.P., —Modern Digital Electronics , 3rd Edition, Tata McGraw Hill, 2003.

#### Course Outcomes:

CO1 Develop a digital logic and apply it to solve real life problems.

CO2 Analyze, design and implement combinational logic circuits.

CO3 Classify different semiconductor memories.

CO4 Analyze, design and implement sequential logic circuits.

CO5 Analyze digital system design using PLD.

CO6 Simulate and implement combinational and sequential circuits using VHDL systems.

EE-301-B	Power system Engineering-I	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

#### OBJECTIVE

**The development of electric power systems has contributed to the phenomenal technological advance of human mankind over the past century. This course present methods of power generation & power system analysis in sufficient depth to give the students the basic theory at the**

**under-graduate level. The contents are designed to develop students' thinking process, enabling them to reach a sound understanding of topics related power system engineering.**

1. **GENERAL PRINCIPLES:** An electric energy system—operations, objectives and structure— distribution level, sub transmission level and grid level; feeders; distributors and service mains; electric energy demand; and power development in India; resources for generation; present power position in India; future planning; Power Corporations in India. Basic definitions – connected load; maximum demand; demand factor; load and load duration curve; load factor; base load and peak load power plants; plant capacity factor; plant use factor.
2. **THERMAL POWER, HYDRO POWER, NUCLEAR POWER STATIONS:** Selection of site for thermal power plants; thermodynamic cycle for steam flow; general layout & main components of thermal power station (inbrief).  
Hydropower Power Plants- **selection of site for hydroelectric power stations; their classifications; layout and main components (in brief).**  
Nuclear power plants – **fission energy; general layout and main components (in brief); waste disposal; types of nuclear reactors (in brief); general lay out and main components (in brief); waste disposal; types of nuclear radiations & their effect.**
3. **CIRCUIT PARAMETERS AND ANALYSIS OF TRANSMISSION LINES:** Review of calculations of resistance, inductance, capacitance of a single conductor, multi conductor, single phase and three phase transmission lines; transposition; double circuit lines; skin and proximity effect, Ferranti effect; Classification; generalized ABCD constants; representation & steady state analysis of short and medium lines; regulation and efficiency; nominal-T and pi circuits; Long line: Rigorous method.
4. **CORONA AND RADIO INTERFERENCE:** Electric stress between parallel conductors; disruptive and visual critical voltage; corona power loss; factors effecting corona; effects of corona. Radio interference-electromagnetic effect; electrostatic effect; reduction of interference.
5. **INSULATORS AND CABLES:** Overhead line insulators –types and materials; voltage distribution calculations; different methods of equalizing voltage drops across insulators of string; string efficiency. Cable conductor, insulating, sheathing and armouring materials; single core and three core belted cables, gas and oil pressure cables (qualitative treatment); insulation resistance and capacitance calculations; capacitive and intersheath grading.

#### **TEXT BOOK**

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND & COMPANY LTD., New Delhi 2004.
3. Singh, S. N., “Electric Power Generation, Transmission and Distribution”, 2<sup>nd</sup> Edition, Prentice Hall of India, Pvt.Ltd.

#### **REFERENCE BOOKS**

1. Sivanagaraju, S. & Satyanarayana, S., “Electric Power Transmission & Distribution”, ‘Pearson Education. Glover, J. Duncan, Sarma, Mulukutla S., et.al, “Power System Analysis and Design”, ‘Cengage Learning India Pvt.Ltd.
2. Elements of Power Station design and practice by M.V. Deshpande, Wheeler Publishing.
3. Electrical Power Systems by C.L. Wadhawa New age International (P) Limited, Publishers 1997

EE-303B	Electric Machines	L T P	Cr
		3 0 0	3

## OBJECTIVE

**Providing sound knowledge about the principles of operation of various electrical machines, their constructional features, and their behavior and characteristics under various condition of operation.**

## PRE-REQUISITES

### **Knowledge of electrical technology and electrical machines-I**

1. **THREE PHASE INDUCTION MOTOR:** Review or constructional details; production of rotating field; induction motor action; torque production; testing of induction motor; losses and efficiency; development of equivalent circuit; performance characteristics; circle diagram; starting methods of 3 phase induction motor, methods of speed control; Induction generator-grid connected and self excited mode, synchronous motor **SINGLE PHASE MOTORS:** Double revolving field theory; cross field theory; equivalent circuit; characteristics and starting of single phase motor by different methods; shaded pole machine, Switched reluctance motor.
2. **PRINCIPLES OF SYNCHRONOUS MACHINES:** Constructional features of synchronous machines; cylindrical rotor and salient pole machines; terms related to winding of synchronous machines; coil span factor; distributed A.C winding types; distribution factor; excitation systems; E.M.F equation and harmonic elimination armature reactions.
3. **SYNCHRONOUS GENERATORS:** Interaction between excitation flux and armature m.m.f; equivalent circuit model and phasor diagram for cylindrical rotor machine. Salient pole machine: two reaction theory; equivalent circuit; model and phasor diagrams; power angle equations and characteristics; slip test; transient and sub-transient reactances; voltage regulation: Different methods for finding voltage regulation i.e. EMF method; MMF method; Pottier triangle method; synchronization of alternators by different methods; parallel operation and load sharing; active and reactive power control.
4. **SYNCHRONOUS MOTORS:** Principles of synchronous motor; V-curve; starting method of synchronous motors; damping winding; hunting effect; synchronous condenser application of synchronous motor, testing of

synchronous machine; stability considerations.: Hysteresis motor; reluctance motor; single phase series and repulsion motor; stepper motors: Variable reluctance and permanent magnetictype.

### TEXT BOOK

**Bimbora .P. S. “Electrical Machinery”, Khanna Publishing, 2003**

### REFERENCE BOOKS

1. Bimbora, P.S., “Generalized Theory of Electrical Machines”, Khanna Publishers,2002
2. Nasar, Syed A “Electric Machines & Power Systems” Volume-I, McGraw-Hill, Inc. U.S.A., 1995.
3. Openshaw Taylor “The Performance & Design of A.C. Commutator Motors” E., A. H. Wheeler & Co,1971.
4. Fitzgerald Kingsley C & Umans, S.D., “Electric Machinery, ”McGraw Hill,2003
5. Sen.P.C. “Principal of Electric Machines and Power Electronics”, Second Ed., John Wiley & Sons,1997.

CS-305-B	Python Programming	L T P	Cr
		3 0 0	3

### Course Objectives:

Computer programming skills are now becoming part of basic education as these skills are increasingly of vital importance for future job and career prospects. The Python programming language which is one of the most popular programming languages worldwide. The course shows you how to use the free open-source Python to write basic programs and high level applications using concepts such as Class,BIF of Python, functions, variables, If Else statements, For loops, While loops, iterative and recursive programs and algorithms such as the Insertion Sort algorithm. This course will be of great interest to all learners who would like to gain a thorough knowledge and understanding of the basic components of computer programming using the Python language—and might be a gentle introduction to programming for those who think they might have a longer-term interest in the subject area.

### Unit-1

Introduction to Python Programming Language. : Introduction to Python Language, Strengths and Weaknesses, IDLE, Dynamic Types, NamingConventions, StringValues, StringOperations, StringSlices, StringOperators, Numeric Data Types, Conversions, Built In Functions

### Unit-2

Data Collections and Language Component :Introduction, Control Flow and Syntax,Indenting,TheifStatement,Relational Operators,Logical,Operators,True or False, Bit Wise Operators,ThewhileLoop,breakandcontinue,TheforLoop,Lists,Tuples,Sets,Dictionaries,Sorting Dictionaries, Copying Collections.

### Unit-3

Object and Classes: Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

#### Unit-4

Functions and Modules :Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions-"First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules–sys, Standard Modules–math, Standard Modules–time, The dir Function.

#### Unit-5

I/O and Error Handling In Python :Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions.

#### Reference Book:

1. Dive into Python, Mike
2. Learning Python, 4th Edition by Mark Lutz
3. Programming Python, 4th Edition by Mark Lutz

EC-351B	Digital Signal Processing Lab	L T P	Cr
		0 0 2	1

#### LIST OF EXPERIMENTS Perform the experiments using MATLAB:

1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. To develop program for discrete convolution.
3. To develop program for discrete correlation.
4. To understand stability test.
5. To understand sampling theorem.
6. To design analog filter (low-pass, high pass, band-pass, band-stop).
7. To design digital IIR filters (low-pass, high pass, band-pass, band-stop).
8. To design FIR filters using windows technique.
9. To design a program to compare direct realization values of IIR digital filter



10. To develop a program for computing parallel realization values of IIR digital filter.
11. To develop a program for computing cascade realization values of IIR digital filter
12. To develop a program for computing inverse Z-transform of a rational transfer function.

**Course Outcomes:**

CO1 Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.

CO2 Modeling of discrete time signals and systems and verification of its properties and results.

CO3 Implementation of discrete computations using DSP processor and verify the results.

CO4 Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.

EC-353B	Microprocessors and Microcontroller Lab	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

**LIST OF EXPERIMENTS**

1. Familiarization with the operation of 8085 Microprocessor kit.
2. Write a program using 8085 for: a) Addition of two 8-bit numbers. b) Addition of two 16-bit numbers
3. Write a program using 8085 for : a) 8-bit subtraction b) 16-bit subtraction
4. Write a program using 8085 for a) Multiplication of two 8- bit numbers b) Division of two 8-bit numbers
5. Write a program using 8085 to arrange an array of 10 Nos in- a) Ascending order b) Descending order
6. Familiarization with the operation of 8086 microprocessor kit
7. Write a program using 8086 for copying 12 bytes of data from source to destination.
8. Write a program using 8086 for: a) Finding the largest number from an array. b) Finding the smallest number from an array.
9. Write a program using 8086 for arranging an array of numbers in descending order and ascending order
10. Write a program for finding square of a number using look-up table and verify.
11. Write a program to interface a two digit number using seven-segment LEDs. Use 8085 microprocessor and 8255 PPI.

**Course Outcomes:**

- CO1. Familiarize with the assembly level programming using 8086microprocessor.
- CO2. Design circuits for various applications using microprocessor.
- CO3. An in-depth knowledge of applying the concepts on real- timeapplications

CO4.	Design and apply interfacing circuits for different applications
CO5.	Understand the basic concepts of 8086 microprocessors with their application

<b>EC-355B</b>	<b>Digital System Design Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

#### LIST OF EXPERIMENTS

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) half adder b) full adder
3. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) multiplexer b) DE multiplexer
4. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) decoder b) encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6. Write a VHDL program for ALU.
6. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
7. Write a VHDL program for a counter and check the wave forms and the hardware generated
8. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) register b) shift register
9. Implement any three (given above) on FPGA/CPLD kit

#### Course Outcomes:

- CO1. Describe Verilog hardware description languages (HDL).
- CO2. Design Digital Circuits in Verilog HDL. Write behavioral models of digital circuits.
- CO3. Write Register Transfer Level (RTL) models of digital circuits.
- CO4. Describe standard cell libraries and FPGAs.
- CO5. Synthesize RTL models to standard cell libraries and FPGAs. 8. Implement RTL models on FPGAs and Testing & Verification.

<b>EE-353B</b>	<b>Electrical Machine Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

#### LIST OF EXPERIMENTS

1. To perform the open circuit test and block rotor test on 3 phase induction motor and draw the circlediagram.
2. Speed control of induction motor by rotor resistancecontrol.
3. To conduct the load test to determine the performance characteristics of theI.M.
4. To compute the torque v/s speed characteristics for various statorvoltages.
5. To perform the open circuit test and block rotor test on single-phase induction motor and determine equivalent circuitparameters.
6. To perform load test on a universal motor and determine the performance with dc/ac supply voltage.
7. Voltage Vs load Characteristics of 3 phase synchronous generator. And draw

input vs. Output power.

8. To perform O.C. test on synchronous generator. And determine the full load regulation of a three phase synchronous generator by synchronous impedance method
9. Determination of direct axis and quadrature axis reactance of synchronous machines.
10. To plot V- Curve of synchronous motor.
11. To study the parallel operation of synchronous generators.
12. Determination of sequence impedances of synchronous machine for various stator voltages.

EC-360B	Minor Project*	L T P	Cr
		0 0 2	1

**OBJECTIVE** The project involves in-depth study on the topic, design, development, analysis fabrication and/or experimental work – Hardware and/or Software. It is intended to give an opportunity to a student to apply his knowledge to solve real-life problem.

The student has to select a project work based on a topic of interest.

**OPERATION** Minor Project shall comprise of Phase-I and can be upgraded in VII Semester. The students may work jointly (small group) or individually.

CS-355B	Python Programming Lab	L T P	Cr
		0 0 2	1

List of Experiments:

1. Write python program to print Hello World
2. Write python program to Hello World using string variable
3. Write python program to store data in list and then try to print them.
4. Write python program to do basic trim and slice on string.
5. Write python program to print list of numbers using range and for loop
6. Write python program to store strings in list and then print them.
7. Write python program to let user enter some data in string and then verify data and print welcome to user.
8. Write python program in which an function is defined and calling that function prints Hello World
9. Write python program in which a function (with single string parameter) is defined and calling that function prints the string parameters given to function.
10. Write python program in which a class is defined, then create object of that class and call simple print function defined in class

### SIXTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	EC-302B	Scientific Computing	3-0-0	3
2	EC-304B	Probability Theory and Stochastic Process	3-0-0	3
3	EC-306B	Broadband Network	3-0-0	3

4	EE-302B	Power System Engineering-II	3-0-0	3
5	EE-304B	Electric Drives	3-0-0	3
6	EE-306B	Power Electronics	3-0-0	3
7	EE-354B	Electric Derives Lab	0-0-2	1
8	EE-356B	Power Electronics Lab	0-0-2	1
9	EC-356B	Broadband Network Lab	0-0-2	1
10	PD2-392B	Problem Solving Skills	0-0-2	1
				<b>22</b>

EC-302B	Scientific computing	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

### Unit-1

**Introduction:** Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability and Accuracy Computer Arithmetic: Floating Point Numbers, Normalization, Properties of Floating Point System, Rounding, Machine Precision, Subnormal and Gradual Underflow, Exceptional Values, Floating-Point Arithmetic, Cancellation

### Unit-2

System of linear equations: Linear Systems, Solving Linear Systems, Gaussian elimination, Pivoting, Gauss-Jordan, Norms and Condition Numbers, Symmetric Positive Definite Systems and Indefinite System, Iterative Methods for Linear Systems Linear least squares: Data Fitting, Linear Least Squares, Normal Equations Method, Orthogonalization Methods, QR factorization, Gram-Schmidt Orthogonalization, Rank Deficiency, and Column Pivoting Eigenvalues and singular values: Eigenvalues and Eigenvectors, Methods for Computing All Eigenvalues, Jacobi Method, Methods for Computing Selected Eigenvalues, Singular Values Decomposition, Application of SVD.

### Unit-3

Nonlinear equations: Fixed Point Iteration, Newton's Method, Inverse Interpolation Method Optimization: One-Dimensional Optimization, Multidimensional Unconstrained Optimization, Nonlinear Least Squares Interpolation: Purpose for Interpolation, Choice of Interpolating, Function.

### Unit-4

Polynomial Interpolation, Piecewise Polynomial Interpolation Numerical Integration And Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation, Initial Value Problems for ODES, Euler's Method, Taylor Series Method, Runge-Kutta Method, Extrapolation Methods, Boundary Value Problems For ODES, Finite Difference Methods, Finite Element Method, Eigenvalue Problems Partial

### Unit-5

Differential Equations, Time Dependent Problems, Time Independent Problems, Solution for Sparse Linear Systems, Iterative Methods Fast Fourier Transform, FFT Algorithm, Limitations, DFT, Fast polynomial Multiplication, Wavelets, Random Numbers And Simulation, Stochastic Simulation, Random Number Generators, Quasi-Random Sequences

Text/ Reference Books:

1. Heath Michael T., "Scientific Computing: An Introductory Survey", McGraw-Hill, 2nd Ed., 2002
2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery, "Numerical Recipes: The Art of Scientific Computing", Cambridge University Press, 3rd Ed., 2007

<b>EC-304B</b>	<b>Probability and Stochastic Processes</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

#### **Unit-1**

Sets and set operations; Probability space; Conditional probability and Bayes theorem; combinatorial probability and sampling models.

#### **Unit-2**

Discrete random variables, probability mass function, probability distribution function, example random variables and distributions; Continuous random variables, probability density function, probability distribution function, example distributions.

#### **Unit-3**

Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds.

#### **Unit-4**

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem.

#### **Unit-5**

Random process. Stationary processes. Mean and covariance functions. Ergodicity. Transmission of random process through LTI. Power spectral density.

**Text/Reference Books:**

1. H. Stark and J. Woods, "Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education

2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,
5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers
6. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

1. Understand representation of random signals
2. Investigate characteristics of random processes
3. Make use of theorems related to random signals
4. To understand propagation of random signals in LTI systems.

EC-306B	Broadband Networks	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

Unit-1 Overview of internet –concepts, challenges and history. Next Generation Internet- challenges and problems. Multicasting in Internet. Real time communication over Internet.

Unit-2 Packet scheduling Algorithms- requirements and choices. Admission control in internet. Differentiated Services in internet. Internet Telephony and voice over IP (VoIP) - RTP and RTCP.

Unit-3 Broadband ISDN and ATM Networks- ATM protocols. IP switching and MPLS- Overview of IP over ATM and its evolution to IP switching. Policy based Networking. Policy servers.

Unit-4 Web in Qos domain. Architecture for Web Qos. Web Access – Intelligent web browsing and web caching. . Internet and web Traffic measurement and characterization. Prediction for network management.

Unit-5 Optical communication networks- DWDM based transport network. Issues in IP over DWDM optical IP routers and switching.

EE-302 B	<b>Power System Engineering -II</b>	<b>L-T-P</b>	<b>Credits</b>
		<b>3-0-0</b>	<b>3</b>

**OBJECTIVE**

**Electrical power is an energy transportation system. A large variety of equipment is necessary to economically and efficiently distribute electrical power. Practical, reliable and safe distribution depends on protective devices to sense fault conditions and disconnect malfunctioning equipment. The course is designed for exhaustive study of faults, circuit interrupters, protective relays and system protection.**

1. **SYSTEM REPRESENTATION AND FAULT ANALYSIS:** Single line representation; per unit system; modeling of transformer, load & synchronous machine; nature and causes of faults; fault analysis – symmetrical faults on a synchronous machine at no load and full load; calculations for current limiting reactors – their use, construction and location. Unbalanced faults-symmetrical component transformation; phase shift in star-delta transformation; sequence impedances. Unsymmetrical faults using symmetrical components–sequencenetworksandtheirinter-connectionforshunttypesoffaults.
2. **CIRCUIT INTERRUPTERS:**
  - (a) **Fuses:** Types; ratings; the mechanism of fuse performance – characteristics and discrimination; construction and characteristics of HRCfuses.
  - (b) **Circuit Breakers:** Theory of formation and extinction of arcs, arc control devices and arc quenching media; inductive and capacitive current interruption; current chopping; resistive switching; recovery and restriking voltage and rate of rise of restriking voltage and factors affecting them; air blast circuit breakers; oil circuit breakers; SF6 circuit breakers; rating of circuitbreaker.
3. **PROTECTIVE RELAYS (STATIC & DIGITAL RELAY) :** General introduction; classification of relays, basic requirements of protective relaying; universal torque equation; construction features of electromagnetics relays – attracted armature, induction (disc and cup) type. Basic principle of static relaying, phase & amplitude comparators, introduction to digital relays-basic principle.
4. **RELAY APPLICATION & CHARACTERISTICS:** Over current, instantaneous over current, IDMT, directional and differential relays; distance relays - plain impedance, mho, reactance, offset mho, transmission line & feeder protection and carrier currentprotection.
5. **APPARATUS PROTECTION:** Transformer, generator, Transformer generator unit protection & motor protection; Neutralgrounding.

#### **TEXT BOOK**

1. Chakrabarti, A., Soni, M.L., Gupta, P.V., “A Text Book on Power System Engineering”, Dhanpat Rai & Sons, 2010.
2. Switchgear and Protection – by Sunil S Rao, KhannaPubllishers
3. . Power System Protection and Switchgear by Badari Ram , D.N Viswakarma, TMH Publications

#### **REFERENCE BOOKS**

1. Warrington, W.Van., “Protective Relays: Their theory & practice” Vol. I & II, Chapman Hall.

2. Lucas M. Faulkenberry & Walter Coffey, 'Electric Power Distribution and Transmission', Pearson Education.
3. B. Ravinder Nath & M.Chander: "Power system protection & switchgear", Wiley Eastern.
4. Singh, L.P., "Digital Protection: Protective relay from Electro Mechanical to Microprocessor", Wiley Eastern
5. Fundamentals of Power System Protection by Paithankar and S.R.Bhide., PHI, 2003. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.
6. Electrical Power Systems – by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3rd edition A Text book on Power System Engineering by B.L.Soni, Gupta, Bhatnagar, Chakrabarty, Dhanpat Rai & Co.

EE-304 B	Electric Drives	L-T-P	Credits
		0-0-2	1

## OBJECTIVE

**Due to lack of technology, electric drives historically were designed to provide crude power without consideration of performance. Advances in industrial manufacturing led to a need for more sophisticated drives which stimulated the development of the subject. With the development of power electronics devices & circuits, virtually any type of power source can now be used with any type of electric motor. The course contents are designed to develop fundamentals of drives systems & their control using static devices.**

1. **INTRODUCTION TO ELECTRIC DRIVES:** Basic components of an electric drive system-power source; converters; controllers; types of industrial loads; load torque components; torque speed characteristics of electric motors; classification, choice of electric drive machines; status of ac and dc drives.
2. **DYNAMICS OF ELECTRIC DRIVES:** Fundamental torque equations; equivalent values of drives parameters; joint speed-torque characteristic of electric motors and mechanical loads; bi-directional electric drive systems; four-quadrant electric drive systems.
3. **ESTIMATION OF MOTOR POWER RATING:** Heating and cooling; determination of motor rating-continuous; short time and intermittent duty rating; use of load diagrams; load equation and determination of MOI of the flywheel.
4. **SEMI-CONDUCTOR CONTROLLED DC MOTOR DRIVES:** Starting; acceleration control; braking of DC drive; converter fed DC drive & chopper fed DC drive, permanent magnet brushless DC drive.
5. **SEMI-CONDUCTOR CONTROLLED INDUCTION MOTOR DRIVES:** Starting; acceleration control; braking; static control techniques – stator frequency control; stator voltage control; rotor resistance control; static Scherbius system & static Kramer system; vector control, permanent magnet sine fed drives; switched reluctance machine drive.



## TEXT BOOK

**G. K. Dubey, 'Fundamentals of Electric Drives', Narosa Publishing House.**

## REFERENCE BOOKS

1. S. K. Pillai, 'A First Course in Electric Drives', WileyEastern.
2. Mohamed A. El-Sharkawi, 'Fundamentals of Electric Drives', Thomson Learning, USA.
3. G.K. Dubey, 'Power Semi-conductor Controlled Drives', PrenticeHall.

EE-306 B	Power Electronics	L-T-P	Credits
		3-0-0	3

## OBJECTIVE

**Providing a sound understanding of the fundamental concepts of power electronics devices their characteristic, operation, control and applications.**

## PRE-REQUISITES

**Knowledge of basic electronics electrical and electronics circuits.**

1. **POWER ELECTRONIC DEVICES:** Role of Power Electronics; Classification of power electronic devices; construction; characteristics and applications of power transistor; power MOSFET; IGBT; GTO; SCR; triac; diac; Two transistor analogy for turning ON-OFF SCR; turn ON mechanism; different methods of turning ON-OFF SCR; turn OFF mechanism; thyristor firing circuits.
2. **OPERATION & PROTECTION OF SCR:** Series -parallel operation of SCRs; firing ckts. for series and parallel operation; static and dynamic equalising ckts.; equalisation of current in parallel connected SCRs; string efficiency; derating factor; Devices used in control circuits; protection of SCRs against  $di/dt$ ;  $dv/dt$ ; radio freq. interference; over voltage; overcurrent.
3. **DIFFERENT TYPES OF SCR RECTIFIERS:** Principle of phase control; half wave controlled rectifier; half controlled bridge and fully controlled bridge rectifier for resistive and RL load; derivation for output voltage and current; effect of freewheeling diode; single phase dual converters. Three phase half controlled bridge and fully controlled bridge rectifier.
4. **INVERTER CIRCUITS:** Basic circuits for forced commutation; series inverter; improved series inverter; parallel inverter; output voltage and waveform control; principle of operation for three phase bridge inverter in 120 deg. and 180 deg. mode; single phase transistorized bridge inverter.  
**DC CHOPPER: Basic principles of chopper; time ratio control and current limit control techniques; voltage commutated chopper circuit.**

**Jones chopper; step-up chopper; step- down chopper; Regulated DC Power supplies and SMPS**

5. **AC VOLTAGE REGULATORS:** Types of regulators; equation of load current; calculation of extinction angle; output voltage equation; harmonics in load voltage. Synchronous tap changers. Three phase voltage regulators. Basic principle of cyclo-converters; single phase to single phase and three phase cyclo-converters; Load commutated and force commutated cyclo-converters

**APPLICATION OF POWER ELECTRONICS: Static circuit breakers; fan speed regulator; principle of soft start circuits. Zero Voltage Switch; UPS; and Induction heating; static VAR Control**

#### TEXT BOOK

**Rashid.M.H. “Power Electronics Circuits Devices and Application” Prentice Hall of India, 2000**

#### REFERENCE BOOKS

1. Bimbhra.P.S. “Power Electronics” Khanna Publisher,2009
2. Sen. P.C. “Power Electronics”, Tata McGraw Hill,1999
3. Rai. H.C. “Industrial and Power Electronics” , Galgotia Publication ,2000.
4. Agrawal Vineeta, Krishna Kant, “Power Electronics”, BPB Publications,2002
5. Singh .M.D. & Khanchandani K.B. “Power Electronics” Tata McGraw Hill,2003.

EE-354 B	Electric Derives Lab	L-T-P	Credits
		0-0-2	1

#### LIST OF EXPERIMENTS

1. Speed control of dc motor using dcchopper.
2. Speed control of dc motor using single –phase converter.
3. Speed control of dc motor using 3-phase converter.
4. Speed control of dc motor using single –phase dual converter.
5. Inverter fed single –phase induction motordrive.
6. CSI fed induction motordrive.
7. Speed control of single –phase induction motor using a regulator.
8. Regenerative braking of dc motor using single- phase converter.
9. Speed control of single- phase induction motor using cycloconverter.
10. Static rotor resistance control method.

EE-356 B	Power Electronics Lab	L-T-P	Credits
		0-0-2	1

#### LIST OF EXPERIMENTS

1. To study V-I characteristics of SCR and measure latching and holding currents.
2. To study UJT trigger circuit for half wave and full wave control.

3. To study single-phase half wave controlled rectified with (i) resistive load (ii) inductive load with and without freewheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.
6. To study single-phase ac voltage regulator with resistive and inductive loads.
7. To study single phase cyclo-converter
8. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor
9. To study operation of IGBT/MOSFET chopper circuit
10. To study MOSFET/IGBT based single-phase series-resonant inverter.
11. To study MOSFET/IGBT based single-phase bridge inverter.

EC-356 B	Broadband Networks Lab	L-T-P	Credits
		0-0-2	1

#### List of Experiments

1. To Study of Computer Network and Network Topologies.
2. Introduction to Electronic Private Automatic Branch Switching Exchanges Study of WSN
3. Introduction to Electronic Private Automatic Branch Switching Exchanges Study of working of a Manual and Automatic matrix switching Network
4. Learning Broadband communication and its various protocol and connection using simtelNetsys software
5. Study of different types of ISDN interfaces
6. To set basic configuration of ISDN system using Emulator, ISDN Telephones, terminal Adapter and Analog Telephones.
7. To analyses simple Trace using Protocol Analyzer after establishing, voice communication between two ISDN telephones
8. Study of Different types of Numbering in ISDN System
9. Study of point to point/multipoint connections in ISDN System
10. Study of filtering in ISDN analyzer
11. Study of ISDN Telephone Features
12. Study of Euro-/SDN ETSI standards with Fault Finding
13. To setup base-band digital communication link using Raised Cosine spectrum pulses with the chosen roll-off factor, to study the characteristics of the RC pulse, to explore the behavior of the timing acquisition algorithm and to understand clock slip control in the tracking algorithm

To mitigate the distortion introduced by the channel on the transmitted signal using Adaptive Linear Equalizer (LE) on the received samples from ADC output.

PD392 B	Problem Solving Skills	L-T-P	Credits
		0-0-2	1

### SEVENTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	ECEL-417B	IOT Using RFID and microcontroller	3-0-0	3
2	EE-407B	Power System Operation and Control	3-0-0	3
3	EE-423B	Advance Electrical Derives	3-0-0	3
4	ECEL-403B	Electronics System Design	3-0-0	3
5	OEL	OPEN ELECTTIVE (CS-303C Artificial Intelligence)	3-0-0	3
6	ECEL-415B	Smart Grid Technologies	3-0-0	3
7	EC-491B	Major Project	0-0-4	4
8	ECEL-457B	IOT Using RFID and microcontroller Lab	0-0-2	1
9	ECEL-453B	Electronics System Design Lab	0-0-2	1
10	EE-473B	Advance Electrical Derives Lab	0-0-2	1
11	ECEW-403B	Electronics Workshop	0-0-4	2
12	PDP-492	Professional Career Skill	0-0-2	2
18-0-14				29

ECEL-417B	IOT Using RFID and Microcontroller	L T P	Cr
		3-0-0	3

#### Course Objectives:

1. To Understand the Architectural Overview of IoT
2. To Understand the IoT Reference Architecture and RealWorld Design Constraints
3. To Understand the various IoT Protocols

#### Unit-1

IoT-An Architectural Overview– Building an architecture, Main design principles and needed ,An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.

IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

#### Unit-2

PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART,Z-Wave,Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN,Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

### Unit-3

Wireless Sensor Structure–Energy Storage Module–Power Management Module–RF Module–Sensing Module. Bar codes and RFID basics- Components of an RFID system-Data -Tags-Antennas-Connectors-Cables- Readers- encoder/ printers for smart labels- Controllers- software- RFID advantages over Bar codes

### Unit-4

Intel 8051 - architecture- memory organization- special function registers- timing and control- port operation- memory interfacing - I/O interfacing, Programmers model of Intel-Operand types- Operand addressing- Data transfer instructions- Arithmetic Instructions - Logic instructions- Control transfer instructions.- 8051 Interfacing and applications.

### Unit-5

Short range RFID applications- access control - personal identification - Transportation ticketing- blood , tissue and organ identification- fleet management- personal identification- car body production- passport security. Long range RFID applications. Reading RFID cards using 8051- RFID in the supply chain- Vehicles parking using RFID- library management system- electronic toll payment.

### Reference :

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Dennis E. Brown , " RFID implementation" Tata McGraw - Hill, 2007
4. Steven Shepard, "RFID: Radio frequency and Identification", Tata McGraw - Hill.
5. Ajit Pal, " Microcontrollers- principles and applications", Prentice hall of India, 2011
6. Krishna Kant. " Microprocessors and Microcontrollers", Prentice hall of India,2011
7. [www.circuitstoday.com/interfacing-rfid-module-to-8051](http://www.circuitstoday.com/interfacing-rfid-module-to-8051)

EE-407B	Power System Operation and Control	L T P	Cr
		3-0-0	3

### OBJECTIVE

**Among man-made systems, the electric power system has three distinctions (i) High financial involvement (ii) Immense utility (iii) Challenging technical aspects. The system needs careful planning and operation, which is gaining complexity due to the increase in size of individual systems as well as due to the inter connection of the regional**

systems to form a power pool etc. Considerations such as economy & security in operation are very important against the background of rising costs of operation & production. This course assumes significance because the power systems which have earlier been studied in parts is now being dealt with as a system. The contents of the course relate to the efficient operation of the system as well as problems may arise during operation.

1. **NON-LINEAR PROGRAMMING (NLP):** Introduction to optimization; problem; convexity; formulation of NLP problem and its solution using Lagrange multipliers and Kuhn–Tucker conditions.  
**ECONOMIC POWER DISPATCH: Formulation of economic power dispatch problem of an All-Thermal power system with and without considering transmission losses and its solution using Lagrange multipliers and K-T conditions, concept of incremental fuel cost; incremental transmission loss and penalty factors.**
2. **FORMULATION OF LOAD FLOW PROBLEM:** Primitive network; formation of Y-bus by inspection and using singular transmission (qualitative treatment only), load flow equations; types of buses and classification of variables; solution of load flow problem by Gauss – Seidel method (for small system only).
3. **POWER SYSTEM STABILITY:** Steady state; transient and dynamic stabilities; equal area criterion; effect of fault clearing time on transient stability; factors affecting steady state and transient stability.
4. **CONTROL OF POWER AND FREQUENCY:** Necessity of maintaining frequency constant; load frequency control; turbine – governor characteristic, control loops, division of load between generators; power – frequency characteristics of an interconnected system; systems connected by lines of relatively small capacity; effect of governor characteristics
5. **CONTROL OF VOLTAGE AND REACTIVE POWER:** Power transfer between two sources; generation and absorption of reactive power; relation between voltage, power and reactive power at a node, methods of voltage control; generator controllers-P-f and Q-V (qualitative treatment only)  
**VOLTAGE STABILITY:** Basic concept; voltage collapse & prevention.

## TEXT BOOK

Sivanagaraju, S. and Sreanivasan, G., “Power System Operation and Control”, Pearson Education, 2009.

## REFERENCE BOOKS

1. Weedy B.M. & Cory, B.J., “Electric Power Systems”, 4<sup>th</sup> Edition, Wiley student edition, John Wiley & Sons, New York.
2. Nagrath, I.J. & Kothari, D.P., “Power system Engineering”, Tata Mc Graw Hill
3. Elgerd, O.I., “Electric Energy System Theory”, Tata McGraw Hill.

<b>EE-423B</b>	<b>Advance Electrical Derives</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

**Unit 1:** Power Converters for AC drives PWM control of inverter, selected harmonic elimination, space vector modulation, current control of VSI, three level inverter, Different topologies, SVM for 3 level inverter, Diode rectifier with boost chopper, PWM converter as line side rectifier, current fed inverters with self-commutated devices. Control of CSI, H bridge as a 4-Qdrive.

**Unit 2:** Induction motor drives Different transformations and reference frame theory, modeling of induction machines, voltage fed inverter control-v/f control, vector control, direct torque and flux control(DTC).

**Unit 3:** Synchronous motor drives modeling of synchronous machines, open loop v/f control, vector control, direct torque control, CSI fed synchronous motor drives.

**Unit 4:** Permanent magnet motor drives Introduction to various PM motors, BLDC and PMSM drive configuration, comparison, block diagrams, Speed and torque control in BLDC and PMSM.

**Unit 5:** Switched reluctance motor drives Evolution of switched reluctance motors, various topologies for SRM drives, comparison, closed loop speed and torque control of SRM.

Text / References: 1. B. K. Bose, “Modern Power Electronics and AC Drives”, Pearson Education, Asia, 2003.

2. P. C. Krause, O. Wasynczuk and S. D. Sudhoff “Analysis of Electric Machinery and Drive Systems”, John Wiley & Sons, 2013.

3. H. A. Taliyat and S. G. Campbell, “DSP based Electromechanical Motion Control”, CRC press, 2003. 4. R. Krishnan, “Permanent Magnet Synchronous and Brushless DC motor Drives”, CRC Press,2009.

**Course Outcomes:** At the end of this course, students will demonstrate the ability to

1. Understand the operation of power electronic converters and their control strategies.
2. Understand the vector control strategies for ac motor drives.
3. Understand the implementation of the control strategies using digital signal processors.

<b>ECEL-403B</b>	<b>Electronic System Design</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

**UNIT-I: Analog and Digital Circuit Design of Circuits:** Analog and digital circuit design of circuits for biomedical applications using operational amplifiers, data acquisition, conversion, and interface to microcomputers. Patient safety, patient isolation circuits. Operating principles of various types of patient isolation circuitry. Most suitable isolation circuit for a given application. Test isolation circuits.

**UNIT-II: Data Acquisition:** Sample and Hold Conversion, Multi-Channel acquisition, High speed sampling in ADC, Selection of drive amplifier for ADC performance, Gain setting and level shifting, ADC input protection, Multichannel channel applications for data acquisition systems, External protection of amplifiers, High speed ADC architectures.

**UNIT-III: Interference and Noise Reduction Techniques:** Types of noise-Thermal noise, shot noise, excess noise, Burst, Internal noise in OPAMPs, Noise issues in high speed applications, Causes of noise and interference encountered in medical equipment. Manifestation of noise or interference. Techniques for minimizing the impact of noise or interference when using various types of medical equipment.

**UNIT-IV: Hardware Approach to Digital Signal Processing:** Coherent and non-coherent sampling, Digital signal processing techniques, DSP hardware, ALU, Multipliers, accumulators, data address generators, serial ports, system interfacing ADC's and DAC's to DSPs. Interfacing IO ports to DSPs.

**UNIT-V: Use of Telemetry in A Medical Environment:** Available frequency bands and licensing requirements for RF telemetry environments. Typical telemetry methods used in medical applications. Common problems with telemetry installations. Battery management procedures. Types of batteries used in medical equipment. Typical shelf life of common batteries. Applications for common batteries. Techniques to improve life of batteries. Test equipment for correct function after battery replacement.

#### TEXT BOOKS:

- HalitEren, "Electronic portable instruments-Design and applications", CRC Press, 2004.
- Robert B. Northrop, "Analysis and application of analog electronic circuits to biomedical instrumentation", CRC Press, 2004.

#### REFERENCE BOOKS:

- Reinaldo J. Perez, "Design of medical electronic devices", Academic Press, 2002

S.No	OEL	Open Elective	L-T-P	Credit
1	BA-271A	Human Resource Management	3-0-0	3
2	BBA-214	Ethics and Corporate Social responsibility	3-0-0	3
3	MEOE-401B	Robotics	3-0-0	3
4	CE-423B	Hydropower engineering	3-0-0	3
5	EC-441B	Non-Conventional Energy Resources	3-0-0	3
6	CS-303C	Artificial Intelligence	3-0-0	3
7	CS-305C	Python Programming	3-0-0	3



ECEL-415B	Smart Grid Technology	L T P	Cr
		3-0-0	3

### Course Objectives:

- To introduce students about the challenging issues and architecture of smart grid
- To give exposure to the students about the communication and wide area monitoring in smart grid
- To introduce the implementation of the control in computational intelligence and security issues in smart grid and the role of Power electronics and energy storage in smart grid

### Unit-1

**The smart grid:** Introduction – Necessity of smart grid – Definition – Early smart grid initiatives – overview of the technologies required for the smart grid-Information and communication technologies, Sensing measurement, control and automation technologies, Power electronics and energy storage.

### Unit-2

**Data communication:** Introduction – dedicated and shared communication channels – switching techniques – communication channels- layered architecture and protocols;

**Communication technologies for the smart grid:** Introduction –communication technologies – standards for information exchange.

### Unit-3

**Information Security for the smart grid:** Introduction – Encryption and Decryption: Symmetric Key encryption, Public key encryption - Authentication – Digital signature: Secret key signature, Public key signature, Message digest – cyber security standards.

### Unit-4

**Smart metering and demand side integration:** Introduction – smart metering – smart meters – Communication infrastructure and protocols for smart metering - Demand side integration.

### Unit-5

**Introduction to smart grid applications:** Introduction – voltage and VAR control and optimization – fault detection, isolation and restoration (FDIR) – Demand response (DR) – Distributed energy resources (DERs) – wide area monitoring, control and protection (WAMCP).

**Course Outcomes:** At the end of this course, students will demonstrate the ability to

1. Understand the challenging issues and architecture of smart grid
2. Understand the communication and wide area monitoring in smart grid
3. Rudimentary energy management issues in smart grid

4. Acquire the knowledge in computational intelligence and security issues in smart grid

5. Know the role of Power electronics and energy storage in smart grid

**Text Books:**  
1. “Smart Grid: Technology and Applications” by Janaka Ekanayake , Kithsiri Liyanage , Jianzhong Wu , Nick Jenkins – John Wiley & sons Limited ; 2012 first Edition.

2. “Smart Grid: Applications, communication and security” by Lars T. Berger and Krzysztof Iniewski - John Wiley & sons Limited; 2012 first Edition.

**Reference Books:**

1. “Smart grid: Fundamental of Design and analysis” by James Momoh “John Wiley & sons Limited IEEE Press, 2012.

<b>ECEL-457B</b>	<b>IOT Using RFID and Microcontroller Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

**List of Experiments:**

1. Study and Install Python in Eclipse and WAP for data types in python.
2. Write a Program for arithmetic operation in Python.
3. Write a Program for looping statement in Python.
4. Study and Install IDE of Arduino and different types of Arduino.
5. Write program using Arduino IDE for Blink LED.
6. Write Program for RGB LED using Arduino.
7. Study the Temperature sensor and Write Program for monitor temperature using Arduino.
8. Study and Implement RFID, NFC using Arduino.
9. Study and implement MQTT protocol using Arduino.
10. Study and Configure Raspberry Pi.
11. WAP for LED blink using Raspberry Pi.
12. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.

<b>ECEL-453B</b>	<b>Electronic System Design Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

**Minimum Twelve Experiments to be conducted: (Six from each part A & B)**

**Part A:**

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order)
3. Function Generator using OP AMPs.

4. IC 555 Timer – Monostable and Astable Operation Circuit.
5. IC 566 – VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 bit DAC using OP AMP.

**Part B:**

**Simulate the internal structure of the following Digital IC's using VHDL / VERILOG and verify the operations of the Digital IC's (Hardware) in the Laboratory**

1. D Flip-Flop 7474
2. Decade counter-7490
3. shift registers-7495 7
4. 3-8 Decoder -74138
5. 4 bit Comparator-7485
6. 8 x 1 Multiplexer -74151 and 2x4 Demultiplexer-74155
7. RAM (16x4)-74189 (Read and Write operations)

**Equipment required for Laboratories:**

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components:- IC741, IC555, IC566, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

**For Software Simulation**

- 1 Computer Systems
- 2 LAN Connection (Optional)
- 3 Operating Systems
- 4 VHDL/ VERILOG
- 5 FPGAS/CPLDS (Download Tools)

EW-403B	Electronic Workshop	L T P	Cr
		0-0-4	2

**List:**

1. Study of BASIC ELECTRONIC COMPONENTS
2. Study of CRO, FUNCTION GENERATOR, MULTIMETRE, D.C. POWER SUPPLY
3. Study of PCB AND PCB layout.
4. Survey of optoelectronic devices.
5. How an industry works- A survey.'

6. Survey of electromagnetic spectrum.
7. Assembling a electronic circuit on PCB and testing it.
8. Simulation of a electronic circuit using simulation software.

<b>ECEL-491B</b>	<b>Major Project*</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>4</b>

**OBJECTIVE** The project involves in-depth study on the topic, design, development, analysis fabrication and/or experimental work – Hardware and/or Software. It is intended to give an opportunity to a student to apply his knowledge to solve real-life problem. The student has to select a project work based on a topic of interest.

**OPERATION** Major Project shall comprise of Phase-I and PhaseII, spread over Semester VI and VII respectively. The students may work jointly (small group) or individually.

<b>PDP-492</b>	<b>Professional Career Skill</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>2</b>

1. Advocating for yourself and your causes
2. Asking for help or advice
3. Brainstorming
4. Building buy-in to an idea
5. Business writing
6. Dealing with difficult people
7. Facilitating
8. Handling office politics
9. Handshaking
10. Information and Communications Technology (ICT)
11. Interviewing
12. Managing a positive relationship with an employer
13. Listening
14. Networking
15. Persuasion
16. Resume writing
17. Small talk
18. Verbal communication
19. Written communication

S.no	OEL	Open Elective	L-T-P	Credit
1	BA-271A	Human Resource Management	3-0-0	3
2	BBA-214	Ethics and Corporate Social responsibility	3-0-0	3

3	MEOE-401B	Robotics	3-0-0	3
	CE-423B	Hydropower engineering	3-0-0	3
5	EC-441B	Non-Conventional Energy Resources	3-0-0	3
6	CS-303C	Artificial Intelligence	3-0-0	3
7	CS-305C	Python Programming	3-0-0	3

SN	Course No.	Course Name		Credits
1	EE-483B	INTERNSHIP	0-0-32	16
2	EE-484B	SEMINAR	0-0-2	1
3	EC-485B	5G Technology	3-0-0	3
			<b>3-0-34</b>	<b>20</b>

<b>EC-483B</b>	<b>INTERNSHIP</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-32</b>	<b>16</b>

**OBJECTIVE** To carryout training for a period of six months after VII Semester in industry (private or public)/ research laboratory/organization of repute, on platforms learnt till the completion of 4 years of bachelor degree.

**METHODOLOGY** The students shall demonstrate their ability to understand a given problem and to innovatively bring out solution. Students shall be free to select any operating system, programming language and database tools for accomplishing the given problem successfully. Marks of this course shall be given in the marks memorandum.

This component is conducted at various production and manufacturing units, Design, Development and Consulting Agencies, National Laboratories, R&D Centers, etc. The students solve real-life problems of interest to the host organizations. The professional expert acts as a consultant while resident University faculty supervises the work.

Assessment of Industrial/Field Training and Internship will be based upon certificate of Industry/Field training obtained by the student, report, and seminar and viva-voce examination.

<b>EC-484B</b>	<b>SEMINAR</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

The seminar is to cover the details regarding Internship problem definition, literature survey, concepts and methodology employed, analysis, design and development, conclusions and future work.

<b>EC-485B</b>	<b>5G Technology</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

Unit- 1 : Overview of 5G communication technology, (operating scenarios, mm wave technology, propagation models),

Unit- 2 : Waveform in 5G, (W-OFDM, F-OFDM, UPMC, FBMC, GFDM, adaptive OFDM)

Unit-3 : Modulation and coding in 5G, Propagation Characteristics of 5G Channel models

Unit-4 : MIMO communication essentials, Massive MIMO in 5G (massive MIMO, pilot contamination, Beam forming)

Unit-5 : Heterogeneous Ultra Dense networks in 5G, (Small cells, D2D, MIMO-NOMA), Ubiquitous Quality of Service Provisioning for real time traffic.

**Text books/Reference books:**

1. An Introduction to LTE: LTE, LTE-Advanced, SAE, VoLTE and 4G Mobile Communications 2nd Edition, Christopher Cox, Wiley; 2 edition (July 28, 2014)
2. LTE for UMTS: Evolution to LTE-Advanced 2nd Edition, Harri Holma (Author), Antti Toskala (Author), Wiley; 2 edition (April 25, 2011)
3. LTE - The UMTS Long Term Evolution: From Theory to Practice, Stefania Sesia, Wiley; 2 edition (August 29, 2011)
4. 4G, LTE-Advanced Pro and The Road to 5G, Third Edition 3rd Edition, Erik Dahlman (Author), Stefan Parkvall (Author), Johan Skold (Author), Academic Press; 3 edition (August 12, 2016)
5. Fundamentals of LTE (Prentice Hall Communications Engineering and Emerging Technologies Series from Ted Rappaport) 1st Edition, by Arunabha Ghosh (Author), Jun Zhang (Author), Jeffrey G. Andrews (Author), Rias Muhamed (Author), Prentice Hall; 1 edition (September 20, 2010)
6. 4G: LTE/LTE-Advanced for Mobile Broadband, Dahlman (Author), Stefan Parkvall (Author), Johan Skold (Author), Academic Press, 1 edition (May 10, 2011)

**Course Outcomes:**

Students will be aware about the LTE Evolution System.

Students will know the architecture of 2G & 3G communication system.

Students will be able to demonstrate MIMO system

Students will be aware about future wireless communication technology.

## SCHEME FOR B. TECH. (ECE)

B. TECH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101B	Applied Mathematics – I	3	1	0	4
2	PH-103B	Applied Physics	3	1	0	4
3	CS-105B	Computer Programming	3	0	0	3
4	EN-107B	Communication Skills – I	3	0	0	3
5	CE-109B	Environmental Science and Ecology	2	0	0	2
6	EL-111B	Basics of Electrical and Electronics Engg	3	1	0	4
7	PH-151B	Applied Physics Lab	0	0	2	1
8	EN-153B	Communication Skills Lab – I	0	0	2	1
9	CS-155B	Computer Programming Lab	0	0	2	1
10	EL-157B	Basics of Electrical and Electronics Engg Lab	0	0	2	1
11	ME-159B	Workshop Practice – I	0	0	4	2
Total			17	3	12	26

B. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102B	Advanced Mathematics and Numerical Methods	3	1	0	4
2	EN-104B	Communication Skills – II	3	0	0	3
3	BA-106B	Engineering Economics and Industrial Management	3	0	0	3
4	EC-108B	Digital Electronics	3	1	0	4
5	CS-110B	Data Structures and Algorithm	3	0	0	3
6	EC-112B	Electrical Engineering Materials and Semi-Conductor Devices	3	0	0	3
7	MA-150B	Applied Numerical Methods Lab	0	0	2	1
8	EC-154B	Digital Electronics Lab	0	0	2	1

9	CS-156B	Data Structures and Algorithm Lab	0	0	2	1
10	EC-158B	Electrical Engineering Materials and Semi-Conductor Devices Lab	0	0	2	1
11	PD-191A	Co- Curricular Activities And Hobby Club	0	1	0	1
<b>Total</b>			<b>18</b>	<b>3</b>	<b>8</b>	<b>25</b>

### SCHEME FOR B. TECH. (ECE)

B. TECH.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-114B	Data Base Management System	3	0	0	3
2	CS-201B	Object Oriented Programming using C++	3	1	0	4
3	EC-201B	Electro Mechanical Energy Conversion	3	0	0	3
4	EC-203B	Electromagnetic Theory	3	1	0	4
5	EC-205B	Analog Electronics & Circuits	3	1	0	4
6	EC-207B	Network Theory	3	1	0	4
7	CS-251B	OOPS using C++ Lab	0	0	2	1
8	EC-251B	Electro Mechanical Energy Conversion Lab	0	0	2	1
9	EC-255B	Analog Electronics & Circuits Lab	0	0	2	1
10	EC-257B	Network Theory Lab	0	0	2	1
11	HOT-201B	Hands on Training	0	0	4	2
<b>Total</b>			<b>18</b>	<b>4</b>	<b>12</b>	<b>28</b>

B. TECH.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-202B	Digital & Analog Communication	3	0	0	3
2	CS-202B	Computer Networks	3	1	0	4
3	EC-204B	Electronics Measuring Instruments	3	0	0	3
4	EC-206B	Signals and Systems	3	1	0	4
5	EC-208B	Control System	3	1	0	4
6	EC-210B	MOS IC's & Technology	3	0	0	3



7	EC-252B	Digital & Analog Communication Lab	0	0	2	1
8	CS-252B	Computer Networks Lab	0	0	2	1
9	EC-254B	Electronics Measuring Instruments Lab	0	0	2	1
10	EC-258B	Control System Lab	0	0	2	1
11	EC-260B	MOS IC's & Technology Lab	0	0	2	1
12	PD-293	Intra & Inter Personal Skills	0	0	2	1
<b>Total</b>			<b>18</b>	<b>3</b>	<b>12</b>	<b>27</b>

### SCHEME FOR B. TECH. (ECE)

<b>B. TECH.</b>			<b>Semester</b>			<b>V</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	EC-301B	Digital Signal Processing	3	1	0	4
2	EC-303B	Microprocessor & Microcontroller	3	0	0	3
3	EC-305B	Digital System Design	3	0	0	3
4	EC-307B	Microwave and Radar Engineering	3	0	0	3
5	EC-309B	Antenna & Wireless Communication	3	0	0	3
6	CS-305B	Python Programming	3	0	0	3
7	EC-351B	Digital Signal Processing Lab	0	0	2	1
8	EC-353B	Microprocessor & Microcontroller Lab	0	0	2	1
9	EC-355B	Digital System Design Lab	0	0	2	1
10	EC-357B	Microwave and Radar Engineering Lab	0	0	2	1
11	EC-360B	Minor Project	0	0	2	1
12	CS-355B	Python Programming Lab	0	0	2	1
<b>Total</b>			<b>18</b>	<b>1</b>	<b>12</b>	<b>25</b>

<b>B. TECH.</b>			<b>Semester</b>			<b>VI</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	EC-302B	Scientific Computing	3	0	0	3

2	EC-304B	Probability Theory and Stochastic Process	3	0	0	3
3	EC-306B	Broadband Network	3	0	0	3
4	EC-312B	Internet of Things	3	0	0	3
5	EC-314B	Digital Image and Video Processing	3	0	0	3
6	EC-322B	Real Time System	3	0	0	3
7	EC-362B	Internet of Things Lab	0	0	2	1
8	EC-364	Digital Image and Video Processing Lab	0	0	2	1
9	EC-356B	Broadband Network Lab	0	0	2	1
10	PD2-392B	Problem Solving Skills	0	0	2	1
<b>Total</b>			<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>

<b>B. TECH.</b>			<b>Semester</b>			<b>VII</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	ECEL-403B	Electronics System Design	3	0	0	3
2	ECEL-413B	Energy Harvesting Technologies & Power Management for IOT devices	3	0	0	3
3	ECEL-417B	IOT Using RFID and microcontroller	3	0	0	3
4	ECEL-421B	Satellite Communication	3	0	0	3
5	ECEL-415B	Smart Grid Technologies	3	0	0	3
6	ECEL-453B	Electronics System Design Lab	0	0	2	1
7	ECEL-457B	IOT Using RFID and microcontroller Lab	0	0	2	1
8	ECEL 471B	Satellite Communication Lab	0	0	2	1
9	OEL CS-303C	BA-271A Human Resource Management/ (CS-303C Artificial Intelligence)	3	0	0	3
10	ECEW-403B	Electronics Workshop	0	0	4	2
11	EC-491B	Major Project	0	0	8	4
12	PDP-492	Professional Career Skill	0	0	2	1
<b>Total</b>			<b>18</b>	<b>0</b>	<b>20</b>	<b>28</b>

<b>B. TECH.</b>			<b>Semester</b>			<b>VIII</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	

1	EC-483B	INTERNSHIP	0	0	32	16
2	EC-484B	SEMINAR	0	0	2	1
3	EC-485B	5G Technology	3	0	0	3
<b>Total</b>			<b>3</b>	<b>0</b>	<b>34</b>	<b>20</b>

MA-101B	APPLIED MATHEMATICS-I	L-T-P	Credits
		3-1-0	4

**Objective-**The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Outcome:**

- CO6. Learn to apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- CO7. Learn the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- CO8. Learn the tool of power series and Fourier series for learning advanced Engineering Mathematics.
- CO9. Learn to deal with functions of several variables that are essential in most branches of engineering. The essential tool of matrices and linear algebra in a comprehensive manner.
- CO10. Understand the multivariable differential Calculus.

**UNIT 1Matrices:** Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, Skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

**UNIT 2Sequences and series:** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

**UNIT 3Calculus:** Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

**UNIT 4Calculus:** Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

**UNIT 5Multivariable Calculus (Differentiation):** Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

**TEXT BOOK/REFERENCE BOOKS:**

G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

7. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
8. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
9. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
10. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
11. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
12. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

PH-103B	APPLIED PHYSICS	L-T-P	Credits
		3-1-0	4

**Objective:** The core objective is to provide a coherent foundation of physics for all majors that are usually necessary to work in areas such as computer science, electronic industry, mechanical domains and communication technologies. The contents are based on the static and dynamic state of elementary physics resulting in the field theory and wave mechanics the matter.

#### Course Outcomes:

CO1: The students will learn scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, and lasers.

CO2: learn about generation of electromagnetic field.

CO3: Student will the application of laser technology

CO4: Learn the application of wave optics.

CO5: Learn the concepts of quantum mechanics

### 6. ELECTROSTATICS AND MAGNETOSTATICS (12 lectures)

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential, Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

**7. MECHANICS (8 lectures)**

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical Coordinates

**8. QUANTUM MECHANICS (8 lectures)**

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

**9. WAVE OPTICS (10 lectures)**

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.

Fraunhauffer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

**10. LASERS (8 lectures)**

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO<sub>2</sub>), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: monochromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

**SUGGESTED TEXT/REFERENCE BOOKS**

- (i) David Griffiths, Introduction to Electrodynamics.
- (ii) W. H. Hayt and J. A. Buck. Engineering Electromagnetics.
- (iii) Engineering Mechanics, 2nd ed. — MK Harbola.
- (iv) Introduction to Mechanics — MK Verma
- (v) Eisberg and Resnick, Introduction to Quantum Physics
- (vi) D. J. Griffiths, Quantum mechanics.
- (vii) A. Ghatak, Optics
- (viii) O. Svelto, Principles of Lasers

POs	P O	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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Cos	1													
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

CS-105B	COMPUTER PROGRAMMING										L-T-P	Credits
											3-0-0	3

**OBJECTIVE:** To give basic knowledge of Computer Hardware, Software systems & internets

6. **COMPUTER SYSTEMS:** Overview of Computer Systems, Evolution of Computer Systems, Generations of computers, Characteristics of Computer: speed, storage, Accuracy, Categories of computer: Micro Computers, Mini Computers, Main Frames, Super Computers, Computer Organization: Central processing unit, Arithmetic and Logic Unit, Control Unit, Memory System: Primary memory, secondary memory and Data Representation in a Computer System. Number system : decimal, Binary, Octal, Hexadecimal representation and conversion
7. **PROGRAMMING LANGUAGES & OPERATING SYSTEM BASICS:** Software Basics: Application software, System Software, Utility Software, Programming languages: Low level languages, Machine language, Assembly language, Limitations of Low level languages, High Level languages, Translator, Assembler, Interpreter, Compiler, Operating System: Need of Operating System, Function of Operating System, Types of Operating System
8. **NETWORK SYSTEMS, INTERNET & WEB:** Introduction to networking, Local and Wide Area Networks, communication media: wired and wireless, Network Topologies: Star, Ring, Bus, Networking devices: Switch, Hub, Bridge, Internet overview, Internet Architecture, The idea of hypertext and hyper media; how the browser works: MIME types, plug-ins and helper applications; XML, XHTML, XSLT and the W3C, Hosting and Domains:
9. **HYPERTEXT MARKUP LANGUAGE:** The anatomy of an HTML document; marking up for structure and style: ordered and unordered lists, Structuring content with HTML using natural divisions, Marquee, Anchor Tag, Email Link; embedding images and controlling appearance, table creation: Frames and Nesting, iframes, forms,

Semantic elements of HTML5, HTML5 Form elements, Media tags in HTML5, HTML5 Data Storage

**10. COMPUTER SECURITY:** Security Threats: Intruders, Password Cracking, Different types of malicious Software: Virus, Worms, Trojan Horse, Prevention from malicious Software: Antivirus (Introduction)

**TEXT BOOKS:**

Computer Fundamentals: P. K. Sinha, BPB pub.

3. Fundamentals of Computer Science and Programming with C: A. K. Sharma, Dhanpat Rai Pub.
4. Uttam K. Roy, "Web Technology", Oxford Publication

**REFERENCE BOOKS:**

3. Computing Fundamentals & C Programming: E. Balaguruswamy, TMH.
4. Fundamentals of Computers: V Rajaraman, PHI

**COURSE OUTCOMES:**

On successful completion of this course students will be able to:

- Identify different application areas of computers.
- Distinguish hardware and software components of the computer system.
- Use Ms-windows operating system. Make use of the basic Microsoft office applications for office use.
- Identify information resources and services available on the Internet.
- Make use of search and retrieval services on subjects of their interest.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

EN-107	COMMUNICATION SKILLS-I	LTP	Cr
		3-0-0	3

**Objective-** Recognized different styles of communication and how to improve understanding and build rapport with others. Reflected on different methods of communication and decided when each is most suitable. Appreciated the role of body language and voice tone in effective communication. Communicated their message in an effective and engaging way for the recipient.

**Course Outcome:**

CO1: Students will be able to understand and apply knowledge of human communication and language processes.

- CO2: Students will be able to understand and evaluate key theoretical approaches used in the interdisciplinary field of communication.
- CO3: students will be able to explain major theoretical frameworks, constructs, and concepts for the study of communication and language, summarize the work of central thinkers associated with particular approaches, and begin to evaluate the strengths and weaknesses of their approaches.
- CO4: Students will be able to understand the research methods associated with the study of human communication, and apply at least one of those approaches to the analysis and evaluation of human communication.
- CO5: Students will be able to communicate effectively orally and in writing.

**UNIT 1 Vocabulary Building:** The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms and standard abbreviations.

**UNIT 2 Basic Writing Skills:** Sentence Structures, Use of phrases and clauses in sentences Importance of proper punctuation, creating coherence, organizing principles of paragraphs in documents, Techniques for writing precisely, Jane Austen: *Pride and Prejudice* (novel)

**UNIT 3 Identifying Common Errors in Writing:** Subject-verb agreement Noun-pronoun agreement Misplaced modifiers, Articles, Prepositions, Redundancies Clichés

**UNIT 4 Nature and Style of sensible Writing:** Describing, Defining, Classifying, Providing examples or evidence, writing introduction and conclusion

**UNIT 5 Writing Practices:** Comprehension Précis Writing, Essay Writing, Charles Dickens: *Oliver Twist* (novel). **Oral Communication:** (This unit involves interactive practice sessions in Language Lab) Listening Comprehension Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues communication at Workplace, Interviews Formal Presentations

#### **Suggested Readings:**

7. Practical English Usage. Michael Swan. OUP. 1995.
8. Remedial English Grammar. F.T. Wood. Macmillan. 2007
9. On Writing Well. William Zinsser. Harper Resource Book. 2001
10. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
11. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
12. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS13	PSO14
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1



CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-
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CE-109B	ENVIRONMENTAL SCIENCE AND ECOLOGY										L T P	Cr
											2 -0 -0	2

**Objective-** Creating the awareness about environmental problems among people. Imparting basic knowledge about the environment and its allied problems. Developing an attitude of concern for the environment. Motivating public to participate in environment protection and environment improvement.

**Course Outcomes:**

- CO6. Enable to analyze the national and global environmental issues relating to atmosphere, water, soil and land use, biodiversity, and natural resources (global warming, climate change, mineral extraction and energy resources, environmental impact assessment and environmental audit)
- CO7. Enable to understand environmental politics in contemporary India, and issues in global environmentalism
- CO8. Investigate the agenda of environmental agencies
- CO9. Demonstrates the relationship between types of contaminants and effect on human health.
- CO10. Learn skills to analyze case studies on, industrial pollution and global warming.

**UNIT 1THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

**UNIT 2NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**UNIT 3ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

**UNIT 4BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

**UNIT 5 ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management – floods, earthquake, cyclone and landslides.

**UNIT 6 SOCIAL ISSUES AND THE ENVIRONMENT:** Water conservation, rain water harvesting, watershed management; climate change, global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

**UNIT 7 HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, population explosion – family welfare programmes; role of information technology in environment and human health; case studies, Chipko movement, Sardar Sarovar dam, mining and quarrying in Udaipur, salinity and water logging in Punjab, Haryana and Rajasthan, Bhopal gas tragedy, Chernobyl nuclear disaster, arsenic pollution in ground water.

#### TEXT BOOK

2. Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition, New Age International Publishers, 2004

#### REFERENCE BOOKS

12. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
13. Bharucha Erach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
14. Brunner R. C., “Hazardous Waste Incineration”, 1st Edition McGraw Hill Inc., 1989.
15. Clark R.S., “Marine Pollution”, 1st Edition Clanderson Press Oxford, 1989
16. Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., “Environmental Encyclopedia”, 2nd Edition, Jaico Publ. House, 2001.
17. De, A. K., “Environmental Chemistry”, 2nd Edition, Wiley Eastern, 1989
18. Jadhav, H. and Bhosale, V.M., “Environmental Protection and Laws”, 1st Edition, Himalaya Pub. House, Delhi, 1995.
19. McKinney, M.L. and Schocl. R.M., “Environmental Science Systems & Solutions”, 2nd Edition, Web enhanced edition, 1996.
20. Rao M.N. and Datta, A.K., “Waste Water Treatment”, 2nd Edition, Oxford & IBH Publ.Co., 1987.
21. Sharma B.K., “Environmental Chemistry”, 2nd Edition, Goel Publ. House, Meerut, 2001
22. Trivedi R.K. and Goel, P.K., “Introduction to Air Pollution”, 2nd Edition, Techno-science Publications, 1996

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Cos														
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1

CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-
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EL-111B	BASIC OF ELECTRICAL AND ELECTRONICS ENGINEERING	L T P	Cr
		3-1-0	4

**OBJECTIVE:** To understand and analyze basic electric and magnetic circuits

To study the working principles of electrical machines and power converters.

To introduce the components of low voltage electrical installations.

**COURSE OUTCOMES:**CO1: Students are able to understand and analyze basic electric and magnetic circuitsCO2: Students are able to understand the working principles of electrical machines and power convertersCO3: Learn the application of Power convertors.

**Unit 1: DC Circuits Electrical** circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton and maximum power transfer Theorems.

**Unit 2: AC Circuits** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real

power, reactive power, apparent power, power factor. Analysis of single-phase ac circuitsconsisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phasebalanced circuits, voltage and current relations in star and delta connections.

**Unit 3: Transformers**Construction, working principle of transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and its comparison with ordinary transformer.

**Unit 4: Electrical Machines**Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

**Unit 5: Power Converters & Electrical Installations** DC-DC converters and AC-DC converters, Switches, Fuses, MCBs, Earthing and its types, Important Characteristics for Batteries and battery backup. Elementary calculations for energy consumption, power factor improvement.

#### **Suggested Text / Reference Books**

(i) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

(ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

(iii)L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press,2011.

(iv) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

(v) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

#### LEARNING OBJECTIVES:

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

PH-151B	APPLIED PHYSICS LAB	L-T-P	Credits
		0-0-2	1

**Course Objective** The present course is aimed to offer a broad aspect of those areas of Physics, which are specifically required as an essential background to all engineering students for their studies in higher semesters.

#### Course Outcomes:

CO1: The students will have sufficient scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, and lasers.

CO2: Learn about resolving power of Microscope.

CO3: Learn about applications of optical fiber.

CO4: Learn about LCR circuit applications.

#### LIST OF EXPERIMENTS:

- 11) To study response curve of a series LCR circuit.
- 12) To determine the Planck's constant using LEDs.
- 13) To determine the Rydberg's constant of Hydrogen atom.
- 14) To find the refractive index and Cauchy's constants of a prism.
- 15) To find the wavelength of light by Newton's rings experiment.
- 16) To determine the thickness of a thin wire by interference.

- 17) To determine the wavelength of LASER using diffraction grating.
- 18) To determine the resolving power of a telescope.
- 19) To find the numerical aperture of an optical fiber cable.
- 20) To find the wavelength of light using Michelson's interferometer.

POs	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

EN-153B	COMMUNICATION SKILLS LAB-I	L T P	Cr
		0-0-2	1

**OBJECTIVE:** To expose the students to a variety of self-instructional learnerfriendly modes of language learning. To enable them to learn better pronunciation through stress on word accent, Intonation and rhythm and to increase vocabulary

#### COURSE OUTCOMES:

- CO6. Students learn to use the basic concepts of communication in an organised set up and social context
- CO7. Learn resume /CV preparation, report writing, format making etc. and to improve writing skills.
- CO8. **Learn** body language a presenter
- CO9. Learn to create network at meetings, college, or social activities.
- CO10. Learn levels of concentration and improves the conversational abilities of the reader.

#### LIST OF PRACTICALS:

11. Self-Introduction
12. Reading Skills
13. Speaking Skills
14. Comprehension
15. Pronunciation, Intonation, Stress and Rhythm
16. Common Everyday Situations: Conversations and Dialogues communication at Workplace
17. Interviews
18. Formal Presentations
19. Personality Development
20. Telephonic Conversation

**ORALCOMMUNICATION** (This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension

- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues communication at Workplace
- Interviews
- Formal Presentations

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<b>3</b>	<b>2</b>	2	2	1	-	-	-	-	-	2	2	1	1
CO2	<b>2</b>	<b>3</b>	1	1	1	-	-	-	-	-	1	2	1	-
CO3	<b>3</b>	<b>2</b>	3	1	-	-	-	-	-	-	2	2	-	-
CO4	<b>1</b>	<b>2</b>	1	2	-	-	-	-	-	-	2	1	2	1
CO5	<b>2</b>	<b>3</b>	3	3	-	-	-	-	-	-	1	2	-	-

<b>CS-155B</b>	<b>COMPUTER PROGRAMMING LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

EL-157B	BASIC OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L T P	Cr
		0-0-2	1

**Objective:** The objective of this course is to build basic concepts of electrical circuits. To understand network theorems and to build fundamental concepts in the design and implementation of different electrical circuit. To build basic concepts for the understanding of different electrical components and devices.

#### COURSE OUTCOMES:

- CO1. The Students will be able to learn Basic concepts of electrical circuits  
CO2. The Students will be able to learn Implementation of network theorems.  
CO3. Learn Characteristics of different electrical components  
CO4. Learn Application of circuit theory in electronics circuit

#### List of experiments / demonstrations:

12. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi – meter, oscilloscope. Resistors, capacitors and inductors.
13. Demonstration of cut – out sections of machines :
14. Torque speed characteristic of dc motor.
15. Parallel operation of single phase Transformer.
16. Open circuit & short circuit test on single phase transformer.
17. To verify the Thevenin's & Norton's theorem.
18. To verify the Superposition theorem.
19. To study frequency response of series & parallel RLC Circuit.
20. Load test on D.C. Shunt generator
21. Torque – speed characteristics of three phase Induction motor & direction reversal by change of phase sequence of connection.
22. To plot field current Vs Armature voltage characteristics of synchronous generator.

POsC Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

ME-159	WORKSHOP PRACTICE-I	L T P	Cr
		0-0-2	1

**OBJECTIVE** To provide an overview of the basic production techniques and allied / supporting techniques used to produce finished products from raw materials. In addition to theory, students will be given practical training on various basic production techniques. After going through this course, the students will be in a position to understand the working of a mechanical workshop.

1. **INTRODUCTION:** Basic manufacturing processes and safety in workshop.
2. **ENGINEERING MATERIALS:** Classification of materials—their general mechanical properties and their selection
3. **CASTING PROCESSES:** Sand casting process; pattern making; types of moulding sands, cores, mould making, melting and pouring of metal; Casting defects.
4. **MACHINING PROCESSES:** Production of components involving turning; facing; taper turning; milling; shaping; planning and drilling operations.
5. **METAL FORMING PROCESSES:** Sheet metal forming operations; shearing, bending, punching and blanking, forging processes as upsetting, drawing down, bending etc.
6. **JOINING PROCESSES:** Metal arc welding; gas welding; resistance welding; soldering and mechanical fastening processes.
7. **FITTING AND MAINTENANCE:** Study of fitting tools, marking tools and measuring instruments like micrometer, Vernier calipers and height gauge; introduction to some basic maintenance techniques/processes.

**TEXT BOOK** Raghuwanshi, B.S., “A course in Workshop Technology, Vol. I & II”, Dhanpatrai & Co.

**REFERENCE BOOK** Hazra & Chaudhary, “Workshop Technology Vol. I & II”, Asian Book Co.

## **NOTES**

1. In all sections of workshop, students will study about the tools used, different operations performed and main parts of the machine
2. Term final evaluation will be done on the basis of doing a practical job and viva-voce. There will be no theory paper on this subject.

### **JOBS TO BE DONE**

#### **A. Machine Shop**

1. To prepare a job on a lathe involving facing, turning, taper turning, step turning, radius making and parting off.
2. To prepare horizontal surface/ vertical surface/ curved surface/ slot or v-grooves on a shaper / planer.
3. To prepare a job involving side and face milling on a milling machine.
4. To prepare a job involving drilling and tapping of holes.

#### **B. Sheet Metal Work**

1. To draw layout, do marking and prepare a rectangular tray of sheet metal.
2. To draw layout, do marking and prepare a funnel of sheet metal.

#### **C. Foundry**

1. To prepare a single piece pattern mould, put metal in the mould and fettle the casting.
2. To prepare a split piece pattern mould.

#### **D. Welding**

1. To prepare joints (Lap and butt) by metal arc welding
2. To prepare welded joint by resistance welding



#### E. Fitting and Maintenance Jobs

1. Fitting jobs involving, chipping, filing, marking and measuring with precision instruments.
2. Maintenance and repair of common domestic appliances such as desert cooler, LPG stove, room heater, water tap, flush system, electric iron, scooter etc.

### SECOND SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	MA-102B	Advanced Mathematics and Numerical Methods	3-1-0	4
2	EN-104B	Communication Skills – II	3-0-0	3
3	BA-106B	Engineering Economics and Industrial Management	3-0-0	3
4	EC-108B	Digital Electronics	3-1-0	4
5	CS-110B	Data Structures and Algorithm	3-0-0	3
6	EC-112B	Electrical Engineering Materials and Semi-Conductor Devices	3-0-0	3
7	MA-150B	Applied Numerical Methods Lab	0-0-2	1
8	EC-154B	Digital Electronics Lab	0-0-2	1
9	CS-156B	Data Structures and Algorithm Lab	0-0-2	1
10	EC-158B	Electrical Engineering Materials and Semi-Conductor Devices Lab	0-0-2	1
11	PD-191A	Co- Curricular Activities And Hobby Club	2-0-0	2
				<b>26</b>

Course Code	Course Name	L-T-P	Credit
MA-102B	Advanced Mathematics & Numerical Methods	3-1-0	4

**Unit-1 Interpolation and Approximation** Newton forward interpolation, Newton backward interpolation for equal intervals, Lagrange's interpolation and Newton divided differences interpolation for unequal intervals. Gregory-Newton forward, Gregory-Newton backward, Stirling and Bessel interpolation for central differences.

**Unit-2 Numerical Differentiation and Integration** Numerical Differentiation for unequal, equal and central differences formula, Numerical Integration by Trapezoidal methods, Simpson 1/3 rule, Simpson 3/8<sup>th</sup> rule, Gauss Quadrature formula.

**Unit-3 Solution of Ordinary Differential equations** Picard's method, Euler's method, Euler's, modified method, Runge-Kutta method, Milne P-C method, Adams-Bashforth method.

**Unit-4 Solution of system of linear equations** Direct methods (Cramer rule, Gauss elimination method, Gauss Jordan method, Doolittle's method, Crout's method) Partition method, iteration method (Jacobi method, Gauss Seidel iteration method).

**Unit-5 Solution of nonlinear equation in one variable** Bisection method, Secant method, Regula falsi method, Newton Raphson method and their rate of convergence, Descartes Rule of signs, Birge-Vita method, Bairstow method for solution of polynomial equations.

#### LIST OF RECOMMENDED BOOKS:

3. Numerical Methods-Jain Iyenger Jain.
4. Numerical Analysis-Goyal-Mittal, Pragati Prakashan.

Course Code	Course Name	L-T-P	Credit
EN-104B	Communication Skills – II	3-0-0	3

**Unit-1:** Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

**Unit-2:** Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, localization.

**Unit-3:** Self Development and Assessment- Self assessment, Awareness, Perception and attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

**Unit-4:** Communication and Technical Writing- Public speaking, Group discussion, Oral presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

**Unit-5:** Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

**Text/Reference Books:**

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

Course Code	Course Name	L-T-P	Credit
BA-106B	Engineering Economics & Industrial Management	3-0-0	3

**Unit- 1: Introduction to Economics:** Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity.

**Unit-2: Theory of Production** production function, meaning, factors of production (meaning & characteristics of Land, Labor, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical

**Unit- 3 : Macro-Economic Indicators** Macro-Economic Indicators, Changes in the Gross Domestic Product (GDP), Gross National Product (GNP), Inflation, Employment & Unemployment Indicators, Currency Strength, Interest rates, Corporate Profits, Balance of Trade, Agricultural Production, Current Account balance, Foreign exchange, Foreign Trade, Industrial Production Index, Wholesale Price Index (WPI), Retail Price Index (RPI), Consumer Price Index (CPI).

**Unit-4 : Introduction to Management** Definitions, Nature, scope Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory.

**Functions to Management:** Planning, Organizing, Staffing, Directing, Controlling ( meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization.

**Unit-5: Introduction to Marketing & Production Management** Marketing Mix, concepts of marketing, demand forecasting and methods, market segmentation Introduction to Finance Management; meaning, scope, sources, functions

**Production Management: Definitions**, objectives, functions, plant layout-types & factors affecting it, plant location- factors affecting it. Introduction to Human Resource Management; definitions, objectives of manpower planning, process, sources of recruitment, process of selection

#### Reference Books:

4. Engineering Economics, R.Paneerselvam, PHI publication
5. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
6. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
4. Principles and Practices of Management by L.M.Prasad.

EC-108B	Digital Electronics	L T P	Cr
		3-1-0	4

**OBJECTIVE** Modern world deals with digital conditioning of various signals. Digitally manipulating signals or using digital circuits have many advantages in terms of accuracy etc. This subject introduces concept of basic digital electronics: gates; combinational and sequential circuits and their designing

Unit-1. **Fundamentals of digital techniques:** Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess3; Gray; EBCDIC; ASCII; Error detection and correction codes.

Unit 2. **Combinational design using gates:** Design using gates; Karnaugh map and Quine Mccluskey methods of simplification. Combinational design using msi devices: Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers for display devices.

Unit 3. **Sequential circuits:** Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.

Unit 4. **Digital logic families:** Switching mode operation of p-n junction; bipolar and MOS. devices. Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

Unit-5. **A/D and D/A converters:** Sample and hold circuit; weighted resistor and R -2 R ladder D/A Converters; specifications for D/A converters. A/D converters: successive approximation; counting type. Programmable logic devices: ROM; PLA; PAL; PEEL; GAL; FPGA and CPLDs.

TEXT BOOK Jain, R.P., “Modern Digital Electronics”, 4th Ed.; Tata McGraw Hill, 2003

#### REFERENCE BOOKS

1. Taub and Schilling, ”Digital Integrated Electronics”, Tata McGraw Hill,1997
2. Malvino and Leach; ”Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006
3. Mano, Morris, “Digital Design”, 3rd Edition, Prentice Hall of India,1994
4. Gupta and Singhal, “Digital Electronics”, 2nd Edition, Dhanpat Rai and Sons, 2000.
5. Wakerly, John F, ”Digital Design Principles and Practices”, 4th Edition, Prentice Hall of India, 2005

POsC os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

CS-110B	Data Structure & Algorithms	LTP	CR
		300	3

**Objective:** To relay the theoretical and practical fundamental knowledge of most commonly used algorithms.

**Course Outcomes:**

- CO5. Ability to analyze algorithms and algorithm correctness.
- CO6. Ability to summarize searching and sorting techniques
- CO7. Ability to describe stack, queue and linked list operation.
- CO8. Ability to have knowledge of tree and graphs concepts.

**UNIT-1 Introduction to data structures and running time:** Definition of data structures and abstract data types; linear vs. non-linear data structure; primitive vs. non-primitive data structure; static and dynamic implementations; arrays, 1,2-dimensional arrays, insertion & deletion in 1-D array; examples and real life applications. Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion.

**UNIT-2 Stacks and queues:** Stacks: definition, array based implementation of stacks,; examples: infix, postfix, prefix representation; conversions, applications; definition of queues, circular queue; array based implementation of queues.

**UNIT-3 Linked lists:** Lists; different type of linked Lists; implementation of singly linked list, linked list implementation of stacks and queues; implementation of circular linked list; applications.

**UNIT-4 Trees and graphs:** Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees: searching, insertion & deletion. Definition of undirected and directed graphs; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; graph traversal: breadth first traversal, depth first traversal; implementations and applications.

**UNIT-5 Sorting and searching algorithms:** Introduction, selection, insertions, bubble sort, efficiency of above algorithms; merge sort, merging of sorted arrays and algorithms; quick sort algorithm analysis, heap sort, searching algorithms: straight sequential search, binary search (recursive & non-recursive algorithms)

#### TEXT BOOK

3. A.K. Sharma – Data structure Using C, 2<sup>nd</sup> edition pearson 2013
4. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++ , Prentice Hall of India, 2009.

#### REFERENCE BOOKS

9. Aho A. V., Hopcroft J. E. and Ullman T. D., —Data Structures and Algorithms, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
10. Horowitz Ellis and Sahni S artaj, —Fundamentals of Data Structures, Addison-Wesley Pub, 1984.
11. Horowitz, Sahni and Rajasekaran, —Fundamentals of Computer Algorithms, 2007.
12. Kruse Robert, —Data Structures and Program Design in C, Prentice Hall of India, 1994
13. Lipschitz Jr. Seymour, —Theory & Problems of Data Structures, Schaum's Outline, Tata McGraw Hill
14. Weiss Mark Allen, —Data Structures and Algorithms Analysis in C, Pearson Education, 2000
15. Cormen T. H. et al., —Introduction to Algorithms, 2nd Edition, Prentice Hall of India, 2001.
16. Dasgupta Sanjay, Christos P. and Vazirani Umesh, —Algorithms, Tata McGraw Hill, 2008

#### WEB REFERENCES

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

EC-112B	Electrical Engineering Materials and Semiconductor Devices	L T P	Cr
		3-0-0	3

**OBJECTIVE:-**The objective of this course is to introduce the student to basic concept of semiconductor device operation based on energy bands and carrier statistics. It also provides the operation of p-n junctions and metal-semiconductor junctions. It extends this knowledge to descriptions of bipolar and field effect transistors, and other microelectronic basic devices. This course is intended for students who plan to study in the area of microelectronics or just have an interest in that area. This course emphasizes the fundamentals of materials and device operation. It is expected that the students taking this course will include ECE and non-EE majors. In this course, one will study semiconductor devices from a fundamental point of view emphasizing a thorough understanding of the mechanisms of device operation. It is expected that students who successfully complete the course will have an understanding of basic semiconductor devices sufficient to design transistors and diodes to particular specifications.

**Unit-1. Conducting materials:** Drift velocity, collision time; Mean free path; mobility; conductivity; relaxation time; factors affecting conductivity of materials; types of thermal conductivity; Wiedemann-Franz law; Super conductivity; applications.

**Unit-2 Dielectric materials:** Behavior of dielectric materials in static electric field; Dipole moments; Polarization; Dielectric constant; Polarizability, Susceptibility; mechanisms of polarization; behavior in alternating field; dielectric loss; loss tangent types of dielectric and insulating materials; electrostriction; Piezo-electricity.

**Unit-3 Magnetic materials:** Permeability; Magnetic susceptibility; magnetic moment; origin of magnetic dipole moment; angular momentum; Magnetization; Classification of magnetic materials-Para; Dia, ferro, antiferro; and ferri; Langevin's theory of dia; Curie-Weiss law; spontaneous magnetism; domain theory; Magnetosriction; eddy current and hysteresis losses; applications.

**Unit-4 Semiconductors:** Review of Si and Ge as semi-conducting materials; Continuity Equation; PN junction; Drift and Diffusion; Diffusion and Transition capacitances of P-N junction; breakdown mechanisms; ZENER diode. **OPTICAL PROPERTIES OF MATERIALS:** Optical properties of metals; semiconductors and insulators; Phosphorescence; Luminescence; Phosphors for CRO; display material for LCD; LED; solar cells and photo-detectors.

**Unit-5 Semiconductor devices:** Brief introduction to Planar Technology for device fabrication; BJT; JFET; MOSFETS. **POWER DEVICES:** Thyristor; IGBT; VMOS; UJT; GTO; their working principles and characteristics.

#### TEXT BOOK

Dekker, A.J., "Electrical Engineering Materials", 3rd Ed. Pentice Hall of India; 2009

#### REFERENCE BOOKS

1. Boylested and Nashelsky, "Electronic Devices and Circuit Theory", Pearson. Education, 2009
2. Dutta Alok, "Semiconductor Devices and Circuits", Oxford University Press, 2008
3. Streetman and Banerjee, "Solid State Electronic Devices", Pearson, 2010
4. Millman and Halkias, "Electronic Devices and Circuits", McGraw Hill, 1996
5. Gupta, J.B., "Electrical Engineering Materials and Semiconductor Devices", Katsons, 2006

Course Code	Course Name	L-T-P	Credit
MA-150B	Applied Numerical Methods Lab	0-0-2	1

#### List of Experiments: (Using C++ Software)

11. Bisection Method.
12. Newton Raphson Method.
13. Secant Method.
14. Regulai Falsi Method.
15. LU decomposition Method.
16. Gauss-Jacobi Method.
17. Gauss-Siedel Method.
18. Lagrange Interpolation or Newton Interpolation.
19. Simpson's rule.
20. Trapezoidal Rule

Course Code	Course Name	L-T-P	Credit
EC-154B	Digital Electronics Lab	0-0-2	1

#### LIST OF EXPERIMENTS

1. Study of TTL gates – AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR.
2. Design and realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer and Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R; J-K; T and D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design and verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
10. To design and realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND and NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

Course Code	Course Name	L-T-P	Credit
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CS-156B	Data Structure and Algorithm Lab	0-0-2	1
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## LIST OF EXPERIMENTS

### ARRAY OPERATIONS

49. Write a program to insert an element at given position in linear array
50. Write a program to insert an element in sorted array.
51. Write a program to delete an element from given position in linear array
52. Perform following operations on matrices using functions only
  - a) Addition b) Subtraction c) Multiplication d) Transpose

### SEARCHING

53. Search an element in a linear array using linear search.
54. Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method

### RECURSION

55. Write a program to compute factorial of given number using recursion
56. Write a program to solve Tower of Hanoi problem using recursion
57. Write a program to find power of given number using recursion

### STACK & QUEUE

58. Write a program for static implementation of stack
59. Write a program for dynamic implementation of queue
60. Write a program for static implementation of circular queue
61. Write a program for dynamic implementation of queue
62. Write a program to evaluate a postfix operation

### LINKED LIST

63. Create a linear linked list & perform operations such as insert, delete at end, at beg & reverse the link list
64. Create a circular linked list & perform search, insertion & delete operation
65. Create a doubly linked list & perform search, insertion & delete operation

### TREE & GRAPH

66. Write program to implement binary search tree. (Insertion and Deletion in Binary Search Tree)
67. Write program to simulate the various tree traversal algorithms
68. Write program to simulate various graph traversing algorithms.

### SORTING ALGORITHMS

69. Write program to implement Bubble, Insertion & selection sort.



70. Write program to implement quick sort
71. Write program to implement merge sort
72. Write a program to implement heap sort

#### TEXT BOOK

5. A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
6. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++ , Prentice Hall of India, 2009.

#### REFERENCE BOOKS

7. R. S. Salaria -Data Structure Using C
8. Kruse Robert, —Data Structures and Program Design in C , Prentice Hall of India, 1994
9. Lipschitz Jr. Seymour, —Theory & Problems of Data Structures , Schaum's Outline, 2nd Edition, Tata McGraw Hill.

POs Cos	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	2	2	1	1
CO2	2	3	1	1	1	-	-	-	-	-	1	2	1	-
CO3	3	2	3	1	-	-	-	-	-	-	2	2	-	-
CO4	1	2	1	2	-	-	-	-	-	-	2	1	2	1
CO5	2	3	3	3	-	-	-	-	-	-	1	2	-	-

Course Code	Course Name	L-T-P	Credit
EC-158B	Electrical Engineering Material and Semiconductor Devices Lab	0-0-2	1

#### LIST OF EXPERIMENTS

1. To study V-I characteristics of diode, and its use as a capacitance.
2. Study of the characteristics of transistor in Common Base configuration.
3. Study of the characteristics of transistor in Common Emitter configuration.
4. Study of V-I characteristics of a photovoltaic cell.
5. Study of characteristics of MOSFET/JFET in CS configuration.
6. To plot characteristics of thyristor.
7. To plot characteristics of UJT.
8. To plot characteristics of diac & Triac.
9. Study of loss factor in a dielectric by an impedance bridge.
10. Study of photo-resist in metal pattern for planar technology.

Course Code	Course Name	L-T-P	Credit
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PD-191B	Co-curricular Activity/Hobby Club	0-0-2	1
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#### ABOUT THE CLUB

The Green club is a part of academic curriculum scheme of Lingaya's Vidyapeeth and taken up by the students of First Year so that they could get the first-hand knowledge of Environment and its sustainability. This club is born with a vision to make the campus green and Eco-friendly and educate the youth about the importance of sustainable development, outside of the campus.

**OBJECTIVE**  
To make the Environment clean and green and pollution free.

#### ACTIVITIES OF THE CLUB

1. Colour coded dustbins for Recyclable and Non-Recyclable.
2. Work on renovating a unusual waste area/dump to provide value to the region.
3. Recycling of waste.
4. Create Blog of "Simply Green".
5. Water conservation day.
6. Reduce water usage.
7. Recycle waste water.
8. Reduce Power Consumption.
9. Cook Using Solar Cooker.
10. Rain Water Harvesting.
11. Tree planting.
12. Practical solution of ozone depletion.
13. Speech by a notable speaker/local environmentalist.
14. Quiz and GD on environmental issues
15. Debate on environmental issue
16. Collaborate with municipality and organic clean day.
17. Green march/marathon.
18. Cycle rally.
19. Zero food wastage awareness drive.
20. Writing articles and publicity them in the local newspapers.

21. Establishing link with local NGO's and works with them to save the degraded environment.

22. Zero waste campus.

### THIRD SEMESTER

SN	Course No.	Course Name	L-T-B	Credits
1	CS-114B	Data Base Management System	3-0-0	3
2	CS-201B	Object Oriented Programming using C++	3-1-0	4
3	EC-201B	Electro Mechanical Energy Conversion	3-0-0	3
4	EC-203B	Electromagnetic Theory	3-1-0	4
5	EC-205B	Analog Electronics & Circuits	3-1-0	4
6	EC-207B	Network Theory	3-1-0	4
7	CS-251B	OOPS using C++ Lab	0-0-2	1
8	EC-251B	Electro Mechanical Energy Conversion Lab	0-0-2	1
9	EC-255B	Analog Electronics & Circuits Lab	0-0-2	1
10	EC-257B	Network Theory Lab	0-0-2	1
11	HOT-201B	Hands on Training	0-0-4	2
				<b>28</b>

<b>CS-114B</b>	<b>Data Base Management System</b>	<b>L T P</b>	<b>CR</b>
		<b>3 0 0</b>	<b>3</b>

#### **OBJECTIVE:**

To provide knowledge about various organizations and management information systems, keeping in view the aspects of share ability, availability, evolvability and integrity

**PRE-REQUISITES**  
Knowledge of data structures, discrete mathematical structure

#### **COURSE OUTCOMES:**

- CO6. Students will be able to solve mathematical equations.
- CO7. Students will be able to apply numerical methods in engineering.
- CO8. To know how to find the roots of transcendental equations.
- CO9. To learn how to interpolate the given set of values
- CO10. To understand the curve fitting for various polynomials

**Unit-1 Introduction:** What is database, Purpose of database system; advantages of using DBMS; database concept and architecture; data abstraction; data models; instances and schema; data independence; schema architecture; database languages; database administrator; database users

**Unit-2 Data modeling:** Entity sets attributes and keys, relationships (ER); database modeling using entity; type role and structural constraints, weak and strong entity types; enhanced entity-relationship (EER), ER diagram design of an E-R database schema; specialization and generalization

**Unit-3 Relational model:** Relational model: relational model -basic concepts, enforcing data integrity constraints, Relational algebra: introduction, Selection and projection, set operations, renaming, Joins,

Division, syntax, semantics. Operators; extended relational algebra operations, Calculus: Tuple relational calculus, Domain relational Calculus; Codd's rules.

**Unit-4 Database design and sql:** Database design process; relational database design, anomalies in a database; functional dependencies membership and minimal covers normal forms, multi-valued dependencies, join dependencies, inclusion dependencies; reduction of an E-R schema to tables; effect of de-normalization on database performance, Query-by-example (QBE), Introduction to SQL, basic queries in SQL, advanced queries in SQL, functions in SQL; basic data retrieval, aggregation, categorization, updates in SQLs; views in SQL.

**Unit-5 Transaction processing:** Desirable properties of transactions, implementation of atomicity and durability; consistent model, read only and write only model; concurrent executions, schedules and recoverability; serializability of schedules concurrency control; serializability algorithms; testing for serializability; precedence graph; concurrency control, deadlock handling - detection and resolution.

#### TEXT BOOK/ REFERENCE BOOKS:

10. Silberschatz A., Korth H. F. and Sudarshan S., "Database System Concepts", 6th edition, McGraw-Hill, International Edition, 2010
11. Steven Feuerstein, Bill Pribyl, "Oracle PL/SQL", O'Reilly Media, 4th Edition, 2005
12. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
13. Elmasri R. and Navathe S. B., "Fundamentals of Database Systems", 6th edition, Addison-Wesley, Low Priced Edition, 2010
14. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition, 2003
15. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
16. Hansen G. W. and Hansen J. V., "Database Management and Design", 2nd edition, Prentice-Hall of India, Eastern Economy Edition, 1999
17. Majumdar A. K. and Bhattacharyya P., "Database Management Systems", 5th edition, Tata McGraw-Hill Publishing, 1999
18. Looms, "Data Management & File Structure", Prentice Hall of India, 1989.

CS-201-B	Object Oriented Programming Using C++	L T P	CR
		3 1 0	4

#### OBJECTIVE:

Providing a sound conceptual understanding of the fundamental concepts of computing hardware, software, networking and services; build programming logic and thereby developing skills in problem solving using C++ programming language; Introduce the concept of object orientation and on how to handle data in different forms; Emphasize the concepts and constructs rather than on language features..

#### COURSE OUTCOMES:

- CO6. Understanding about conducting materials and their behaviour
- CO7. Study of dielectric and magnetic material and their losses and application
- CO8. Understand the current voltage characteristics of semiconductor devices,
- CO9. Study the optical properties of the materials
- CO10. Understand the characteristics of power devices

**UNIT-1 OBJECT ORIENTED CONCEPTS & INTRODUCTION TO C++:** Introduction to objects and object oriented programming, difference between procedure oriented & Object oriented programming; main feature of Object oriented programming: Class, Object, encapsulation (information hiding); Polymorphism: overloading, inheritance, overriding methods, abstract classes, access modifiers: controlling access to a class; method, or variable (public, protected, private, package); other modifiers; Basics of C++, Simple C++ Programs, preprocessors directives, Namespace, Memory management operators in C++, Inline function, default arguments, & reference types

**UNIT-2 CLASSES AND DATA ABSTRACTION:** Introduction; structure definitions; accessing members of structures; class scope and accessing class members; separating interface from implementation; controlling access function and utility functions, initializing class objects: constructors, using default arguments with constructors; using destructors; classes : const(constant) object and const member functions, object as member of classes, friend function and friend classes; using this pointer, dynamic memory allocation with new and delete; static class members & function; container classes and integrators; **UNIT-3 OPERATOR**

**OVERLOADING, TEMPLATE & EXCEPTION HANDLING:** Introduction; fundamentals of operator overloading; restrictions on operators overloading; operator functions as class members vs. as friend functions; overloading, <<, >> overloading unary operators; overloading binary operators. Function templates; overloading template functions; class template; class templates and non-type parameters; basics of C++ exception handling: try, throw, catch, throwing an exception, catching an exception, re-throwing an exception

**UNIT-4 INHERITANCE, VIRTUAL FUNCTIONS AND POLYMORPHISM:** Introduction, inheritance: base classes and derived classes, protected members; casting base-class pointers to derived-class pointers; using member functions; overriding base-class members in a derived class; public, protected and private inheritance; using constructors and destructors in derived classes; implicit derived-class object to base-class object conversion; composition vs. inheritance; virtual functions; abstract base classes and concrete classes; polymorphism; new classes and dynamic binding; virtual destructors; polymorphism; dynamic binding.

**UNIT-5 FILES AND I/O STREAMS:** Files and streams; creating a sequential access file; reading data from a sequential access file; updating sequential access files, random access files; creating a random access file; writing data randomly to a random access file; reading data sequentially from a random access file; stream input/output classes and objects; stream output; stream input; unformatted I/O (with read and write); stream manipulators; stream format states; stream error states.

## **TEXT BOOK**

3. Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008.
4. Scheldt, Herbert —C++: The Complete Reference , Tata McGraw Hill, 3rd Ed, 2008.

## **REFERENCE BOOKS**

5. Kamthane, —Object Oriented Programming with ANSI and Turbo C++ , Pearson Education.
6. Lafore, Robert, —Object Oriented Programming in Turbo C++ , The WAITE Group Press, 1994.
7. Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008.
8. Bhave, —Object Oriented Programming with C++ , Pearson Education.

EC-201-B	ELECTRO MECHANICAL ENERGY CONVERSION	L T P	CR
		3 0 0	3

#### OBJECTIVE:

To study the working of different electrical machines.

#### COURSE OUTCOMES:

- CO7. Students learn to analyze three phase networks
- CO8. Students learn to analyze magnetic fields and circuits
- CO9. Students learn to analyze principles of electromechanical energy conversion
- CO10. Students learn to analyze performance of transformers
- CO11. Students learn to analyze performance of synchronous generators
- CO12. Students learn to analyze performance of induction motors

**UNIT-1 Magnetic Circuits and Induction:** Magnetic Circuits, Magnetic Materials and their properties, static and dynamic EMFs, force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses.

**UNIT-2DC MACHINES :** Basic theory of DC generator, brief idea of construction and working, EMF equation, load characteristics, basic theory of DC motor, concept of back EMF, torque and power equations, load characteristics, starting methods and speed control of DC motors, applications.

**UNIT-3SYNCHRONOUS MACHINE:** Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage Regulation. **SYNCHRONOUS MOTOR:** Starting methods, Effect of varying field current at different loads, V- Curves.

**UNIT-4Three Phase Transformer & Induction Machine:** Review of Single phase transformer. Three Phase transformer: Basics & operation. **Induction Machine:** Constructional features, Rotating magnetic field, Principle of operation Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, Induction generator & its applications.

**UNIT-5Introduction of Single phase Induction Motor, Repulsion motor. AC Commutator Motors:** Universal motor, single phase a.c. series compensated motor, stepper motors, servo motor.

#### Text Books:

3. D.P.Kothari & I.J.Nagrath, "Electric Machines", Tata Mc Graw Hill
4. Ashfaq Hussain "Electric Machines" Dhanpat Rai & Company

#### Reference Books:

3. P.S.Bimbhra, "Electrical Machines", Khanna Publisher

4. Fitzgerald, A.E., Kingsley and S.D. Umans "Electric Machinery", MC Graw Hill.

EC-203-B	ELECTROMAGNETIC THEORY	L T P	CR
		4 0 0	4

**OBJECTIVE:**

Equip the students with the fundamental understanding of electro-magnetic wave system. To lay the foundations of mathematical Maxwell equations, electrodynamic wave propagation and transmission lines.

**Course Outcomes**

- CO6. Explain and apply vector calculus to static and time varying electric-magnetic fields in different engineering situations.
- CO7. Explain and able to solve Electromagnetic Relation using Maxwell Formulae
- CO8. Examine the phenomena of electrodynamic wave propagation in unbounded media and its interfaces.
- CO9. Analyze and generalized the concepts of guided structures like transmission lines and their characteristics.
- CO10. Analyze wave propagation on metallic waveguides in modal form.

**Unit-1 Introduction:**

Vector Relation in rectangular; Cylindrical; Spherical and general curvilinear coordinate system, Concept and physical interpretation of gradient; Divergence and curl; Gauss's Divergence and Stoke's theorems.

**Unit-2 Electrostatics:**

Electric field intensity; flux density and polarization; Electric field due to various charge configurations. Potential functions and displacement vector, Gauss's law; Poisson's and Laplace's equation and their solution in rectangular coordinates; Uniqueness theorem; Capacitance and electrostatics energy; methods of electrostatics images; boundary conditions.

**Unit-3 Magneto statics:**

Magnetic field vector; Magnetic field intensity; flux density and magnetization, Bio-Savart's law; Ampere's law; Magnetic vector potential; Energy stored in magnetic field; Boundary conditions; Analogy between electric and magnetic field.

**Unit-4 Time varying fields:**

Faraday's law; Displacement currents and equation of continuity. Maxwell's equations; Uniform plane wave in free space; Reflections; refraction and polarization of UPW; surface impedance; standing wave ratio, Poynting theorem and power considerations.

**Unit-5 Electromagnetic fields:**

Generation – Electro Magnetic Wave equations – Wave parameters, Waves in free space, lossy and lossless dielectrics, conductors and Magnetic Materials and Skin effect.

**Theory of Transmission Line** -Transmission line as a distributed circuit; transmission line equation and parameters; characteristic impedance, smith chart.

## TEXT BOOK

2. Sadiku MH, "Principles of Electromagnetics", Oxford University Press Inc, New Delhi, 2009

## REFERENCE BOOKS

5. Krauss, J.D., "Electromagnetics", Tata McGraw Hill, 5th Edition, 2005.
6. Jordan and Balmain, "Electromagnetic Waves and Radiating Systems", 4th Ed., Prentice Hall of India, 2004
7. William H Hayt and Jr John A Buck, "Engineering Electromagnetics", Tata Mc Graw-Hill
8. Publishing Company Ltd, New Delhi, 2008

EC-205-B	ANALOG ELECTRONICS & CIRCUITS	L T P	CR
		4 0 0	4

## OBJECTIVE

To show the students the physical picture of the internal behavior of semiconductor diode and its different type of circuit. Among these are rectifier; clipper; clamper; and filter. Also gives knowledge of internal behavior of transistor; FET and its application. Regulated power supplies. Step knowledge from semiconductor physics to devices; model; circuit and system .

### Course Outcomes:

At the end of this course students will demonstrate the ability to:

- CO5. Understand the characteristics of diodes and transistors
- CO6. Design and analyze various rectifier and amplifier circuits
- CO7. Design sinusoidal and non-sinusoidal oscillators
- CO8. Understand the functioning of OP-AMP and design OP-AMP based circuits Design ADC and DAC.

**UNIT-1 SEMICONDUCTOR DIODE:** Diode as a rectifier; switching characteristics of diode; Diode as a circuit element; the load-line concept.

**SEMICONDUCTOR DIODE CIRCUITS :** Half-wave and full wave rectifiers; clipping circuits; clamping circuits; filter circuits; peak to peak detector; voltage doublers and voltage multiplier circuits.

**UNIT-2 TRANSISTOR AT LOW FREQUENCIES:** Bipolar junction transistor :  $\pi$  characteristics; Ebers-moll model of transistor; hybrid model; h-parameters (CE; CB; CC configurations); analysis of a transistor amplifier circuits using h-parameters; emitter follower; Miller's Theorem ;Effect of Emitter by pass capacitor on low frequency response; Step response of an amplifier; frequency response of R-C coupled amplifier; pass band of cascaded stages; Multi stage CE Amplifier.

**UNIT-3TRANSISTOR AT HIGH FREQUENCIES:** Hybrid model; CE short circuit current gain; frequency response; alpha; cutoff frequency; gain bandwidth product; emitter follower at high frequencies.

**TRANSISTOR BIASING:** Operating point; bias stability; collector to base bias; self-bias; emitter bias; bias compensation; thermistor and sensistor compensation; thermal runaway.



**UNIT-4FIELD EFFECT TRANSISTORS:** Junction field effect transistor; MOSFET Enhancement and Depletion mode; V-MOSFET; Common source amplifier; source follower; biasing of FET; applications of FET as a voltage variable resistor (V V R).

**UNIT-5REGULATED POWER SUPPLIES:** Series and shunt voltage regulators; power supply parameters; three terminal IC regulators; SMPS.

### TEXT BOOK

7. Millman and Halkias, *Integrated Electronics*, 2nd Edition, Tata McGraw Hill, 1998.

### REFERENCE BOOKS

8. Neamen, D.A., —*Electronic Circuit Analysis and Design*l, 2nd Edition, Tata McGraw Hill, 2004.
9. Malvino, —*Electronics Principles*l, 6th Edition McGraw Hill, 2003.
10. Schilling, Donald L. and Boylestad, Charles Belove and Nashelsky, —*Electronics Circuits*l, 8th Edition, McGrawHill, 2005.
11. Bell, David A., —*Electronic Devices and Circuits*l, 3rd Edition, Prentice Hall of India, 2007.
12. Motorstad, *Electronics Devices and Circuits*l, 2nd Edition, Prentice Hall of India, 2004.

EC-207-B	NETWORK THEORY	L T P	CR
		4 0 0	4

### OBJECTIVES:

Network Theory is a successful technique frequently used to plan, monitor and control the projects involving thousands of activities. To minimize project cost. . To minimize the project time. . To ensure optimum utilization of human and other resources. To ensure minimum conflicts and unnecessary delays.

**Course Outcomes:** At the end of this course students will demonstrate the ability to

- CO6.Understand basics electrical circuits with nodal and mesh analysis.
- CO7.Appreciate electrical network theorems.
- CO8.Apply Laplace Transform for steady state and transient analysis.
- CO9.Determine different network functions.
- CO10. Appreciate the frequency domain techniques.

### Unit 1:

Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactances, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.

### Unit 2:

Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

### Unit 3:

Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

**Unit 4:**

Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and Two four port network and interconnections.

**Unit 5:**

Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters.

**Text/Reference Books:**

4. Van, Valkenburg.; “Network analysis”; Prentice hall of India, 2000
5. Sudhakar, A., Shyammohan, S. P.; “Circuits and Network”; Tata McGraw-Hill New Delhi, 1994
6. A William Hayt, “Engineering Circuit Analysis” 8th Edition, McGraw-Hill Education

CS-251-B	OOPS Using C++ Lab	L T P	CR
		0 0 2	1

**Objectives:**

The objectives of the course are to have students identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.

**Course Outcomes:**

- CO6. Creating simple programs using classes and objects in C++.
- CO7. Implement Object Oriented Programming Concepts in C++.
- CO8. Develop applications using stream I/O and file I/O.
- CO9. Implement simple graphical user interfaces.
- CO10. Implement Object Oriented Programs using templates and exceptional handling concepts

**LIST OF EXPERIMENTS:**

**BASIC CONCEPT OF C++**

Write a program to show the concept reference type, call by reference & return by reference in C++

Write a program to show the concept of default arguments in C++

Write a program to show the concept of inline function

Write a program to show the concept of dynamic memory management in C++

Write a program to show the concept of function overloading

**CLASS & OBJECTS**

Write a C++ program to show the concept of class & object

Write A C++ program showing function taking objects as a arguments and function returning objects

Write C++ programs to show the concept of static data member & static member function

Write C++ program to show the concept of friend function

Write C++ program to show the concept of different type of constructor

Write C++ program to show the concept of destructor

### **OPERATOR OVERLOADING**

Write a C++ program showing overloading of unary operator using member function & friend function

Write a C++ program showing overloading of binary operator using member function & friend function

Write a C++ program showing overloading of << and >> operators

### **INHERITANCE**

Write a C++ program to show the concept of multilevel inheritance

Write a program to show the concept of multiple inheritance

Write a C++ program to show the concept of hybrid inheritance

Write a program to show the concept of virtual base class

### **DYNAMIC BINDING & VIRTUAL FUNCTION**

Write a C++ to show the concept of virtual function to implement dynamic binding

Write a C++ program to show the concept of pure virtual function & abstract class

### **FILES HANDLING**

Write C++ programs for creating, reading& writing sequential access file

Write C++ programs for creating, reading & writing random access file

### **TEMPLATES**

Write a C++ program to show the concept of class template

Write a C++ program to show the concept of function template

### **TEXT BOOK**

Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008

Schildt, Herbert —C++: The Complete Reference , Tata McGraw Hill, 3rd Ed, 2008.

## REFERENCE BOOKS

Kamthane, —Object Oriented Programming with ANSI and Turbo C++ , Pearson Education

Lafore, Robert, —Object Oriented Programming in Turbo C++ , The WAITE Group Press, 1994

Balagurusamy, E., —Object Oriented Programming with C++ , Prentice Hall of India, 2008

Bhave, —Object Oriented Programming with C++, Pearson Education.

EC-251-B	Electro Mechanical Energy Conversion Lab	L T P	CR
		0 0 2	1

### Objectives:

To give information about conversion of electrical energy into mechanical energy and vice versa using electromagnetic fields, to explain different machines and generators, working principles, to build basis for more advanced studies in electrical machines and to introduce renewable energy resources.

### Course Outcomes:

CO6. Can explain the transformation of electrical energy into mechanical energy or vice versa using electromagnetic fields.

CO7. Explain the operation of DC motors and generators and analysis.

CO8. Explain the operation of transformers.

CO9. Know the operation of induction machines and generators.

CO10. Know the basic principles of renewable alternate current energy production.

### List of Experiments:

10. To perform no load and blocked rotor tests on a three phase squirrel cage induction motor and determine equivalent circuit.
11. To perform load test on a three phase induction motor and draw: (i) Torque -speed characteristics (ii) Power factor-line current characteristics
12. To perform no load and blocked rotor tests on a single phase induction motor and determine equivalent circuit.
13. To study speed control of three phase induction motor by Keeping V/f ratio constant
14. To study speed control of three phase induction motor by varying supply voltage.
15. To perform open circuit and short circuit tests on a three phase alternator and determine voltage regulation at full load and at unity, 0.8 lagging and leading power factors by (i) EMF method (ii) MMF method.
16. To determine V-curves and inverted V-curves of a three phase synchronous motor.
17. To determine  $X_d$  and  $X_q$  of a three phase salient pole synchronous machine using the slip test and draw the power-angle curve.
18. To study synchronization of an alternator with the infinite bus by using: (i) dark lamp method (ii) two bright and one dark lamp method

EC-255-B	ANALOG ELECTRONICS & CIRCUITS Lab	L T P	CR
		0 0 2	1

## OBJECTIVES:

The objective of this laboratory is to link the theoretical concepts of different analog electronics circuits with practical feasibility thereby giving them a scope to learn basic electronics circuits and their different electrical characteristics in a better way.

## COURSE OUTCOMES:

- CO6. Acquire basic knowledge of physical and electrical conducting properties of semiconductors.
- CO7. Develop the Ability to understand the design and working of BJT / FET amplifiers. 3. Able to design amplifier circuits using BJT s And FET's. and observe the amplitude and frequency responses of common amplifier circuits
- CO8. Observe the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies.
- CO9. Observe the effect of positive feedback and able to design and working of different Oscillators using BJTS.
- CO10. Develop the skill to build, and troubleshoot Analog circuits.

## LIST OF EXPERIMENTS

- 12. Study the effect of voltage series; current series; voltage shunt; and current shunt feed- back on amplifier using discrete components.
- 13. Design and realize inverting amplifier; non-inverting and buffer amplifier using 741 Op Amp.
- 14. Verify the operation of a differentiator (ideal and practical) circuit using 741 op amp and show that it acts as a high pass filter.
- 15. Verify the operation of a integrator circuit (ideal and practical) using 741 op amp and show that it acts as a low pass filter.
- 16. Design and verify the operations of op amp adder and subtractor circuits.
- 17. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.
- 18. Design and realize using op amp 741; Sine wave oscillator.
- 19. To design and realize using op amp 741; triangular wave generator.
- 20. To design and realize using op amp 741; logarithmic amplifier and VCCS.
- 21. Study of Timer circuit using NE555 and configuration for nonstable and astblemultivibrator.
- 22. Realization of a V-to-I and I-to-V converter using Op-Amps.
- 12. To Study and construct class-A and class-B Power amplifier
- 13. To study and construct Active filters using Op amps.

EC-257-B	NETWORK THEORY Lab	L T P	CR
		0 0 2	1

## OBJECTIVES:

To equip the students with the knowledge and techniques of analyzing Three phase electrical circuits. Students learn the concepts of Two-port Network parameters. . To introduce the concept of DC and AC transient analysis.

#### **COURSE OBJECTIVES:**

- CO7. Learner will be able to apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
- CO8. Analyze AC and DC transient response of resistance, inductance and capacitance in terms of impedance.
- CO9. Analyze three phase circuits.
- CO10. Understand, and calculate the initial conditions of RL, RC circuits.
- CO11. To formulate, solve the differential equations for RL, RC, and RLC circuits and carry out the transient analysis.
- CO12. Understand, analyze and design prototype LC filters.

#### **LIST OF EXPERIMENTS**

11. To calculate the 'Z' parameters of given two port network and verify the result experimentally
12. To calculate the 'Y' parameters of given two port network and verify the result experimentally
13. To calculate the 'ABCD' parameters of given two port network and verify the result experimentally
14. To calculate the 'Y' parameters of given two port network and verify the result experimentally
15. To verify the frequency response of low pass filter circuit.
16. To verify the frequency response of high pass filter circuit.
17. To plot a frequency response of Band pass filter and determine the 3 - db Bandwidth
18. To study the frequency response of a series R-L-C circuit
19. To study the frequency response of a series R-L-C circuit
20. Introduction to PSPICE.

<b>HOT-201B</b>	<b>Hands On Training</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>2</b>

**OBJECTIVES:** Toengage students in the learning process. As a result, students' attention and focus increases and they develop critical thinking skills and active participation in the learning process results in a much higher retention of learning.

#### **COURSE OUTCOME:**

- CO6. More program material is retained
- CO7. Simulated learning is an engaging environment
- CO8. A hands-on learning environment develops critical thinking skills
- CO9. Real-world experience and knowledge from an instructor can go a long way
- CO10. Use of materials and equipment used on the job

#### **ROBOTICS**

8. Introduction to Robotics.
9. Introduction to basic components of Robot.
10. Introduction to Basics of Electronics.
11. Introduction to Micro Controller & its features.
12. Introduction to PCB & Soldering techniques.
13. Demonstration & Hands on soldering of PCB.
14. Assembling of Robot of your choice

#### FOURTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	EC-202B	Digital & Analog Communication	3-0-0	3
2	CS-202B	Computer Networks	3-1-0	4
3	EC-204B	Electronics Measuring Instruments	3-0-0	3
4	EC-206B	Signals and Systems	3-1-0	4
5	EC-208B	Control System	3-1-0	4
6	EC-210B	MOS IC's & Technology	3-0-0	3
7	EC-252B	Digital & Analog Communication Lab	0-0-2	1
8	CS-252B	Computer Networks Lab	0-0-2	1
9	EC-254B	Electronics Measuring Instruments Lab	0-0-2	1
10	EC-258B	Control System Lab	0-0-2	1
11	EC-260B	MOS IC's & Technology Lab	0-0-2	1
12	PD-293	Intra & Inter Personal Skills	0-0-2	1
			18-3-12	<b>27</b>

EC-202B	Digital & Analog Communication	L T P	CR
		3 0 0	3

**Unit 1:** Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

**Unit 2:** Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.

**Unit 3:** Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

**Unit 4:** Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

**Unit 5:** Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

#### **Text/Reference Books:**

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.

2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., "Principles of Communication Engineering" John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., "Digital Communication", Kluwer Academic Publishers, 2004.
6. Proakis J.G., "Digital Communications", 4th Edition, McGraw Hill, 2000.

**Course Outcomes:** At the end of this course students will demonstrate the ability to

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance.

<b>CS-202B</b>	<b>Computer Networks</b>	<b>L T P</b>	<b>CR</b>
		<b>4 0 0</b>	<b>4</b>

## OBJECTIVE

To have a fundamental understanding of the design, performance and state of the art of wireless communication systems, Topics covered include state of the art wireless standards and research and thus changes substantially from one offering of this course to the next

**PRE-REQUISITES:** Knowledge of computers hardware and software

**Unit1 OVERVIEW OF DATA COMMUNICATION AND NETWORKING:** Introduction; Data communications: components, data, direction of data flow, Protocols, Networks: type of connection, topology: Star, Bus, Ring, Mesh, Tree, categories of network: LAN, MAN, WAN: Internet: brief history, Layered architecture of networks, OSI reference model, Functions of each layer, services and protocols of each layer, TCP / IP reference model.

**Unit-2 PHYSICAL AND DATA LINK LAYER:** Transmission media: Guided media, unguided media switching: Circuit switching, packet switching, datagram switching. Error Detection and Correction: Types of errors, detection vs correction, cyclic codes, checksum. Framing: Flow and Error Control, Protocols: Stop &wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ.

**Unit3 MEDIUM ACCESS SUBLAYER** Random access: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Controlled Access: Reservation, Polling, Channelization: FDMA, TDMA, CDMA, IEEE Standards, Standard Ethernet, Changes in the standard, Fast Ethernet, Gigabit Ethernet

**Unit4 NETWORK LAYER:** Network Devices: Active and Passive Hubs, Repeaters, Bridges, Two and Three layer switch, Gateway. Internet Protocol, Transmission Control Protocol, User Datagram Protocol; IP Addressing, IP address classes, subnet addressing, DNS, Internet control protocols: ARP, RARP, ICMP.

**Unit5 TRANSPORT LAYER :** Process to process delivery, user datagram protocol, TCP services, features, TCP Connection, flow control, error control and congestion control; Congestion control, Quality of Service, WAN Technologies: Synchronous Digital Hierarchy (SDH) / Synchronous Optical Network (SONET); Asynchronous Transfer Mode (ATM) Frame Relay.



## TEXT BOOK

Tanenbaum Andrew S, —Computer Networks , 4th Edition, Pearson Education/Prentice Hall of India, 2003.

## REFERENCE BOOKS

10. Forouzan Behrouz A., —Data Communications and Networking , Tata McGraw Hill 2006.
11. Stallings William, —Data and Computer Communication , 5th Edition, Prentice Hall of India, 1997.
12. Fred Halsall, —Data Communications, Computer Networks and Open Systems , 4th edition, Addison Wesley, Low Price Edition, 2000
13. Fitzgerald Jerry, —Business Data Communications , Wiley, 2009.
14. Peterson Larry L. and Davie Bruce S., —Computer Networks – A System Approach , 3rd Edition, Morgan Kaufmann, 2003.
15. Tittel E. D., —Computer Networking , Tata McGraw Hill, 2002
16. Kurose James F. and Ross Keith W., —Computer Networking: A Top-Down Approach Featuring the Internet , 2nd Edition, Pearson Education, 2003.
17. Keshav S., —An Engineering Approach to Computer Networking , Addison-Wesley, 1997.
18. Comer D. E., —Internetworking with TCP/IP , Volume 1, 3rd Edition, Prentice Hall of India, 1995.

EC-204B	Electronics Measuring Instruments	L T P	CR
		3 0 0	3

**Course Objectives:** To present a problem oriented introductory knowledge of Electronic measurement techniques. To focus on the study different Instruments used for Electronic measurements.

### UNIT-1 MEASURING SYSTEM FUNDAMENTALS:

S.I. units, Absolute standards (International, Primary, Secondary & Working Standards), True Value, Errors (Gross, Systematic, Random); Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution & threshold). Classification of Instruments (Absolute and Secondary; Indicating, Recording and Integrating Instruments, Based Upon principle of operation); Block diagram and description of block of generalized instrument; 3 forces in electromechanical Indicating Instrument (Deflecting, Controlling and Damping forces).

### UNIT-2 ANALOG & DIGITAL MEASURING INSTRUMENTS:

Classification of analog instruments; Constructional details and principle of operation of various analog instruments; Introduction to digital meters; Instruments for measurement of voltage, current and other parameters; frequency measurements.

### UNIT-3A.C. BRIDGES:

Classification of resistances, resistance – Measurements by Wheat Stone Bridge ,Kelvin's double bridge method and their limitation General Balance Equation, Circuit Diagram, Phasor Diagram, Advantage and Disadvantages, Application of Maxwell's Inductance, Inductance – Capacitance, Hay's, Anderson's, Owen's, De-Sauty's, Schering and Wein's Bridges, Shielding and Earthing.

#### UNIT-4 GENERATION AND ANALYSIS OF WAVEFORMS:

Block Diagram of Oscilloscope, pulse-generator; Signal generators; Function Generators; Wave analyzer; Distortion Analyzers; Spectrum analyzer; Harmonic Analyzer; Power Analyzer, Sampling & Digital storage Oscilloscope.

#### UNIT-5 INSTRUMENTATION:

Transducers; classification and selection of transducers; strain Gauges; Inductive and Capacitive transducer; Piezo-electric and Hall-Effect transducers; Thermistors and thermocouples; Photo-Diode and Photo-transistors; Encoder type digital transducer; Signal conditioning, Telemetry and Data Acquisition system.

#### TEXT BOOK

Sawhney, A.K, "Electrical / Electronic Measurement and Instrumentations", Danpath Rai and Sons, 2003.

#### REFERENCE BOOKS

7. Gupta, J.B, "Electrical / Electronic Measurement and Instrumentations", Kataria & Sons, Year Jan 2007-08
8. Cooper, W. D. & Helfrick, A. D, "Electrical Measurement", Prentice Hall of India, 1999
9. Doebelin, E. O, "Measuring System", Tata McGraw Hill, 2000
10. Golding, E. W, "Electrical Measurement", Wheeler Publishing, 1999.
11. Bhargava N. N., "Basic Electronics and Linear Circuits", Tata McGraw Hill, 2007
12. Salivahan, "Electronics Devices and Circuits", Tata McGraw Hill, 3rd Edition, 2003.

**Course Outcomes:** At the end of this course students will demonstrate the ability to:

- CO5. Classify the Instrumentation and Measurement system and various measurement errors.
- CO6. Analyze and design voltmeter circuits, AC electronic voltmeter, digital frequency meter and current measurement with electronic instruments.
- CO7. Evaluate various resistance and impedance measuring methods using Bridges and Q-meter. Analyze fundamental operation of CRO and some special type of oscilloscopes like DSO, Sampling oscilloscope.
- CO8. Demonstrate calibration method to calibrate various instruments and classify transducers like for force, pressure, motion, temperature measurement etc.

EC-206B	Signals & Systems	L T P	CR
		4 0 0	4

#### Course Objectives:

To introduce students, the concept and theory of signals and systems needed in electronics and

telecommunication engineering fields.

To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain

### **Unit -1 Introduction to signals**

Signals: Definition, types of signals and their representations: continuous-time/discrete-time, periodic/non-periodic, even/odd, energy/power, deterministic/ random, one-dimensional/multi-dimensional; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables).

### **Unit- 2 Fourier Transform**

Fourier Transforms (FT): (i) Definition, conditions of existence of FT, proper ties, magnitude and phase spectra, some important FT theorems, Parseval's theorem, Inverse FT

### **Unit – 3 Introductions to Sytems**

Impulse response characterization and convolution integral for CT LTI system, signal responses to CT - LTI system, properties of convolution, LTI system response properties from impulse response. Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT

**Unit -4- Laplace Transform**Laplace-Transform (LT): (i) One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC) (ii) One sided and Bilateral Z-Transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping .

**Unit – 5 Z- Transform**Z-transform (ZT): Regions of convergence (ROC) (ii) One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using One-sided ZT, s- to z-plane mapping. **Text Books:**

Signal and Systems' I J NAGRATH, R. RANJAN & Sharan, 2009 Edn., TMH, New Delhi

### **Reference Books:**

4. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, 'Signals & System', PEARSON Education, Second Edition, 2003.
5. Schaume Series on Signals & Systems, HSU & RANJAN, TMH, India
6. DSP –A Practical Approach –Emmanuel C. Ifeache, Barrie. W. Jervis, 2nd Ed., Pearson Education.

### **Course Outcomes:**

CO5. Understand about various types of signals and systems, classify them, analyze them,

and perform various operations on them,  
 CO6. Understand use of transforms in analysis of signals and system in continuous and discrete time domain.  
 CO7. Observe the effect of various properties and operations of signals and systems.  
 CO8. Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behavior of electronic

EC-208B	Control System	L T P	CR
		4 0 0	4

**OBJECTIVE** Providing sound knowledge about the various control system techniques required for the operation and accurate controls of Industrial processes and other strategies for complicated processes and efficient control.

#### UNIT-1 INTRODUCTION TO CONTROL PROBLEM:

Industrial control examples; Transfer function models of mechanical; electrical and thermal systems, system response; control hardware and models: synchros; dc and ac servomotors; tachogenerators; servomotors; closed-loop systems, Block diagram and signal flow graph analysis; transfer function.

#### UNIT-2 BASIC CHARACTERISTICS OF FEEDBACK CONTROL SYSTEM:

Stability; steady-state accuracy; transient accuracy; disturbance rejection; insensitivity and robustness. Basic modes of feedback control: proportional; integral and derivative. Feed-forward and multi-loop control configurations, standard input signals; response of 1<sup>st</sup> and 2<sup>nd</sup> order systems; time domain specifications i.e.; rise time; peak time; delay time; peak overshoot; settling time; steady state error etc.; Different types of feedback systems; steady state errors for unit ramp; unit step and unit parabolic inputs.

#### UNIT-3 TIME DOMAIN STABILITY ANALYSIS:

Introduction; concept of stability; conditions for stable system; asymptotic; relative and marginal stability; Routh-Hurwitz criterion for stability and various difficulties with Routh-Hurwitz criterion. Introduction; concepts of root locus; construction of root loci and various rules pertaining to locus diagram development.

#### UNIT-4 FREQUENCY DOMAIN ANALYSIS AND STABILITY:

Introduction; relation between time and frequency response for 2<sup>nd</sup> order system; Bode plot; construction Procedure for bode plot; gain cross over and phase cross over frequency; gain margin and phase margin; Nyquist plot and Nyquist stability criterion.

#### UNIT-5 STATE-VARIABLE ANALYSIS:

Concept of state; state variable; state model; state models for linear continuous time functions; diagonalization of transfer function; solution of state equations; concept of controllability and Observability.

## TEXTBOOK

Nagrath and Gopal, "Control System Engineering", New Age International, 2005

## REFERENCE BOOKS

6. Ogata .K. "Modern Control Engineering", Pearson Education, 2000
7. Gopal Madan "Control System – Principles & Design" Tata McGraw Hill, 1998
8. Dorl.R. C. & Bishop "Modern Control Engineering", Addison Wesley, 1999.
9. Kuo, B. C. "Automatic control System", John Wiley & Sons, 1998
- 10.

### Course Outcomes:

- CO6. Apply systems theory to complex real world problems in order to obtain models that are expressed using differential equations, transfer functions, and state space equations
- CO7. Predict system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain
- CO8. Analyze the behavior of closed loop systems using tools such as root locus, Routh Hurwitz, Bode, Nyquist, and Matlab
- CO9. Design controllers using classical PID methods, root locus methods, and frequency domain methods.
- CO10. Devise a safe and effective method of investigating a system identification problem in the lab

EC-210B	MOS IC's & Technology	L T P	CR
		3 0 0	3

**OBJECTIVE** The objective of this course is to introduce the students to the concepts in VLSI circuits. The course also aims to provide students with the knowledge required to design, implement, and test digital VLSI circuits through nMOS, pMOS, and CMOS and BiCMOS technologies and to integrate those VLSI circuits in complex digital systems.

6. **FUNDAMENTALS OF MOS TECHNOLOGY:** Introduction to IC technology; MOS Transistor - Enhancement and Depletion mode operations; Introduction to Fabrication; CMOS and BiCMOS Devices. Equivalent circuit for MOSFET.
7. **MOS TRANSISTOR THEORY:** MOS Device Design Equations; MOS Transistor; Evaluation aspects of MOS Transistor; Threshold voltage; MOS Transistor Trans-conductance; Figure of Merit; Determination of Pull-up to Pull-down Ratio for an n-MOS inverter driven by another n-MOS inverter and by one or more pass transistor; alternative forms of Pull-up; CMOS and Bi-CMOS-inverters. Latch up in CMOS circuitry and BiCMOS Latch up susceptibility.
8. **MOS CIRCUITS AND LOGIC DESIGN:** Basic Physical Design of simple logic gates using n-MOS; p-MOS and CMOS; CMOS logic gate design considerations; CMOS logic structures.

9. **CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION:** Resistance estimation; Capacitance estimation; Inductance; Switching characteristics; Voltage Transfer Characteristics (VTC) of Resistor Load n-MOS and Comparison with CMOS Inverter, Noise Margin Estimation, CMOS Gate Transistor Sizing; Power Dissipation. **DESIGN EXAMPLE USING CMOS :** ; Clocking Strategies, Incrementer/ Decrementer; Left/Right Shift Serial/Parallel Register; Comparator for two n-bit number; a two-phase non-overlapping clock generator with buffered output on both phases; design of an event driven element for EDL system.
10. **VLSI FABRICATION:** Extraction of Silicon from Sand/Silica, Purification, Crystal growth and Chemical Cleaning Processes, Wafer preparation and orientations; Epitaxy; Oxidation; Lithography; Etching; Diffusion; Dielectric and Poly-silicon Film Deposition; Ion Implantation; Metallization. Yield and Reliability

#### TEXT BOOK

Sung-Mo Kang, Yusuf Leblebici, "CMOS Digital Integrated Circuits", Tata McGraw-Hill Education, 2003

#### REFERENCE BOOKS

8. Sze, S.M., "VLSI Technology", 2<sup>nd</sup> Edition, Tata McGraw Hill, 2001.
9. Sze, S.M., "Physics of Semiconductor Devices", Wiley
10. Sorab K. Ghandhi, "VLSI Fabrication Principles" 1994
11. Botkar, K.R., "Integrated Circuit", 4<sup>th</sup> Edition, Prentice Hall of India, 2000
12. Weste, N.H.F and Eshraghian, "Principal of CMOS VLSI Design", 2<sup>nd</sup> Edition, John Wiley & sons, 2000
13. Pucknell, Douglas A., "Basic VLSI Design", Kamsan Eshraghian, 5<sup>th</sup> Edition, Prentice Hall of India, 2005.
14. Wolf, Wayne, "Modern VLSI Design", Prentice Hall.

#### Course Outcomes:

- CO6. to acquire qualitative knowledge about the MOS transistors fabrication
- CO7. to develop the layout of any logic circuit which helps to understand and estimate parasitical effects.
- CO8. to develop Structures of logical gates using CMOS inverter and analyze their transfer characteristics.
- CO9. to develop Structures of logical gates using CMOS inverter and analyze their transfer characteristics.
- CO10. to design simple logic circuit using Array memories and to acquire Knowledge on testing and testability of a system.

EC-252B	Digital & Analog Communication Lab	L T P	CR
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		<b>002</b>	<b>1</b>
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### LIST OF EXPERIMENTS

1. Study of Amplitude Modulation and determination of Modulation index.
2. Study of Frequency Modulation and determination of Modulation index.
3. Study of Phase Modulation.
4. Study of Pulse Amplitude Modulation.
5. Study of Pulse Width Modulation.
6. Study of Pulse Frequency Modulation.
7. Study of Pulse Code Modulation.
8. Study of frequency Shift Keying.
9. Study of ASK and QASK.
10. Study of PSK and QPSK.
11. Project related to the scope of the course.

<b>CS-252B</b>	<b>Computer Networks Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>002</b>	<b>1</b>

List of Experiments:

10. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
11. Study of Network Devices in Detail.
12. Study of network IP.
13. Connect the computers in Local Area Network.
14. Study of basic network command and Network configuration commands.
15. Configure a Network topology using packet tracer software.
16. Configure a Network topology using packet tracer software.
17. Configure a Network using Distance Vector Routing protocol.
18. Configure Network using Link State Vector Routing protocol.

<b>EC-254B</b>	<b>Electronics Measuring Instruments Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>002</b>	<b>1</b>

### LIST OF EXPERIMENTS

13. To measure power and p.f. by 3-ammeter method in a single phase circuit.
14. To measure power and p.f. by 3-voltmeter method in a single phase circuit
15. To measure power and p.f in 3-phase circuit by 2-wattmeter method.
16. To measure inductance by Maxwell's bridge.
17. To measure capacitance by De Sauty's bridge.
18. To calibrate an energy meter with the help of a standard wattmeter and a stop watch.
19. To study the use of LVDT or displacement transducers.

20. Measurement of temperature using R.T.D.
21. Measurement of temperature using Thermocouple.
22. Measurement of pressure using Piezo-electric pickup.
23. To measure frequency by Wien's bridge.
24. To measure the power with the help of C.T and P.T.

**Course Outcomes:**

- CO7. Recognize the evolution and history of units and standards in Measurements.
- CO8. Identify the various parameters that are measurable in electronic instrumentation.
- CO9. Employ appropriate instruments to measure given sets of parameters.
- CO10. Practice the construction of testing and measuring set up for electronic systems.
- CO11. To have a deep understanding about instrumentation concepts which can be applied to Control systems.
- CO12. Relate the usage of various instrumentation standards.

<b>EC-258B</b>	<b>Control System Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

**LIST OF EXPERIMENTS:**

1. To study A.C. Servo-motor and to plot its torque-speed characteristics
2. To study magnetic amplifier and to plot its load current v/s control current characteristics for (a) Series connected mode (b) Parallel connected mode
3. To implement a PID controller for temperature control of a pilot plant
4. To study different components of process control simulator kit
5. To study A.C. Motor position control through continuous command
6. To study Synchro transmitter and receiver and to plot stator voltage v/s rotor angle for synchro transmitter
7. To study lead, lag, lead-lag compensator and to draw their magnitude and phase plot
8. To study D.C. Servo-motor and to plot its torque-speed characteristics
9. To study simple open loop and closed loop control system with disturbance and without disturbance using process control simulator kit
10. To study (PD), PI, PID controllers.
11. To study a stepper motor and control the speed by 8085 microprocessor kit

**ADDITIONAL EXPERIMENTS**

12. Obtain the unit step response of a second order system with given zeta and  $\omega_n$  using MATLAB.
13. Determine the unit step response of a given close loop transfer function using MATLAB.
14. Determine the damping ratio, undamped natural frequency of oscillation and percentage overshoot of a unity feedback open loop transfer function to a unit step input using MATLAB.

**Course Outcomes:**

- CO5. Understand the basics of Matlab and familiarize with control system tool box for designing various LTI systems.
- CO6. Design, analyze various models of the systems in time domain and evaluate different response parameters



- CO7. Analyze stability from root locus of the given model of the system.
- CO8. Design, analyze various models of the systems in frequency domain and evaluate different response parameters.

<b>EC-260B</b>	<b>MOS IC's &amp; Technology Lab</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

### LIST OF EXPERIMENTS

13. Introduction to the Simulation software PSPICE.
14. To obtain the drain current of the enhancement PMOS using PSPICE. Also compare with the theoretical value.
15. To obtain the noise margin of a CMOS inverter using PSPICE.
16. To obtain dynamic power dissipation of a CMOS inverter using PSPICE.
17. To obtain propagation delay of CMOS NAND gate using PSPICE.
18. To plot voltage transfer characteristics of a depletion load MOSFET with substrate connected to ground.
19. Evaluation of transient response of enhancement MOSFET and comparison.
20. Evaluation of frequency response of CMOS amplifier.
21. To study the effect of change in temperature on CMOS inverter.
22. To study the effect of change in W/L ratio on CMOS inverter.
23. Study of power dissipation in Pseudo-NMOS inverter and comparison with CMOS inverter using PSPICE.
24. Evaluation of electrical parameters of an OPAMP

<b>PD-293</b>	<b>Intra &amp; Inter Personal Skills</b>	<b>L T P</b>	<b>CR</b>
		<b>0 0 2</b>	<b>1</b>

### FIFTH SEMESTER

<b>SN</b>	<b>Course No.</b>	<b>Course Name</b>	<b>L-T-P</b>	<b>Credits</b>
1	EC-301B	Digital Signal Processing	3-1-0	4
2	EC-303B	Microprocessor & Microcontroller	3-0-0	3
3	EC-305B	Digital System Design	3-0-0	3
4	EC-307B	Microwave & Radar Engineering	3-0-0	3
5	EC-309B	Antenna & Wireless Communication	3-0-0	3
6	CS-305B	Python Programming	3-0-0	3

7	EC-351B	Digital Signal Processing Lab	0-0-2	1
8	EC-353B	Microprocessor & Microcontroller Lab	0-0-2	1
9	EC-355B	Digital System Design Lab	0-0-2	1
10	EC-357B	Microwave & Radar Engineering Lab	0-0-2	1
11	EC-360B	Minor Project	0-0-2	1
12	CS-355B	Python Programming Lab	0-0-2	1
				25

EC-301B	Digital Signal Processing	L T P	Cr
		4 0 0	4

## OBJECTIVE

- To induce a thorough understanding of theory of DSP.
- To get in-depth knowledge of various applications- Filters, MultiMate DSP, DSP to speech & Radar, Transforms etc.

1. **DISCRETE-TIME SIGNALS AND SYSTEMS:** Signal classifications; frequency domain representation; time domain representation; representation of sequences by Fourier transform; properties of Fourier transform; discrete time random signals; energy and power theorems. System Classification; properties; time invariant system

2. **Z-TRANSFORM:** Introduction, properties of the region of convergence; properties of the Z-transform, inversion of the Z-transform, applications of Z-transform. DFT & FFT

3. **BASICS OF DIGITAL FILTERS:** Fundamentals of digital filtering; various types of digital filters; design techniques of digital filters: window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP; DSP algorithm implementation consideration. Applications of DSP.

4. **ERRORS IN DIGITAL FILTERING:** Errors resulting from rounding and truncation, round-off effects in digital filters. Finite word length effects in digital filter.

5. **MULTIRATE DIGITAL SIGNAL PROCESSING:** Introduction to multirate digital signal processing; sampling rate conversion; filter structures; multistage decimator and interpolators; digital filter banks.

## TEXT BOOKS:

- Digital Signal Processing: Principles, Algorithms & Applications J.G.Proakis& D. G.Manolakis, 4thEd., PHI.
- Discrete Time Signal Processing Alan V Oppenheim & R. W Schaffer, PHI.
- DSP –A Practical Approach –Emmanuel C. Ifeachor, Barrie. W. Jervis, 2<sup>nd</sup>Ed., Pearson Education.

## REFERENCE BOOKS:

1. Modern Spectral Estimation: Theory & Application –S. M .Kay, 1988, PHI.
2. Multi Rate Systems and Filter Banks –P.P.Vaidyanathan –Pearson Education.

**Course Outcomes:** At the end of this course students will demonstrate the ability to

1. Represent signals mathematically in continuous and discrete time and frequency domain
2. Get the response of an LSI system to different signals
3. Design of different types of digital filters for various applications.

<b>EC-303-B</b>	<b>Microprocessors and Microcontroller</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 1 0</b>	<b>3</b>

**OBJECTIVE** This subject introduces the concept of Microprocessors to the students. It covers 8 bit (8085) and 16-bit (8086) Microprocessors: their architecture, assembly language programming and interfacing with peripheral devices

#### **UNIT-1 THE 8085 PROCESSOR:**

Introduction to microprocessor; 8085 microprocessor: Architecture; Pin Diagram; instruction set; interrupt structure; Addressing modes and assembly language programming.

#### **UNIT-2 THE 8086 MICROPROCESSOR ARCHITECTURE:**

Architecture; block diagram of 8086 with details of sub-blocks; memory segmentation and physical address computations; program relocation; addressing modes; pin diagram and description of various signals; Interrupt Structure.

#### **UNIT-3 INSTRUCTION SET OF 8086:**

Data transfer instructions; arithmetic instructions; branch instructions; looping instructions; NOP and HLT instructions; flag manipulation instructions; logical instructions; shift and rotate instructions; directives; programming examples.

**UNIT-4INTERFACING DEVICE:** The 8255 PPI chip: Architecture; control words and modes; interfacing and programming with 8085.

**DMA:** Introduction to DMA process; 8257 pin diagram; architecture; operation; command words; interfacing and programming with 8085.

#### **UNIT-5PROGRAMMABLE INTERRUPT CONTROLLER:**

8259 pin diagram; architecture; initialization command words; operational command words.

**PROGRAMMABLE INTERVAL TIMER:** 8253 pin diagram; architecture; modes.

#### **TEXT BOOK**

Gaonkar, Ramesh S., —Microprocessor Architecture: Programming and Applications with 8085, 5th Edition, Prentice Hall of India, 1995

#### **REFERENCE BOOKS**

6. Brey,||The Intel Microprocessors 8086- Pentium Processor||, 4th Edition, 2005
7. Hall, —Microprocessors and interfacing||, Tata McGraw Hill, 3rd Edition, 2003

8. Liu Yu-Chang and Gibson Glenn A., —Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, Prentice Hall of India, 2003
9. Ray A. K. and Burchandi, —Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing, Tata McGraw Hill, 2002
10. Rafiquzzman, —Microprocessor based System Design UBSI Wiley-Interscience, 5th Edition, 2005

**Course Outcomes:**

CO1 Demonstrate the various features of microprocessor, memory and I/O devices including concepts of system bus.

CO2 Identify the hardware elements of 8085/8086 microprocessor including architecture and pin functions and programming model including registers, instruction set and addressing modes.

CO3 Select appropriate 8085/8086 instructions based on size and functions to write a given assembly language program.

CO4 Design a given interfacing system using concepts of memory and I/O interfacing.

CO5 Demonstrate the features of advance microprocessors.

EC-305-B	<b>Digital System Design</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

**OBJECTIVE**

This course provide student with a foundation in digital system. The course will explore the essential topic related to the design of modern digital circuit and to go about designing complex, high speed digital system and implement such design using programmable logic.

**UNIT-1 INTRODUCTION:** Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL; data objects; classes and data types; Operators; Overloading; logical operators. Types of delays, Entity and Architecture declaration. Introduction to behavioral; dataflow and structural models.

**UNIT-2 VHDL STATEMENTS:** Assignment statements; sequential statements and process; conditional statements; Generate statement; case statement Array and loops; resolution functions; concurrent statements. Packages and Libraries; Subprograms: Application of Functions and Procedures; Structural Modelling; component declaration; structural layout and generics; Configuration Statements

**UNIT-3 COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN:** VHDL Models and Simulation of combinational circuits such as Multiplexers; Demultiplexers; encoders; decoders; code converters; comparators; implementation of Boolean functions etc.

**UNIT-4 FINITE STATE MACHINES:** Introduction to FSM; Melay & Moore Machines, Test Benches; ALIAS; Generate statement.

**UNIT-5 PROGRAMMABLE LOGIC DEVICES:** PAL, PLA, CPLD & FPGA

**TEXT BOOK**

3. Brown and Vranesic, «Fundamentals of Digital Logic with VHDL Design», Tata McGraw Hill, 2nd Edition, 2000
4. Bhasker, "A VHDL Primer", 2nd Edition, Star Galaxy, 1998.

**REFERENCE BOOKS**

7. IEEE Standard VHDL Language Reference Manual, 1993.
  8. Chang, K.C., —Digital Design and Modelling with VHDL and Synthesis, 1st Edition, Wiley-IEEE Computer Society Press., 1999
  9. Roth, Charles. H., —Digital System Design Using VHDL, PWS, 1998.
  10. Navabi, Z, "VHDL-Analysis and Modelling of Digital Systems", 2nd Edition, McGraw Hill, 1998.
  11. Douglas, Perry L., —VHDL, IV Edition, Tata McGraw Hill, 2008
  12. Ercegovac, Lang and Moreno, «Introduction to Digital Systems», PWS, 2000.
- Jain, R.P., —Modern Digital Electronics , 3rd Edition, Tata McGraw Hill, 2003.

**Course Outcomes:**

CO1 Develop a digital logic and apply it to solve real life problems.

CO2 Analyze, design and implement combinational logic circuits.

CO3 Classify different semiconductor memories.

CO4 Analyze, design and implement sequential logic circuits.

CO5 Analyze digital system design using PLD.

CO6 Simulate and implement combinational and sequential circuits using VHDL systems.

EC-307-B	Microwave & Radar Engineering	L T P	Cr
		3 0 0	3

**OBJECTIVE**

- To understand theoretical principals underlying microwave devices and networks
- To study microwave components such as power dividers; hybrid junctions; cavity resonant ferrite devices; and a single stage microwave transistor amplifiers and various results of electromagnetic theory including Maxwell's Equations.

**Unit-1.WAVEGUIDES:** Comparison with transmission lines; propagation in TE and TM mode; rectangular wave guide; TEM mode in rectangular wave guide; characteristic impedance; introduction to circular waveguides and planar transmission lines.

**Unit-2. MICROWAVE COMPONENTS:** S-parameters; Directional couplers; tees; hybrid ring; attenuators; cavity resonators; mixers and detectors; phase shifter; Ferrite devices: Isolators; circulators and gyrators.

**Unit-3. MICROWAVE SOURCES: TUBES-** Construction; operation and properties of Klystron amplifier; reflex Klystron; magnetron; TWT; BWO; crossed field amplifiers.

**SOLID STATE DEVICES:** Varactor diode; Tunnel diode; Schottky diode; GUNN diode; IMPATT; TRAPATT and PIN diodes. MASER; parametric amplifiers.

**Unit-4. MICROWAVE MEASUREMENTS:** Network Analyser and measurement of scattering parameters, Spectrum Analyser and measurement of spectrum of a microwave signal, **Power**, Frequency and impedance measurement at microwave frequency, Measurement of Microwave antenna parameters, Noise at microwave frequency.

**Unit-5. INTRODUCTION TO RADAR:** Block Diagram and operation; Radar Frequencies; Types of RADAR, Simple form of Radar Equation; Prediction of Range Performance; Pulse Repetition frequency and Range Ambiguities; Applications of Radar

#### TEXT BOOK

1. Samuel. Liao, "Microwave Devices and Circuits", 3rd Edition, Prentice Hall of India,1996.
2. Robert E Colin, "Foundations for Microwave Engineering", John Wiley & Sons Inc, 2005
3. Kulkarni, M, "Microwave Devices and Radar Engineering", 2nd Edition, Umesh Publications,

#### REFERENCE BOOKS

1. Reinhold Ludwig and Gene Bogdanov, "RF Circuit Design: Theory and Applications", PearsonEducation Inc., 2011
2. D.M. Pozar," Microwave Engg.", 2nd edition, John Wiley and Sons, 1999

#### Course Outcomes:

- CO1. Explain different types of waveguides and their respective modes of propagation.
- CO2. Analyze typical microwave networks using impedance, admittance, transmission and scattering matrix representations.
- CO3. Design microwave matching networks using L section, single and double stub and quarter wave transformer.
- CO4. Explain working of microwave passive circuits such as isolator, circulator, Directional couplers, attenuators etc.
- CO5. Learn working of microwave tubes and solid-state devices.

EC-309-B	Antenna and Wireless Communication	L T P	Cr
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**OBJECTIVE** The basic objective of Antenna and Wave Propagation is communication of information from source to destination and to understand the basic theory of electromagnetic waves traveling from transmitter to receiver. This course explains how antenna converts the electrical energy in the electromagnetic wave and vice versa. This course also explains the various types of transmitting and receiving antennas recently in use.

#### **UNIT-1 Basics of Antenna:**

Concept and Function of antenna, Properties of antennas, Reciprocity theorem, antennas parameters, Radiation mechanism, Friis transmission formula, Hertzian dipole, Different current distribution in linear antennas, Working and radiation characteristics of half wave dipole, quarter wave dipole, full wave dipole and monopole.

#### **UNIT-2 Antennas Arrays:**

Two element array, Uniform linear array, Broadside and endfire array, Array of non-isotropic radiations, Principles of pattern multiplication, Binomial arrays. Array Synthesis: Synthesis methods, Dolph Chebyshev methods.

#### **UNIT-3 HF, VHF and UHF Antennas:**

Resonant and non – resonant antennas, LF Antennas, Antennas for HF, VHF and UHF, Folded dipole, Yagi-Uda antenna, Log-periodic antenna, Loop antenna, Helical antenna.

#### **UNIT-4 Practical Antennas:**

Parabolic reflector, Types of parabolic reflector, Feed systems, shaped beam antennas, Horn antennas, Slot antenna, Microstrip antenna, Antennas for satellite communication and mobile communication.

#### **UNIT-5 Radio Wave Propagation:**

Ground waves, Space waves, Effect of Earth, Duct formation, Ionosphere, sky waves, Propagation in free space, structure of the ionosphere, propagation of plane waves in ionized medium, Determination of critical frequency, MUF, Fading, tropospheric propagation, Super refraction

#### **Text Book:**

1. “Electromagnetic Waves and Radiating Systems”, E. C. Jordan & K.G. Balmain, PHI.
2. “Antenna Theory and Design”, C.A. Balanis, John Wiley & Sons, Inc.

#### **Reference Books:**

1. “Antennas and Wave Propagation, G.S.N. Raju, Pearson Education.
- Kraus, J.D., “Antennas”, 2nd Edition, Tata McGraw Hill, 2003.
2. “Antenna Analysis”, Edward A. Wolf, John Wiley and Sons,
3. “Antenna Theory and Practice”, Rajeshwari Chatterjee, IInd Edition, New Age International Ltd.

#### **Course Outcomes:**

CO1 Aware of parameter considerations viz. antenna efficiency, beam efficiency, radiation resistance etc. in the design of an antenna.

CO2 Capable to analyze the designed antenna and field evaluation under various conditions and formulate the electric as well as the magnetic fields Equation set for Far field and near field

conditions.

CO3 Understand the Array system of different antennas and field analysis under application of different currents to the individual antenna elements

CO4 Understand the design issues, operation of fundamental antennas like Yagi-Uda, Horn antennas and helical structure and also their operation methodology in practice.

CO5 Design a lens structure and also the bench step for antenna parameter measurement of testing for their effectiveness.

CS-305-B	Python Programming	L T P	Cr
		3 0 0	3

### **Course Objectives:**

Computer programming skills are now becoming part of basic education as these skills are increasingly of vital importance for future job and career prospects. The Python programming language which is one of the most popular programming languages worldwide. The course shows you how to use the free open-source Python to write basic programs and high level applications using concepts such as Class,BIF of Python, functions, variables, If Else statements, For loops, While loops, iterative and recursive programs and algorithms such as the Insertion Sort algorithm. This course will be of great interest to all learners who would like to gain a thorough knowledge and understanding of the basic components of computer programming using the Python language—and might be a gentle introduction to programming for those who think they might have a longer-term interest in the subject area.

### **Unit-1**

Introduction to Python Programming Language. : Introduction to Python Language, Strengths and Weaknesses, IDLE, Dynamic Types, NamingConventions, StringValues, StringOperations, StringSlices, StringOperators, Numeric Data Types, Conversions, Built In Functions

### **Unit-2**

Data Collections and Language Component :Introduction, Control Flow and Syntax,Indenting,TheifStatement,Relational Operators,Logical,Operators,True or False, Bit Wise Operators,ThewhileLoop,breakandcontinue,TheforLoop,Lists,Tuples,Sets,Dictionaries,Sorting Dictionaries, Copying Collections.

### **Unit-3**

Object and Classes: Classes in Python, Principles of Object Orientation, CreatingClasses, InstanceMethods, File Organization Special Methods, Class Variables, Inheritance, Polymorphism, Typeldentification, Custom Exception Classes.

### **Unit-4**



Functions and Modules :Introduction, Defining Your Own Functions,Parameters,Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments,Scope,Functions-"First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary,Lambda,Modules,Standard Modules–sys,Standard Modules–math, Standard Modules–time,ThedirFunction.

## Unit-5

I/O and Error Handling In Python :Introduction, DataStreams, Creating Your Own Data Streams, AccessModes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories,Metadata,Errors,Run Time Errors, The Exception Model, ExceptionHierarchy, Handling Multiple Exceptions.

### Reference Book:

1. Dive into Python, Mike
2. Learning Python, 4thEdition by MarkLutz
3. Programming Python, 4thEdition by Mark Lutz

EC-351B	Digital Signal Processing Lab	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

### LIST OF EXPERIMENTS Perform the experiments using MATLAB:

1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. To develop program for discrete convolution.
3. To develop program for discrete correlation.
4. To understand stability test.
5. To understand sampling theorem.
6. To design analog filter (low-pass, high pass, band-pass, band-stop).
7. To design digital IIR filters (low-pass, high pass, band-pass, band-stop).
8. To design FIR filters using windows technique.
9. To design a program to compare direct realization values of IIR digital filter
10. To develop a program for computing parallel realization values of IIR digital filter.
11. To develop a program for computing cascade realization values of IIR digital filter
12. To develop a program for computing inverse Z-transform of a rational transfer function.

**Course Outcomes:**

CO1 Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.

CO2 Modeling of discrete time signals and systems and verification of its properties and results.

CO3 Implementation of discrete computations using DSP processor and verify the results.

CO4 Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.

EC-353B	Microprocessors and Microcontroller Lab	L T P	Cr
		0 0 2	1

**LIST OF EXPERIMENTS**

12. Familiarization with the operation of 8085 Microprocessor kit.
13. Write a program using 8085 for: a) Addition of two 8-bit numbers. b) Addition of two 16-bit numbers
14. Write a program using 8085 for : a) 8-bit subtraction b) 16-bit subtraction
15. Write a program using 8085 for a) Multiplication of two 8- bit numbers b) Division of two 8-bit numbers
16. Write a program using 8085 to arrange an array of 10 Nos in- a) Ascending order b) Descending order
17. Familiarization with the operation of 8086 microprocessor kit
18. Write a program using 8086 for copying 12 bytes of data from source to destination.
19. Write a program using 8086 for: a) Finding the largest number from an array. b) Finding the smallest number from an array.
20. Write a program using 8086 for arranging an array of numbers in descending order and ascending order
21. Write a program for finding square of a number using look-up table and verify.
22. Write a program to interface a two digit number using seven-segment LEDs. Use 8085 microprocessor and 8255 PPI.

**Course Outcomes:**

- CO6. Familiarize with the assembly level programming using 8086microprocessor.
- CO7. Design circuits for various applications using microprocessor.
- CO8. An in-depth knowledge of applying the concepts on real- timeapplications
- CO9. Design and apply interfacing circuits for different applications
- CO10. Understand the basic concepts of 8086 microprocessors with their application

EC-355B	Digital System Design Lab	L T P	Cr
		0 0 2	1

## LIST OF EXPERIMENTS

10. Design all gates using VHDL.
11. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) half adder b) full adder
12. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) multiplexer b) DE multiplexer
13. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) decoder b) encoder
14. Write a VHDL program for a comparator and check the wave forms and the hardware generated
2. 6 Write a VHDL program for ALU.
15. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
16. Write a VHDL program for a counter and check the wave forms and the hardware generated
17. Write VHDL programs for the following circuits; check the wave forms and the hardware generated a) register b) shift register
18. Implement any three (given above) on FPGA/CPLD kit

### Course Outcomes:

- CO6. Describe Verilog hardware description languages (HDL).
- CO7. Design Digital Circuits in Verilog HDL. Write behavioral models of digital circuits.
- CO8. Write Register Transfer Level (RTL) models of digital circuits.
- CO9. Describe standard cell libraries and FPGAs.
- CO10. Synthesize RTL models to standard cell libraries and FPGAs. 8. Implement RTL models on FPGAs and Testing & Verification.

EC 357B	Microwave & Radar Engineering Lab	L T P	Cr
		0 0 2	1

## LIST OF EXPERIMENTS

1. To study of wave guide component
2. To Study the characteristics of reflex Klystron and determine its timing range
3. To measure frequency of microwave source and demonstrate relationship among guide dimensions, free space wave length and guide wavelength
4. To measure VSWR of unknown load and determine its impedance using a smith chart
5. To study the properties of E-Plane tee junction and to determine isolation and coupling coefficient
6. To measure coupling and directivity of direction couplers
7. To measure insertion loss, isolation of a three port circulator

8. To study the V-I characteristics of GUNN diode
  9. To study isolation and coupling of a Magic tee
  10. To plot a radiation pattern of Antenna
  11. To measure VSWR, insertion losses and attenuation of a fixed and variable attenuator.
  12. To understand the operation of pulsed RADAR system by using block diagram
- Optional Experiment

**Course Outcomes:**

- CO1. Understand the concepts of Microwave & Radar Engineering.
- CO2. Students will be able to generated Microwave Signals.
- CO3. Students will be able to communicate by microwave signal between source & receiver.
- CO4. Students will be able to implement RADAR communication system.

EC-360B	Minor Project*	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

**OBJECTIVE** The project involves in-depth study on the topic, design, development, analysis fabrication and/or experimental work – Hardware and/or Software. It is intended to give an opportunity to a student to apply his knowledge to solve real-life problem.

The student has to select a project work based on a topic of interest.

**OPERATION** Minor Project shall comprise of Phase-I and can be upgraded in VII Semester. The students may work jointly (small group) or individually.

CS-355B	Python Programming Lab	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

**List of Experiments:**

11. Write python program to print Hello World
12. Write python program to Hello World using string variable
13. Write python program to store data in list and then try to print them.
14. Write python program to do basic trim and slice on string.
15. Write python program to print list of numbers using range and for loop
16. Write python program to store strings in list and then print them.
17. Write python program to let user enter some data in string and then verify data and print welcome to user.
18. Write python program in which an function is defined and calling that function prints Hello World
19. Write python program in which afunction (with single string parameter)is defined and calling that function prints the string parameters given to function.

20. Write python program in which an class is define, then create object of that class and call simple print function define in class

### SIXTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	EC-302B	Scientific Computing	3-0-0	3
2	EC-304B	Probability Theory and Stochastic Process	3-0-0	3
3	EC-306B	Broadband Network	3-0-0	3
4	EC-312B	Internet of Things	3-0-0	3
5	EC-314B	Digital Image and Video Processing	3-0-0	3
6	EC-322B	Real Time System	3-0-0	3
7	EC-356B	Broadband Network Lab	0-0-2	1
8	EC-362B	Internet of Things Lab	0-0-2	1
9	EC-364B	Digital Image and Video Processing Lab	0-0-2	1
10	PD2-392B	Problem Solving Skills	0-0-2	1
			18-0-8	<b>22</b>

EC-302B	Scientific computing	L T P	Cr
		<b>3 0 0</b>	<b>3</b>

#### Unit-1

**Introduction:** Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability and Accuracy Computer Arithmetic: Floating Point Numbers, Normalization, Properties of Floating Point System, Rounding, Machine Precision, Subnormal and Gradual Underflow, Exceptional Values, Floating-Point Arithmetic, Cancellation

#### Unit-2

System of liner equations: Linear Systems, Solving Linear Systems, Gaussian elimination, Pivoting, Gauss-Jordan, Norms and Condition Numbers, Symmetric Positive Definite Systems and Indefinite System, Iterative Methods for Linear Systems Linear least squares: Data Fitting, Linear Least Squares, Normal Equations Method, Orthogonalization Methods, QR factorization, Gram-Schmidt Orthogonalization, Rank Deficiency, and Column Pivoting Eigenvalues and singular values: Eigenvalues and Eigenvectors, Methods for Computing All Eigenvalues, Jacobi Method, Methods for Computing Selected Eigenvalues, Singular Values Decomposition, Application of SVD.

#### Unit-3

Nonlinear equations: Fixed Point Iteration, Newton's Method, Inverse Interpolation Method Optimization: One-Dimensional Optimization, Multidimensional Unconstrained Optimization, Nonlinear Least Squares Interpolation: Purpose for Interpolation, Choice of Interpolating, Function.

#### Unit-4

Polynomial Interpolation, Piecewise Polynomial Interpolation Numerical Integration And Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation, Initial Value Problems for ODES, Euler's Method, Taylor Series Method, Runge-Kutta Method, Extrapolation Methods, Boundary Value Problems For ODES, Finite Difference Methods, Finite Element Method, Eigenvalue Problems Partial

### Unit-5

Differential Equations, Time Dependent Problems, Time Independent Problems, Solution for Sparse Linear Systems, Iterative Methods Fast Fourier Transform, FFT Algorithm, Limitations, DFT, Fast polynomial Multiplication, Wavelets, Random Numbers And Simulation, Stochastic Simulation, Random Number Generators, Quasi-Random Sequences

Text/ Reference Books:

1. Heath Michael T., "Scientific Computing: An Introductory Survey", McGraw-Hill, 2nd Ed., 2002
2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery, "Numerical Recipes: The Art of Scientific Computing", Cambridge University Press, 3rd Ed., 2007

<b>EC-304B</b>	<b>Probability and Stochastic Processes</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

### Unit-1

Sets and set operations; Probability space; Conditional probability and Bayes theorem; combinatorial probability and sampling models.

### Unit-2

Discrete random variables, probability mass function, probability distribution function, example random variables and distributions; Continuous random variables, probability density function, probability distribution function, example distributions.

### Unit-3

Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds.

### Unit-4

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem.

### Unit-5

Random process. Stationary processes. Mean and covariance functions. Ergodicity. Transmission of random process through LTI. Power spectral density.

**Text/Reference Books:**

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,
5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers
6. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

1. Understand representation of random signals
2. Investigate characteristics of random processes
3. Make use of theorems related to random signals
4. To understand propagation of random signals in LTI systems.

EC-306B	Broadband Networks	L T P	Cr
		3 0 0	3

Unit-1 Overview of internet –concepts, challenges and history. Next Generation Internet- challenges and problems. Multicasting in Internet. Real time communication over Internet.

Unit-2 Packet scheduling Algorithms- requirements and choices. Admission control in internet. Differentiated Services in internet. Internet Telephony and voice over IP (VoIP) - RTP and RTCP.

Unit-3 Broadband ISDN and ATM Networks- ATM protocols. IP switching and MPLS- Overview of IP over ATM and its evolution to IP switching. Policy based Networking. Policy servers.

Unit-4 Web in Qos domain. Architecture for Web Qos. Web Access – Intelligent web browsing and web caching. . Internet and web Traffic measurement and characterization. Prediction for network management.

Unit-5 Optical communication networks- DWDM based transport network. Issues in IP over DWDM optical IP routers and switching.

EC-312B	Internet of Things	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

**Course Objectives:**

- To understand and have a clear vision to IoT.
- To understand and determine IoT Markets perspective.
- Data and Knowledge Management and use of Devices in IoT Technology.
- To build State of the Art architecture – IoT Architecture.
- Application of IoT in real world, understand IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.
- To meet the evolving IoT industry needs by addressing the challenges in Security in IoT, Integration of large scale heterogeneous network, Integration and interaction of uncertain data, and Service adaptation in the dynamic system environment.

Unit 1:

**Introduction to Internet of Things (IoT):**

Definition of the Internet of Things (IoT), the Importance of the Internet of Things (IoT) in Society, IoT Architecture, History of IoT, M2M Machine to Machine, Web of Things

Unit-2

**Sensors and Data Acquisition for IoT:** Wireless Sensors and Transducers, Signal Conditioning Circuits, Data Acquisition Systems, ADC and DACs, Microcontrollers Interfaces for Data Interfaces.

Unit-3

**Architecture of IoT networks:** Basic Network Architecture for IoT, Network and Transport Layer services, Wireless Local Area Network, Mobile Networking, Real Time Networking

Unit -4

**Sensors interfacing** Hardware Interfacing for IoT Sensors interfacing, Actuators interfacing Communication Protocol study for IoT, UART Communication, RS485 Communication, I2C Protocol device interfacing, SPI Protocol device interfacing, Ethernet configuration, **Automation for IoT:** Basic of Automation, Embedded Computing Basics, Internet of Things Automation using Arduino, Internet of Things (IoT) Automation using Raspberry Pi 2, Eagle bone black IoT automation

Unit -5



**Case study & advanced IoT Applications** with: Smart Agriculture Sensors, Smart Environment Sensors, Smart Industrial Sensors, Smart Water Sensors, Smart Home Automation, Smart Security Solutions, Smart Cities Concepts, IoT physical servers,

**Textbook & Reference Books:**

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, —From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence , 1st Edition, Academic Press, 2014.
2. Vijay Madisetti and Arshdeep Bahga, —Internet of Things (A Hands-on-Approach) , 1st Edition, VPT, 2014.
3. Francis da Costa, —Rethinking the Internet of Things: A Scalable Approach to Connecting Everything , 1st Edition, Apress Publications, 2013

EC-314B	Digital Image and Video Processing	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

Unit-1 Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures. Image Enhancements and Filtering-Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain, sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

Unit-2 Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation. Image Segmentation- Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation.

Unit-3 Wavelets and Multi-resolution image processing- Uncertainty principles of Fourier Transform, Time-frequency localization, continuous wavelet transforms, wavelet bases and multi-resolution analysis, wavelets and Subband filter banks, wavelet packets. Image Compression-Redundancy–inter-pixel and psycho-visual; Lossless compression – predictive, entropy; Lossy compression- predictive and transform coding.

Unit-4 Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000. Fundamentals of Video Coding- Inter-frame redundancy, motion estimation techniques – full search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy – Group of pictures, frames, slices, macro-blocks and blocks

Unit-5 Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X. Video Segmentation- Temporal segmentation–shot boundary detection, hard-cuts and soft-cuts; spatial segmentation – motion-based; Video object detection and tracking.

Text/Reference Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India. 2nd edition 2004
3. Murat Tekalp, Digital Video Processing" Prentice Hall, 2nd edition 2015

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Mathematically represent the various types of images and analyze them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Develop algorithms for image compression and coding

EC-322B	Real Time System	LTP	Cr
		300	3

Unit 1: Introduction to Real time system Issues in real time computer structure of real time system, Need for R TOS Task classes performance measures for real time system: properties, traditional performance measures, performance ability, cost function and hard deadline and Estimating program run time introduction LINUX/UNIX OS.

Unit 2: Embedded software and Task Scheduling Examples of embedded system their characteristics and their typical hardware component embedded software architecture scheduling algorithm: round robin, round robin with interrupts, function queue schedule real time operating system selection, CPU Scheduling algorithm: Rate monitoring, EDF, MLF, Priority Scheduling, priority ceiling and priority inheritance Real time operation system: Task and task state, shared data and reentrancy semaphore and shared data, use of semaphore protecting shared data

Unit 3: Features of Real Time operating system Message Queues mailboxes pipe timer function event memory management Interrupt basics system design using an RTOS design principle, interrupt routine, task structure and priority Current research in RTOS. Case studies: Vx work and micro OS-II

Unit 4: Real Time Database Real time v/s general purpose database main memory database transaction priority transaction aborts concurrency control issue: pessimistic concurrency control and optimistic concurrency control disk scheduling algorithm

Unit 5: Fault Tolerance Technique Case of failure fault type fault detection Fault and error containment Redundancy: hardware redundancy software redundancy Time redundancy information redundancy Data diversity Integrated failure handling

EC-356 B	Broadband Networks Lab	L-T-P	Credits
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		<b>0-0-2</b>	<b>1</b>
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#### List of Experiments

14. To Study of Computer Network and Network Topologies.
15. Introduction to Electronic Private Automatic Branch Switching Exchanges Study of WSN
16. Introduction to Electronic Private Automatic Branch Switching Exchanges Study of working of a Manual and Automatic matrix switching Network
17. Learning Broadband communication and its various protocol and connection using simtelNetsys software
18. Study of different types of ISDN interfaces
19. To set basic configuration of ISDN system using Emulator, ISDN Telephones, terminal Adapter and Analog Telephones.
20. To analyses simple Trace using Protocol Analyzer after establishing, voice communication between two ISDN telephones
21. Study of Different types of Numbering in ISDN System
22. Study of point to point/multipoint connections in ISDN System
23. Study of filtering in ISDN analyzer
24. Study of ISDN Telephone Features
25. Study of Euro-/SDN ETSI standards with Fault Finding
26. To setup base-band digital communication link using Raised Cosine spectrum pulses with the chosen roll-off factor, to study the characteristics of the RC pulse, to explore the behavior of the timing acquisition algorithm and to understand clock slip control in the tracking algorithm

To mitigate the distortion introduced by the channel on the transmitted signal using Adaptive Linear Equalizer (LE) on the received samples from ADC output.

EC-362B	Internet of Things Lab	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

1. Study and Install Python in Eclipse and WAP for data types in python.
2. Write a Program for arithmetic operation in Python.
3. Write a Program for looping statement in Python.
4. Study and Install IDE of Arduino and different types of Arduino.
5. Write program using Arduino IDE for Blink LED.
6. Write Program for RGB LED using Arduino.
7. Study the Temperature sensor and Write Program foe monitor temperature using Arduino.
8. Study and Implement RFID, NFC using Arduino.
9. Study and implement MQTT protocol using Arduino.
10. Study and Configure Raspberry Pi.
11. WAP for LED blink using Raspberry Pi.

## 12. Study and Implement ZigBee Protocol using Arduino / Raspberry Pi.

EC-364B	Digital Image and Video Processing Lab	L-T-P	Credits
		0-0-2	1

### List of Experiments

1. To study the fundamental of Image and Video
2. To study the Image Processing concept.
3. To obtain histogram equalization image.
4. To Implement smoothing or averaging filter in spatial domain
5. Program for opening and closing of the image
6. To fill the region of interest for the image
7. Program for DCT/IDCT computation.
8. Program for edge detection algorithm
9. Program of sharpen image using gradient mask.
10. Program for morphological operation: erosion and dilation.

PD-392	Problem Solving Skills	L-T-P	Credits
		0-0-2	1

## SEVENTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	ECEL-403B	Electronics System Design	3-0-0	3
2	ECEL-413B	Energy Harvesting Technologies & Power Management for IOT devices	3-0-0	3
3	ECEL-417B	IOT Using RFID and microcontroller	3-0-0	3
4	ECEL-421B	Satellite communication	3-0-0	3
5	ECEL-415B	Smart Grid Technologies	3-0-0	3
6	ECEL-453B	Electronics System Design Lab	0-0-2	1
7	ECEL-457B	IOT Using RFID and microcontroller Lab	0-0-2	1
8	ECEL-471B	Satellite communication Lab	0-0-2	1
9	(BA-271A/ CS-303C)	Human Resource Management / Artificial Intelligence (Open Elective)	3-0-0	3
10	ECEW-403B	Electronics Workshop	0-0-4	2
11	EC-491B	Major Project	0-0-8	4
12	PDP-492	Professional Career Skill	0-0-2	1

			18-0-20	28
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<b>ECEL-403B</b>	<b>Electronic System Design</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

**UNIT-I: Analog and Digital Circuit Design of Circuits:** Analog and digital circuit design of circuits for biomedical applications using operational amplifiers, data acquisition, conversion, and interface to microcomputers. Patient safety, patient isolation circuits. Operating principles of various types of patient isolation circuitry. Most suitable isolation circuit for a given application. Test isolation circuits.

**UNIT-II: Data Acquisition:** Sample and Hold Conversion, Multi Channel acquisition, High speed sampling in ADC, Selection of drive amplifier for ADC performance, Gain setting and level shifting, ADC input protection, Multichannel channel applications for data acquisition systems, External protection of amplifiers, High speed ADC architectures.

**UNIT-III: Interference and Noise Reduction Techniques:** Types of noise-Thermal noise, shot noise, excess noise, Burst, Internal noise in OPAMPs, Noise issues in high speed applications, Causes of noise and interference encountered in medical equipment. Manifestation of noise or interference. Techniques for minimizing the impact of noise or interference when using various types of medical equipment.

**UNIT-IV: Hardware Approach to Digital Signal Processing:** Coherent and non-coherent sampling, Digital signal processing techniques, DSP hardware, ALU, Multipliers, accumulators, data address generators, serial ports, system interfacing ADC's and DAC's to DSPs. Interfacing IO ports to DSPs.

**UNIT-V: Use of Telemetry in A Medical Environment:** Available frequency bands and licensing requirements for RF telemetry environments. Typical telemetry methods used in medical applications. Common problems with telemetry installations. Battery management procedures. Types of batteries used in medical equipment. Typical shelf life of common batteries. Applications for common batteries. Techniques to improve life of batteries. Test equipment for correct function after battery replacement.

TEXT BOOKS:

- HalitEren, "Electronic portable instruments-Design and applications", CRC Press, 2004.
- Robert B. Northrop, "Analysis and application of analog electronic circuits to biomedical instrumentation", CRC Press, 2004.

REFERENCE BOOKS:

- Reinaldo J. Perez, "Design of medical electronic devices", Academic Press, 2002

<b>ECEL-413B</b>	<b>Energy Harvesting Technologies &amp; Power Management</b>	<b>L T P</b>	<b>Cr</b>
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	<b>for IOT devices</b>	<b>3-0-0</b>	<b>3</b>
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**COURSE OUTCOME** To learn the techniques in involved in Energy harvesting

#### **COURSE OBJECTIVES**

1. Understand the various energy sources and energy harvesting based sensor networks
2. Learn about the various piezoelectric materials and Non-linear techniques
3. Understand the various Power sources for WSN
4. Learn about the applications of Energy harvesting systems.

#### **UNIT I – ENERGY HARVESTING SYSTEMS**

Introduction – Energy sources – energy harvesting based sensor networks – photovoltaic cell technologies – generation of electric power in semiconductor PV cells types

#### **UNIT II - PIEZO-ELECTRIC ENERGY HARVESTING AND ELECTROMECHANICAL MODELING**

Piezoelectric materials – transducers – harvesters – micro generators – strategies for enhancing the performance of energy harvesters. Electromechanical modeling of Lumped parameter model and coupled distributed parameter models and closed-form solutions

#### **UNIT III- ELECTROMAGNETIC ENERGY HARVESTING AND NON-LINEAR TECHNIQUES**

Basic principles – micro fabricated coils and magnetic materials – scaling – power maxima ions– micro and macro scale implementations. Non-linear techniques – vibration control & steady state cases

#### **UNIT IV- ENERGY HARVESTING WIRELESS SENSORS**

Power sources for WSN – Power generation – conversion – examples – case studies. Harvesting microelectronic circuits – power conditioning and losses

#### **UNIT V - SELECTED APPLICATIONS OF ENERGY HARVESTING SYSTEMS**

Case studies for implanted medical devices – Bio-MEMS based applications – harvesting for RF sensors and ID tags – powering wireless SHM sensor nodes

#### **REFERENCES**

1. Carlos Manuel Ferreira Carvalho, Nuno Filipe Silva Verissimo Paulino, “CMOS Indoor Light Energy Harvesting System for Wireless Sensing Applications”, springer
2. Danick Briand, Eric Yeatman, Shad Roundy, “Micro Energy Harvesting

<b>ECEL-417B</b>	<b>IOT Using RFID and Microcontroller</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

**Course Objectives:**

1. To Understand the Architectural Overview of IoT
2. To Understand the IoT Reference Architecture and RealWorld Design Constraints
3. To Understand the various IoT Protocols

**Unit-1**

IoT-An Architectural Overview– Building an architecture, Main design principles and needed, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.

IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

**Unit-2**

PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART,Z-Wave,Bluetooth Low Energy, ZigBee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN,Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

**Unit-3**

Wireless Sensor Structure–Energy Storage Module–Power Management Module–RF Module–Sensing Module. Bar codes and RFID basics- Components of an RFID system-Data -Tags-Antennas-Connectors-Cables- Readers- encoder/ printers for smart labels- Controllers- software- RFID advantages over Bar codes

**Unit-4**

Intel 8051 - architecture- memory organization- special function registers- timing and control- port operation- memory interfacing - I/O interfacing, Programmers model of Intel-Operand types- Operand addressing- Data transfer instructions- Arithmetic Instructions - Logic instructions- Control transfer instructions.- 8051 Interfacing and applications.

**Unit-5**

Short range RFID applications- access control - personal identification - Transportation ticketing- blood , tissue and organ identification- fleet management- personal identification- car body production- passport security. Long range RFID applications. Reading RFID cards using 8051- RFID in the supply chain- Vehicles parking using RFID- library management system- electronic toll payment.

**Reference:**

8. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatiskarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
9. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
10. Dennis E. Brown , " RFID implementation" Tata McGraw - Hill, 2007
11. Steven Shepard, "RFID: Radio frequency and Identification", Tata McGraw - Hill.
12. Ajit Pal, " Microcontrollers- principles and applications", Prentice hall of India, 2011
13. Krishna Kant. " Microprocessors and Microcontrollers", Prentice hall of India,2011
14. [www.circuitstoday.com/interfacing-rfid-module-to-8051](http://www.circuitstoday.com/interfacing-rfid-module-to-8051)

<b>ECEL-421B</b>	<b>Satellite Communication</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

## **OBJECTIVE**

The course aims to provide a comprehensive understanding of satellite communication to perform and verify link budget equations. It also discusses the modulation and multiplexing techniques for satellite, link and application areas of the satellite.

### **Unit-1.PRINCIPLES OF SATELLITE COMMUNICATION:**

Evolution and growth of communication satellite; Synchronous satellite; Satellite frequency allocation and Band spectrum;Advantages of satellite communication; Active and Passive satellite; Modem and Codec. Applications of satellite communication.

### **Unit-2. COMMUNICATION SATELLITE LINK DESIGN:**

Introduction; General link design equations; System noise temperature; C/N and G/T ratio; Atmospheric and Ionospheric effects on link design; Complete link design; Earth station parameters.

### **ANALOG SATELLITE COMMUNICATION:**

Introduction; Baseband analog(Voice) signal; FDM techniques; S/N and C/N ratio in frequency modulation in satellite link; S/N ratio in FM with multiplexed telephone signal in satellite link; Single channel per carrier(SCPC) systems; Companded single sideband (CSSB) systems; Analog FM/FDM TV satellite link; Intermodulation products and their effects in FM/FDM systems; Energy disposal in FM/FDM systems.

### **Unit-3. DIGITAL SATELLITE COMMUNICATION:**



Advantages of digital communication; Elements of digital satellite communication systems; Digital baseband signals; Digital modulation techniques; Satellite digital link design; Time Division Multiplexing.

#### **MULTIPLE ACCESS TECHNIQUES:**

Introduction; TDMA; TDMA-Frame structure; TDMA-Burst structure; TDMA-Frame efficiency; TDMA super frame; TDMA-Frame acquisition and Synchronization; TDMA compared to FDMA; TDMA Burst Time Plan; Multiple Beam ( Satellite switched) TDMA satellite system; Beam Hopping (Transponder Hopping) TDMA; CDMA and hybrid access techniques.

#### **Unit-4. SATELLITE ORBITS:**

Introduction; Synchronous orbit; Orbital parameters; Satellite location with respect to earth; Look angles; Earth coverage and slant range; Eclipse effect; Satellite placement in geostationary orbit; station keeping; Satellite stabilization.

#### **Unit-5. SPECIAL PURPOSE COMMUNICATION SATELLITES:**

BDS; INMARSAT; INTELSAT; VSAT (data broadband satellite); MSAT (Mobile Satellite Communication technique); Sarsat (Search and Rescue satellite) and LEOs (Lower earth orbit satellite); Satellite communication with respect to Fiber Optic Communication; LANDSAT; Defense satellite.

#### **TEXT BOOK**

Aggarwal, D.C., "Satellite Communication", Khanna, 5<sup>th</sup> Edition, 2001.

#### **REFERENCE BOOK**

1. Gagliardi, "Satellite Communication", 4th Edition, CBS Publications, 2003.
2. Roddy, "Satellite Communication" 5th Edition, Tata McGraw Hill, 2006.

<b>ECEL-415B</b>	<b>Smart Grid Technology</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

#### **Course Objectives:**

- To introduce students about the challenging issues and architecture of smart grid
- To give exposure to the students about the communication and wide area monitoring in smart grid

- To introduce the implementation of the control in computational intelligence and security issues in smart grid and the role of Power electronics and energy storage in smart grid

#### **Unit-1**

**The smart grid:** Introduction – Necessity of smart grid – Definition – Early smart grid initiatives – overview of the technologies required for the smart grid-Information and communication technologies, Sensing measurement, control and automation technologies, Power electronics and energy storage.

#### **Unit-2**

**Data communication:** Introduction – dedicated and shared communication channels – switching techniques – communication channels- layered architecture and protocols;

**Communication technologies for the smart grid:** Introduction –communication technologies – standards for information exchange.

#### **Unit-3**

**Information Security for the smart grid:** Introduction – Encryption and Decryption: Symmetric Key encryption, Public key encryption - Authentication – Digital signature: Secret key signature, Public key signature, Message digest – cyber security standards.

#### **Unit-4**

**Smart metering and demand side integration:** Introduction – smart metering – smart meters – Communication infrastructure and protocols for smart metering - Demand side integration.

#### **Unit-5**

**Introduction to smart grid applications:** Introduction – voltage and VAR control and optimization – fault detection, isolation and restoration (FDIR) – Demand response (DR) – Distributed energy resources (DERs) – wide area monitoring, control and protection (WAMCP).

**Course Outcomes:** At the end of this course, students will demonstrate the ability to

6. Understand the challenging issues and architecture of smart grid
7. Understand the communication and wide area monitoring in smart grid
8. Rudimentary energy management issues in smart grid
9. Acquire the knowledge in computational intelligence and security issues in smart grid
10. Know the role of Power electronics and energy storage in smart grid

**Text Books:**  
1. “Smart Grid: Technology and Applications” by JanakaEkanayake , KithsiriLiyanage , Jianzhong Wu , Nick Jenkins – John Wiley & sons Limited ; 2012 first Edition.

2. “Smart Grid: Applications, communication and security” by Lars T. Berger and Krzysztof Iniewski - John Wiley & sons Limited; 2012 first Edition.

#### **Reference Books:**

1. “Smart grid: Fundamental of Design and analysis” by James Momoh “John Wiley & sons Limited IEEE Press, 2012.

<b>ECEL-453B</b>	<b>Electronic System Design Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

Part A:

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order)
3. Function Generator using OP AMPs.
4. IC 555 Timer – Monostable and Astable Operation Circuit.
5. IC 566 – VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 bit DAC using OP AMP.

**Part B:**

**Simulate the internal structure of the following Digital IC's using VHDL / VERILOG and verify the operations of the Digital IC's (Hardware) in the Laboratory**

8. D Flip-Flop 7474
9. Decade counter-7490
10. shift registers-7495
11. 3-8 Decoder -74138
12. 4 bit Comparator-7485
13. 8 x 1 Multiplexer -74151 and 2x4 Demultiplexer-74155
14. RAM (16x4)-74189 (Read and Write operations)

**Equipment required for Laboratories:**

9. RPS
10. CRO
11. Function Generator
12. Multi Meters
13. IC Trainer Kits (Optional)
14. Bread Boards
15. Components:- IC741, IC555, IC566, IC1496, IC723, 7805, 7809, 7912 and other essential components.
16. Analog IC Tester

**For Software Simulation**

- 1 Computer Systems
- 2 LAN Connection (Optional)
- 3 Operating Systems
- 4 VHDL/ VERILOG
- 5 FPGAS/CPLDS (Download Tools)

<b>ECEL-457B</b>	<b>IOT Using RFID and Microcontroller Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

**List of Experiments:**

13. Study and Install Python in Eclipse and WAP for data types in python.
14. Write a Program for arithmetic operation in Python.
15. Write a Program for looping statement in Python.
16. Study and Install IDE of Arduino and different types of Arduino.
17. Write program using Arduino IDE for Blink LED.
18. Write Program for RGB LED using Arduino.
19. Study the Temperature sensor and Write Program for monitor temperature using Arduino.
20. Study and Implement RFID, NFC using Arduino.
21. Study and implement MQTT protocol using Arduino.
22. Study and Configure Raspberry Pi.
23. WAP for LED blink using Raspberry Pi.
24. Study and Implement ZigBee Protocol using Arduino / Raspberry Pi.

<b>EC-471B</b>	<b>SATELLITE COMMUNICATION LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

**List of Experiments:**

1. To Study Satellite Trainer kit.
2. To set up an active satellite link and demonstrate link fail operation.
3. To communicate voice signal through satellite link.
4. To establish analog /digital Communication link and transmit and receive three Signals (audio, video, tone) simultaneously using satellite communication trainer.
5. To transmit and receive PC data through satellite link.
6. To find the link C/N Ratio
7. Evaluation of SNR in Satellite Links
8. To observe effect of Fading margin of received signal in satellite link

9. To Study Analysis of Link Power Budget Equation.

ECEW-403B	Electronic Workshop	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>2</b>

9. Study of BASIC ELECTRONIC COMPONENTS
10. Study of CRO, FUNCTION GENERATOR, MULTIMETRE, D.C. POWER SUPPLY
11. Study of PCB AND PCB layout.
12. Survey of optoelectronic devices.
13. How an industry works- A survey.'
14. Survey of electromagnetic spectrum.
15. Assembling an electronic circuit on PCB and testing it.
16. Simulation of an electronic circuit using simulation software.

S.No	OEL	Open Elective	L-T-P	Credit
1	BA-271A	Human Resource Management	3-0-0	3
2	BBA-214	Ethics and Corporate Social responsibility	3-0-0	3
3	MEOE-401B	Robotics	3-0-0	3
4	CE-423B	Hydropower engineering	3-0-0	3
5	EC-441B	Non-Conventional Energy Resources	3-0-0	3
6	CS-303C	Artificial Intelligence	3-0-0	3
7	CS-305C	Python Programming	3-0-0	3

ECEL-491B	<b>Major Project</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>4</b>

**OBJECTIVE** The project involves in-depth study on the topic, design, development, analysis fabrication and/or experimental work – Hardware and/or Software. It is intended to give an opportunity to a student to apply his knowledge to solve real-life problem. The student has to select a project work based on a topic of interest.

**OPERATION** Major Project shall comprise of Phase-I and PhaseII, spread over Semester VI and VII respectively. The students may work jointly (small group) or individually.

PDP-492	Professional Career Skill	L T P	Cr
		0-0-2	2

1. Advocating for yourself and your causes
2. Asking for help or advice
3. Brainstorming
4. Building buy-in to an idea
5. Business writing
6. Dealing with difficult people
7. Facilitating
8. Handling office politics
9. Handshaking
10. Information and Communications Technology (ICT)
11. Interviewing
12. Managing a positive relationship with an employer
13. Listening
14. Networking
15. Persuasion
16. Resume writing
17. Small talk
18. Verbal communication
19. Written communication

### EIGHTH SEMESTER

SN	Course No.	Course Name	L-T-P	Credits
1	EC-483B	INTERNSHIP	0-0-32	16
2	EC-484B	SEMINAR	0-0-2	1
3	EC-485B	5G Technology	3-0-0	3
			3-0-34	<b>20</b>

EE-483B	INTERNSHIP	L T P	Cr
		0-0-32	16

**OBJECTIVE** To carryout training for a period of six months after VII Semester in industry (private or public)/ research laboratory/organization of repute, on platforms learnt till the completion of 4 years of bachelor degree.

**METHODOLOGY** The students shall demonstrate their ability to understand a given problem and to innovatively bring out solution. Students shall be free to select any operating system, programming language and database tools for accomplishing the given problem successfully. Marks of this course shall be given in the marks memorandum.

This component is conducted at various production and manufacturing units, Design, Development and Consulting Agencies, National Laboratories, R&D Centers, etc. The students solve real-life problems of interest to the host organizations. The professional expert acts as a consultant while resident University faculty supervises the work.

Assessment of Industrial/Field Training and Internship will be based upon certificate of Industry/Field training obtained by the student, report, and seminar and viva-voce examination.

<b>EE-484B</b>	<b>SEMINAR</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

The seminar is to cover the details regarding Internship problem definition, literature survey, concepts and methodology employed, analysis, design and development, conclusions and future work.

<b>EC-485B</b>	<b>5G Technology</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

Unit- 1 : Overview of 5G communication technology, (operating scenarios, mm wave technology, propagation models),

Unit- 2 : Waveform in 5G, (W-OFDM, F-OFDM, UPMC, FBMC, GFDM, adaptive OFDM)

Unit-3 : Modulation and coding in 5G, Propagation Characteristics of 5G Channel models

Unit-4 : MIMO communication essentials, Massive MIMO in 5G (massive MIMO, pilot contamination, Beam forming)

Unit-5 : Heterogeneous Ultra Dense networks in 5G, (Small cells, D2D, MIMO-NOMA), Ubiquitous Quality of Service Provisioning for real time traffic.

**Text books/Reference books:**

7. An Introduction to LTE: LTE, LTE-Advanced, SAE, VoLTE and 4G Mobile Communications 2nd Edition, Christopher Cox, Wiley; 2 edition (July 28, 2014)
8. LTE for UMTS: Evolution to LTE-Advanced 2nd Edition, Harri Holma (Author), Antti Toskala (Author), Wiley; 2 edition (April 25, 2011)
9. LTE - The UMTS Long Term Evolution: From Theory to Practice, Stefania Sesia, Wiley; 2 edition (August 29, 2011)
10. 4G, LTE-Advanced Pro and The Road to 5G, Third Edition 3rd Edition, Erik Dahlman (Author), Stefan Parkvall (Author), Johan Skold (Author), Academic Press; 3 edition (August 12, 2016)
11. Fundamentals of LTE (Prentice Hall Communications Engineering and Emerging Technologies Series from Ted Rappaport) 1st Edition, by Arunabha Ghosh (Author), Jun Zhang (Author), Jeffrey G. Andrews (Author), Rias Muhamed (Author), Prentice Hall; 1 edition (September 20, 2010)

12. 4G: LTE/LTE-Advanced for Mobile Broadband, Dahlman (Author), Stefan Parkvall (Author), Johan Skold (Author), Academic Press, 1 edition (May 10, 2011)

Course Outcomes:

Students will be aware about the LTE Evolution System.

Students will know the architecture of 2G & 3G communication system.

Students will be able to demonstrate MIMO system

Students will be aware about future wireless communication technology.



## SCHEME FOR M. TECH. (EEE)

M. TECH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-501-A	Numerical Techniques	3	1	0	4
2	EL-501-A	Modeling and Analysis of Electrical Machines	3	1	0	4
3	EL-502-A	Design of Electrical Machines	3	1	0	4
4	EL-505-A	Power Electronics Devices and DC Converter	3	1	0	4
5	EL-552-A	Design of Electrical Machines Lab.	0	0	2	1
6	EL-553-A	Simulation Lab.	0	0	4	2
Total			12	4	6	19

M. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EL-504-A	Electric Drives	3	1	0	4
2	EL-506-A	Solid State Controller of Drives	3	1	0	4
3	EL-510-A	Microprocessor Based Industrial Control	3	1	0	4
4	EL-511-A	A. C. Controllers	3	1	0	4
5		Elective – I	3	0	0	3
6	EL-566-A	Seminar – I	0	0	2	1
7	EL-554-A	Electric Drives Lab.	0	0	2	1
8	EL-560-A	Microprocessor Based Industrial Control Lab.	0	0	2	1
9	EL-657-A	Minor Project	0	0	6	3
Total			15	4	12	25

M. TECH.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EL-601-A	Embedded Systems	3	1	0	4
2	EL-604-A	Special Electro Mechanical Devices	3	1	0	4
3	EC-502-A	Digital Signal Processing	3	1	0	4
4		Elective-II	3	0	0	3
5	EL-653-A	Seminar – II	0	0	4	2
6	EC-552-A	Digital Signal Processing Lab.	0	0	2	1
7	EL-652-A	Dissertation Preliminary**	0	0	12	6
		<b>Total</b>	<b>12</b>	<b>3</b>	<b>18</b>	<b>24</b>

M. TECH.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EL-507-A	Power Conditioning	3	0	0	3
2	EL-508-A	Bio-Medical Instrumentation	3	0	0	3
3	EC-508-A	Artificial Intelligence	3	0	0	3
4	EL-509-A	VLSI Technology	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

## DETAILED SYLLABUS

MA-501-A      NUMERICAL TECHNIQUES   L T P   Cr

3 1 0   4

Unit-I: LINEAR EQUATIONS: Matrix theory; solution of general linear system of equations; existence and uniqueness of solution; echelon form of matrix; ill-conditioned matrices; eigen value and eigen vectors; unitary matrices; Hermitian and Normal matrices; Gauss elimination and Gauss-jordan methods for homogeneous and non-homogeneous systems of linear equations; round off error.

Unit-II: NON-LINEAR EQUATIONS AND INTERPOLATION

PROBLEMS: Bisection method; linear interpolation methods; Newton's method; Muller's method; Bairstow's methods for the quadratic factors; Lagrangian polynomial; divided differences; interpolation with cubic spline; B-spline curves and B-spline curves; polynomial approximation of the surfaces; least square method.

Unit-III:      SOLUTION      OF      ORDINARY      DIFFERENTIAL

EQUATION AND INTEGRATION: Derivatives from difference table; higher order derivatives; extrapolation techniques;

integration formulas- Simpson's rule, trapezoidal rule; Gaussian quadrature; adaptive integration; multiple integrals. Modified Euler methods; Milne's method; Adam's Moulton method; convergence criteria; errors and error propagation; comparison of different methods.

Unit-IV: BOUNDARY VALUE PROBLEMS; Shooting method; Rayleigh-Ritz method; Collocation and Galerkin method; characteristic value problem; eigen values by iteration and QR method; application of eigen values.

Unit-V:      SOLUTION      OF      PARTIAL      DIFFERENTIAL

EQUATION: Laplace's equations on a rectangular region; iterative method for the Laplace equation; Poisson equation;

A.D.I method; solution of parabolic differential equation by Crank-Nicholson method; theta method; solution of wave equation by finite differences.

REFERENCE BOOKS:

1.Kreyszg, Erwin, “Advanced Engineering Mathematics”. 2.Greenberg,Mchale.D “Advanced Engineering Mathematics” . 3.Jain, R.K. and Iyengar,S.R.K., “Advanced Engineering Mathematics”.

EL-501-A      MODELLING AND ANALYSIS OF ELECTRICAL MACHINES      L T P   Cr

3 1 0   4

1.      MODELING OF DC MACHINES: Theory of operation; electro mechanical modeling; state space modeling; block diagrams; transfer functions modeling of shunt; series and compound machines; measurement of motor constants; flow chart for computation.

2.      MODELING OF THREE PHASE INDUCTION MOTOR: Principle of operation; steady state performance equations; steady state performance; measurement of parameters.

3.      DYNAMIC MODELING AND REFERENCE FRAME MODELS OF INDUCTION MACHINES: Real time model of a two phase induction machine; transformation to obtain constant matrices; three phase to two phase transformation; power equivalence; generalized model in arbitrary reference frames; electromagnetic torque.

Stator; motor and synchronously rotating reference frame models; equations in flux linkages per unit model.

4 DYNAMIC SIMULATION: Flow chart; small signal equations of the induction machine; normalized small signal equations.

#### CONTROL CHARACTERISTICS OF INDUCTION

MACHINE: Transfer functions; frequency response; computation of time response; control principle of induction motor.

5. SPACE PHASOR MODEL: Principle; dq flux linkages model; root loci of the dq axes based induction machine; derivation of sp model; its root loci; performance of an induction machine; machine dynamics SFG (signal flow graph).

SPECIAL MOTORS: Schrage motor; stepping motors; brush less dc motors; variable reluctance motors.

#### REFERENCE BOOKS

1.      Bimbhra, P.S., “Generalized Theory of Electrical Machines”, Khanna Publishers
2.      Krishnan, R., “Electric Motors Drives: Modeling Analysis and Control”, Pearson Education, 2003.
3.      Mittle, V.N., Mittal, A., “Design of Electrical Machines”, Standard Publishers and Distributors

1.      PRINCIPLES OF ELECTRICAL MACHINE DESIGN: Limitations in design; modern trends in design of electrical machines; electrical engineering materials used in design of electrical machines; superconductors and their applications.

2.      HEATING AND COOLING OF ELECTRICAL MACHINES: Temperature gradients; cooling of rotating electrical machines; temperature rise-time curves; ratings of electrical machines; air hydrogen; water and oil cooling; methods of measurement of temperature rise.

3.      MAGNETIC CIRCUIT CALCULATIONS: Mmf for air gap; mmf for teeth; real and apparent flux densities total iron losses and pulsation losses; magnetic leakage calculations; unbalance

magnetic full and its calculations; magnetizing currents and their calculations.

4.      TRANSFORMER DESIGN: Core design and winding design; transposition of windings; tapplings and tap changing; leakage reactances; transformer assembly and auxiliaries; transformer design; optimum design; minimum cost; minimum loss and maximum efficiency; tank design and cooling surge protection.

5.      DESIGN OF SYNCHRONOUS MACHINES: Design of rotating machines; limiting values of core length and armature diameter estimation of air gap length; Output equation; choice of specific magnetic and electric loading; main dimensions; short circuit ratio (SCR) and its effect on machine performance; introduction to computer aided design and general procedure for optimization.

#### REFERENCE BOOKS

1.      Mittle, V.N., and Mittal, A., "Design of Electrical Machines", Standard Publishers and Distributors Delhi, 2000
2.      Sawhney, A.K., "Design of Electrical Machines", Khanna Publishers Dhanpat Rai, 2000
3.      Say M.G., "Performance and Design of AC Electrical Machines", C.B.S. Pub.
4.      Sen S.K.; "Electric Machine Design", Pearson Education.
5.      Clayton, D.W., "Performance and Design of DC Electrical Machines", Pitman

1. INTRODUCTION TO POWER ELECTRONIC DEVICES: Role of power electronics, review of construction and characteristics of power diode, Shottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, IGBT & SIT.

2. THYRISTOR OPERATION AND CHARACTERISTICS:

Firing circuit design considerations; requirements of firing circuits; two transistor model of thyristor; thyristor transient

characteristics; methods of triggering a thyristor; thyristor turn-off techniques; thyristor types; series and parallel operations of thyristors.

3. THYRISTOR FIRING & COMMUTATION CIRCUITS:

Resistance triggering; contactor triggering; RC firing circuit; pulse transformer triggering; firing of SCR by UJT; triac firing circuit; Turn off characteristics; natural commutation; forced commutation methods; commutation by resonating load; self commutation by an L-C circuit; charged capacitor switched by a load carrying SCR; charged capacitor turned on by an auxiliary switching SCR; an external source of pulse for commutation.

4. CONTROLLED RECTIFIERS: Single phase half wave controlled rectifiers with resistive load; single phase half wave controlled rectifiers with inductive load; single phase half wave rectifier with inductive load and freewheeling diode; load voltage and harmonics; distortion factor; displacement factor; power factor ; three phase half wave converters ; three phase half wave converter with a freewheeling diode; factors affecting the choice of converter circuits; ; filter circuits; Zener voltage regulators; IC voltage regulators.

5. CHOPPERS CIRCUITS: Step down and step up choppers; chopper classification and configurations; series turn-off chopper; parallel capacitor turn-off chopper; effect of source inductance; two quadrant chopper; four quadrant chopper; Morgan chopper; Jones chopper, voltage commutated chopper, current commutated chopper; load commutated chopper; introduction to multi phase choppers.

1. Ramshaw, S.R., and Rashid, M. H., "Power Electronics, Circuits, Drives and Applications", Pearson 2004
2. Rashid, M.H., "Power Electronics: Circuits Devices and Applications", Prentice Hall, Pearson Education, 2004
3. Vithayathil, J., "Power Electronics: Principles and Applications", McGraw-Hill
4. Baliga, B. and Jayant, B., "Power Semiconductor Devices", PWS Publishing Co., Boston
5. Jolankar, R.M. and Pasalkar, N.B., "Power Electronic, Devices, Converter and Applications", Technical Publications, Pune

EL-552 A DESIGN OF ELECTRICAL MACHINES LAB L T P Cr

0 0 2 2

#### LIST OF EXPERIMENTS

1. Electrical machine analysis using MATLAB.
2. Study of electrical machine design software like ansoft Maxwell , rmxpert or motorcad.
3. Stator winding design of a squirrel cage 3-phase induction motor.
4. Design of main dimensions of a D.C. motor using visual basic-6.
5. Design of main dimensions of a transformer and dimensions of Tank.
6. Design of commutator and field winding of D.C. motor.
7. Draw the torque-slip and torque-speed characteristics of 3-phase squirrel cage induction motor.
8. Finding equivalent ckt of a 3 phase squirrel cage induction motor with the help of data obtained from no load test and locked rotor test.
9. Stator winding design of a Slip ring 3-phase induction motor.
10. Design of armature winding for 3-phase induction motor.

NOTE: At least ten experiments are to be performed, six experiments should be performed from above list. Remaining four experiments to be designed and set by the concerned teachers as per the scope of the syllabus.

EL-553 A

SIMULATION LAB L T P Cr

0 0 4 2

LIST OF EXPERIMENTS:

1. To study Pspicesoftware.
2. To verify thevenin and Norton theorems usingPspice.
3. To verify kcl and kvl usingPspice.
4. To verify different logic gates usingPspice.
5. Pspice simulation of single-phase full converter using R,L and Cloads.
6. Pspice simulation of 3-phase full converter using R,L and C loads.
7. Pspice simulation of single phase A.C. voltage controller using R,Lload.
8. Pspice simulation of 3-phase inverter using PWMcontroller.
9. Pspice simulation of resonant pulse commutationcircuit.
10. Make a program for computation of D.C. motorresponse.
11. Develop a flow chart for the dynamic simulation of the chopper controlled D.C. motordrive.
12. Make a flowchart for computation of steady state performance of inductionmotor.
13. Make a flowchart for dynamic simulation of inductionmotor.
14. Make a program for dynamic simulation of vector controlled induction motordrive.

NOTE: At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed and set by the concerned teachers as per the scope of the syllabus



EL-504-A      ELECTRICAL DRIVES      L T P   Cr

3 1 0   4

1.      INTRODUCTION TO ELECTRICAL DRIVES: Components of electrical drives; choice of electrical drive; dynamics of electrical drives; calculation of time and energy; loss in transient operations; steady state stability and load equalization.
2.      CONTROL OF ELECTRICAL DRIVES: Modes of operation; Speed control & Drive classification; Closed loop control of drives; thermal model of motor heating and cooling; classes of motor duty and motor rating.
3.      CHARACTERISTICS AND OPERATING MODES OF DRIVE MOTORS: D.C. motors and induction motors etc. starting; braking and speed control of motors; quadrant drives; Choppers; rectifiers; inverters and cycloconverters in drives system and their performance characteristics.
4.      MODERN TRENDS IN INDUSTRIAL DRIVES & APPLICATIONS: Status of d.c. and a.c. drives; traction drives; machine tool drives; paper mill; textile mill; Miscellaneous applications; stepper motor and switched reluctance motor drives.      5. ENERGY

CONSERVATION: Measures for energy conservation in electrical drives; losses and electrical drive system; use of efficient semiconductor converters; use of efficient motors; use of variable speed drives; energy efficient operation of drives.

#### REFERENCE BOOKS

1.      Dubey, G.K., “Fundamentals of Electric Drives”, Narosa Publications.
2.      Bose, B., “Power Electronics and AC Drives”, Pearson Ed., 2003.
3.      Subramanyam, V.,      “Electric      Drives Concepts      and      Applications”,      TMH Publication.1999
4.      Krishan, R., “Electric Motor Drives, Modeling, Analyses and Control”, Pearson Ed.2003
5.      De, N.K. and Sen, P.K., “Electric Drives”, PHI2004

- 1.. CHOPPERS: Single quadrant; two quadrant and four quadrant choppers; control methods-pulse-width modulation; constant pulse width and variable frequency; gating and control circuits. ROM based control of chopper.
2.      INVERTERS: Basic inverter circuit and control; voltage control and harmonic reduction; current source inverter and gating circuit; ROM based control.
3.      CYCLO CONVERTER: 3-Phase to single phase; 3 phase to 3-phase cyclo converter circuits; synchronizing circuits; logic and triggering circuits phase locked loops; basic principle of operation; linearised analysis of PLL; motor speed control system using PLL.
4.      MICRO-PROCESS BASICS: Micro processor based speed control system; general considerations for drive control; choice of suitable micro-processor; micro- processor based drive control system; Basic configuration of PLC; comparisons of logic controllers VSI; CSI converter with PWM; technique for implementation of field oriented control.
5.      TRANSFER FUNCTION OF CONVERTER CONTROLLED DRIVE AND ANALYSIS; Brushless DC motor unipolar / bipolar dc motor; speed control of brushless dc motor; stepper motor - variable reluctance; permanent magnet; torque vs stepping (or pulsing) rate characteristics; drive circuits for stepper motor; switched reluctance drive system.

#### REFERENCE BOOKS

1.      Pillay, S.K.; “First Course on Electrical Drives”; New Age, 2002
2.      Dubey, G.K. and Doradla, S.R., “Thyristorized Power Controllers”, New Age;
3.      De and Sen, “Electric Drives” PHI, 2004
4.      Jordan, E., “Energy Efficient Electric Motors and Their Applications”, Plentium Press- New York.
5.      Gaonkar, R.S., “Micro Processor Architecture, Programming and Application”, Penram International Publisher 1992.

1.      MICRO COMPUTER HARDWARE: The system bus; micro- processor; micro- computer system; software and hardware concepts; basic features of micro computer development system.
2.      PROCESS CONTROL COMPUTER SYSTEMS: Minis; micros; classification by hardware features and software facilities; performance evaluation techniques; Brief review of characteristics of digitalprocessors.
3.      PROCESS CONTROL SYSTEM SOFTWARE: Review of availability of process control languages; application packages; operating system for real time process control- user specification; system specification; implementation; analog input (ADC) analog output(DAC).
4.      STEPPER MOTOR INTERFACE: Digital input; digital output; availability of process control languages; application packages; operating system for real time process control; temperature control with an analog and digital converter using a temperature sensor; CRT controller- 8275/6845.
5.      SYSTEM SELECTION CRITERIA: Specification; hardware and software requirements; maintenance; procurement and procedures; cost; performance; availability ratios; Development systems for micros; software tools; logic analyzer; cross assemblers; compilers; simulators; emulators; in house Vs turn-key tradeoff.

#### REFERENCEBOOKS

1.      Gaonkar, “Microprocessor and its Architecture” wiley eastern,1992
2.      Ghashaul, S., “Microprocessor Based System Design” Mcmilan,37347
3.      Chhabra, B. S., “Microcontroller its Application”, Dhanpat Rai,1999
4.      Mathur A.P., “Microprocessor Based Industrial Control “ TMH
5.      Rafiquzzman Mohamed,      “Microprocessor      and microcontroller based system design”PHI

1. AC VOLTAGE CONTROLLERS: Applications and types of

a.c voltage controller; single- phase half wave controllers with resistive load; single-phase full-wave controller with resistive load; harmonics; power factor and displacement factor; single-phase voltage controller with R-L load; harmonic analysis of single-phase full-wave controller with R- L load; gating signals; three-phase full wave controllers; synchronous tap changer.

2. CYCLO CONVERTERS: Applications; principle of operation of cyclo converter; mid-point cycloconverter; bridge-type cycloconverter; three phase to single phase cyclo- converter; three phase to single phase cycloconverter.

3. PERFORMANCE: Output voltage equation; input displacement factor; load and source harmonics; circulating current mode of operation; inter-group reactor; inter-group blanking; effect of source inductance; comparison of the cycloconverter and dc link converter.

4. INVERTERS: Applications and types of inverters; single phase bridge inverter; single phase center tapped inverter; series inverter; three phase bridge inverter; impulse commutation inverters; MC Murray inverters; modified MC Murray inverter; design of MC Murray inverter circuit; MC Murray-bed ford inverter; voltage source inverter.

5. ANALYSIS: Single-phase voltage source inverter; single phase full-bridge voltage source inverter; voltage and frequency control; pulse width modulated inverters; single phase modulation; multiple pulse width modulation; sinusoidal pulse width modulation; harmonics reduction in voltage source inverter; current source inverter; operation modes; single phase inverter three phase inverter; single phase bridge-sequential commutated inverter; control circuit for square wave inverter; control circuit for PWM inverter; comparison of circuit source versus voltage source inverters.

## REFERENCE BOOKS

1. Mohan, N., Undeland, T.N., Robbins; "Power Electronics Design and Application", John Wiley and son, 2004
2. Dubey, G.K., and Doradla S. R; "Thyristorized Power Controllers", New Age
3. Mazda, F. F., "Thyristor control", newnes-butterworth.
4. Dewan, S.B., Straughen A.R., Slemon G.R., "Power Semiconductor Drives", Wiley International
5. Dubey, G.K., "Power Semiconductor Controlled Devices", Prentice Hall
6. Rai, H.M, "Power Electronics", Satya Prakashan, New Delhi.

EL-554 A      ELECTRICAL DRIVES LAB. L T P   Cr

0 0 2    2

#### LIST OF EXPERIMENTS

1.      Speed control of dc motor using dcchopper.
2.      Speed control of dc motor using single- phaseconverter.
3.      Speed control of dc motor using 3- phaseconverter.
4.      Speed control of dc motor using single- phase dual converter.
5.      Inverter fed single-phase induction motordrive.
6.      CSI fed induction motordrive.
7.      Speed control of single- phase induction motor using ac regulator.
  
8.      Regenerative braking of dc motor using single- phase converter.
9.      Speed control of single-phase induction motor using cycloconverter.
10.     Static rotor resistance controlmethod.

#### NOTE:

Atleast ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed and set by the concerned teachers as per the scope of the syllabus.

EL-560- A      MICROPROCESSOR BASED INDUSTRIAL CONTROL LAB.      L T P   Cr

0 0 2    2

#### LIST OF EXPERIMENTS

1.      Study architecture of 8085 and familiarization with its hardware, commands and operation of Microprocessorkit.
2.      Write a well-documented programfor:

- a. addition of two 8-bit numbers (provision for carry)
- b. addition of two 8-bit numbers.
3. Write a well-documented program for:
  - a. subtraction of two 8-bit numbers (display of borrow)
  - b. subtraction of two 16-bit numbers (display of borrow)
4. Write a well documented program for:

Multiplication of two 8-bit numbers by repeated addition method. Check for minimum number of addition and also test for typical data.

5. Write a well-documented program for:

Multiplication of two 8-bit numbers by bit rotation method.

6. Write a well-documented program for: Division of two 8-bit numbers by repeated subtraction method. Test for typical data.

7. Write a well-documented program for Dividing two 8-bit numbers by bit rotation method. Test for typical data.

8. Write a well-documented program for:

- a. Finding a largest number from an array.
- b. Finding a smallest number from an array.
9. Write a well-documented program for arranging an array of numbers in descending order.
10. Write a well-documented program for arranging an array of numbers in ascending order.
11. Write a well-documented program for finding square of a number using Look-up table.
12. Identification of input and output pins of port 8255, for various control words.
13. To measure an electrical quantity using microprocessor and 8255.
14. Write a program to interface a 2-digit number using seven-segment LEDs. Use 8085 microprocessor and 8255 PPI chip.
15. Write a program to control the operation of stepper motor using 8085 microprocessor and 8255 PPI chip.

NOTE: At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed and set by the concerned teachers as per the scope of the syllabus.

EL-566-A SEMINAR – I L T P Cr

0 0 2 1

The student has to undertake extensive literature survey on a topic with the approval of the course coordinator. The course coordinator shall not be below the rank of Assistant Professor. The work may involve extensive search of print, audio-video materials, internet surfing etc.

The work of monitoring will be done by the course coordinator and evaluation by the course coordinator and the HOD or his nominee.

EL-657-A MINOR PROJECT L T P Cr

0 0 6 3

The student is required to do the design/fabrication/coding/simulation of equipment/process/system of his/her choice and to be approved by the course coordinator.

The course coordinator will evolve the evaluation procedure under the guidance of HOD.

EL-601 A EMBEDDED SYSTEMS L T P Cr

3 1 0 4

1. INTRODUCTION: Different types of microcontrollers; embedded microcontrollers; external memory microcontrollers; processor architectures; Harvard V/S Princeton; CISC V/S RISC; microcontrollers memory types; microcontrollers features; clocking; i/o pins; interrupts; timers; peripherals.

2. MICROCONTROLLER ARCHITECTURE: Introduction to PIC microcontrollers; architecture and pipelining; program memory considerations; addressing modes; CPU registers; instruction set; simple operations, Interrupt logic; timer2 scalar initialization; intservice Interrupt service routine; loop time subroutine; external interrupts and timers; synchronous serial port module; serial peripheral device; o/p port expansion; I/p port expansion;UART.

3. SOFTWARE PROGRAMMING WITH MICROCONTROLLERS: Arithmetic operations; bit addressing; loop control; stack operation; subroutines; RAM direct addressing; state machines; oscillators;timer

interrupts and memory mapped I/O, Development tools/ environments; assembly language programming style; interpreters; high level languages; Intel hex format object files; debugging.

4. DESINING USING MICROCONTROLLERS: Music box; mouse wheel turning; PWM motor control; aircraft demonstration; ultra sonic distance measuring; temperature sensor; pressure sensor; magnetic fieldsensor.

5. COMMUNICATION INTERFACES: RS232/UART, RS422/RS485, IEEE1394, USB, Ethernet, wireless interfaces, IrDA, IEEE 802.11 & Bluetooth.

#### REFERENCE BOOKS

1. John, B. Peatman, “Design with PIC Microcontrollers Pearson“
2. Predko, “Programming and Customizing the 8051 Microcontroller”, Tata McGrawHill.
3. Catsoulis, John, “Designing Embedded Hardware”, Shroff Pub. and Distr. NewDelhi.
4. Barr Michael, “Programming Embedded Systems in C and C++”, Shroff Pub. and Distr. NewDelhi.



1. INDUCTION MOTOR DRIVES: Analysis and performance; motors with special design double cage I.M starting – reactor starter; soft start using saturable reactor starter; unbalanced starting scheme with soft start; transient analysis; variable frequency control from voltage source; voltage source inverter control.

2. SYNCHRONOUS MOTORS: Permanent magnet motor; synchronous reluctance motor; hysteresis synchronism motor; inductor machine; synchronous motor variable speed drives- variable frequency control; self controlled

synchronous motor drive employing load commutated thyristor inverter; self controlled synchronous motor drive employing a cyclo converter Permanent magnet a.c. drive; sinusoidal PMAC motor drives.

3. SPECIAL MACHINES: Brushless D.C. motor drive for servo applications; low cost brushless d.c motor drives; important features and application, Variable reluctance; permanent magnet; important features of stepper motors; torque Vs stepping (or pulsing rate) characteristics; drive circuits; for stepper motors, Operation and control requirements of SRM.

4. TRACTION DRIVES: Electric traction services nature of traction load; braking; tractive effort and drive ratings, specific energy consumption; maximum allowable tractive effort; important features of traction drives; traction motors; traction drives; conventional d.c. and a.c. traction drives; semiconductor controlled drives; d.c. traction employing polyphase a.c. motors polyphase a.c. motors for traction drives; solar and battery powered drives: Motors suitable for pump drives; solar powered pump drives battery powered vehicle; solar powered electrical vehicle and boat.

5. ENERGY CONSERVATION IN ELECTRICAL DRIVES: Measures for energy conservation in electrical drives; use of efficient semiconductor converters; use of efficient motors; use of variable speed drives; energy efficient operation of drives; improvement of power factor; using a motor of right rating; improvement of quality of supply; use of single to three phase semiconductor converters in rural applications.

## REFERENCE BOOKS

1. Jayant, B.V. “Electro-mechanical Drives”
2. Bose, B.K. “Electro-mechanical Drives”(PHI)
3. Bose, B. K. “Modern Power Electronics and A.C Drives”, Pearson Ed.
4. Raj, G.D., “Non-conventional Sources of Energy”, Khanna Pub.

5. Wilds, Theodore, "Electrical M/cs, Drives and Power Cyst", PearsonEd.
6. Begamudre, R.D., "Energy Conversion System" New age International
7. Dover, A.T., "Electric Traction " Sir ISSAC Pitman & Sons.

EC-502-A      DIGITAL SIGNAL PROCESSING      L T P   Cr

3 1 0   4

1      DISCRETE TIME SIGNALS AND SYSTEMS: Introduction; discrete-time signals - sequences i.e. basic sequences and operations; discrete time systems; memory-less systems; linear time invariant systems; causality; stability properties of linear time-invariant systems; frequency-domain representation of discrete-time signals and systems; Representation of sequences by Fourier transforms; symmetry properties and theorems of Fourier transform; discrete-time random signals.

## 2      FREQUENCY TRANSFORMATIONS

Z-TRANSFORMS: Introduction; properties of Z-transform; region of convergence; inverse Z-transform-partial fraction expansion; power series expansion; application of Z- transform; system function; poles and zeros.

FFT: Frequency transformations in the analog and digital domain. Discrete Fourier Transform (DFT)- properties of DFT; linear convolution using DFT; computation of DFT using fast Fourier transform (FFT)

## 3      DIGITAL FILTERS

STRUCTURES : Basic structures of infinite impulse response (IIR) and finite impulse response (FIR); filters – direct form; cascade form; parallel form; feedback in IIR system; transposed forms design of FIR and IIR filters using all standard procedures

ERRORS IN DIGITAL FILTERING: Errors resulting from rounding and truncation; round-off effects in digital filters; finite word length effects in digital filter.

4      MULTIRATE DIGITAL SIGNAL PROCESSING (MDSP): Sampling rate conversion; multistage implementation of sampling rate conversion; application of multi rate DSP for design of phase shifters; narrow band low pass filters; quadrature mirror filters, digital filterbanks.

5      HARDWARE IMPLEMENTATION OF DSP: Introduction to DSP processor; architecture of DSP processors; DSP devices : Von Neumann model, Harvard architecture.

## REFERENCE BOOKS

1. Alan, V. Oppenheim and Ronald, W. Schaffer, "Digital Signal Processing", Prentice Hall of India, 1998
2. Mitra, Sanjit K., "Digital Signal Processing", Tata McGraw Hill, 2002
3. Proakis, "Digital Signal Processing", Prentice Hall of India, 2002

EC-552-A      DIGITAL SIGNAL PROCESSING LAB      L T P   Cr  
0 0 2    2

## LIST OF EXPERIMENTS USING MATLAB

1. Write a Program for generation of unit impulse, unit step, ramp, exponential, sinusoidal and cosine sequence.
2. Write a Program for computing inverse Z-transform of a rational transfer function.
3. Write a Program for linear convolution
4. Write a Program for plotting the frequency response of first order system.
5. Write a Program for computing Discrete Fourier Transform (DFT).
6. Design a Butterworth Low pass IIR filter using Bilinear Z- transform method.
7. Design FIR Low pass filter and High pass filter using Rectangular window.
8. Transform an analog filter into a digital filter using Impulse Invariant method.
9. Design a Chebyshev Low pass filter.
10. Design FIR low pass filter using Kaiser Window.
11. Determine the execution time of the FFT function.
12. Demonstrate the effectiveness of high-speed convolution FFT algorithm

Note : At least 10 experiments are to be performed from the above list.

EL-652- A

DISSERTATION PRELIMINARY      L T P   Cr

00

15      5

See note as given under course EL-658.

EL-653- A      SEMINAR-II   L T P   Cr

0 0 4   2

The work of Dissertation Preliminary is to be presented by the student in the form of Seminars II.

The work of monitoring will be done by the guide and evaluation by the committee consisting of guide, course coordinator and the HOD or hisnominee.

EL-655- A      SEMINAR-III   L T P   Cr

0 0 4   2

The work of Dissertation Phase-I is to be presented by the student in the form of Seminars III.

The work of monitoring will be done by the guide and evaluation by the committee consisting of guide, course coordinator and the HOD or hisnominee.

EL-658-A      DISSERTATION PHASE – II    L T P    Cr

0 0 54    18

Every student will carry out dissertation under the supervision of a guide. The topic of dissertation shall be approved by a committee constituted by the HOD. The method of evaluation including intermediate assessment shall be as evaluated by the pertinent BOS.

Dissertation work is spread over three terms and coded as EC- 653, EC-656 and EC-659. The distribution of amount of work in these three terms is equivalent to 5, 6 and 12 credits respectively. The evaluation of work is continuous but award of grade is for 23 credits in the last term on the basis of total work.

EL-659-A      TEACHING PRACTICE-I      L T P    Cr

- - -      2

See note as given under course EL-660.

EL-660-A      TEACHING PRACTICE-II      L T P    Cr

- - -      2

Teaching practice comprises of two non-two letter mandatory courses to be done under the guidance of HOD. Here, the student is required to be engaged in teaching of two UG courses (I and II) of his/her choice during the period between VIth to VIIth Sem. of the M.Tech. Degree Programme. The

student shall register for Teaching Practice only at the time he plans to take up teaching of UG course, but the credits earned will be counted in Sem-IV for Full Time students.

EL-507-A      POWER CONDITIONING      L T P   Cr

3 0 0   3

1.      OVERVIEW OF POWER QUALITY: Interest in power quality; voltage quality; power quality phenomena; voltage and current variations; voltage magnitude events; concepts of non linear loads and electric power conditioning; unity power factor rectifier; STATCON; (static condenser) SMPS; analysis; design and control; UPS: on line and off line; introduction to FACTScontroller.
2.      LONG INTERRUPTIONS AND RELIABILITY EVALUATION: Introduction; observation of system performance; generation reliability, transmission reliability; distribution reliability; basic concepts of reliability evaluation techniques; network approach; state-based and event- based approaches; Markov model; Monte Carlosimulation.
3.      SHORT INTERRUPTIONS: Terminology; origin and monitoring of short interruptions; influence on equipment; single phase tripping; stochastic prediction of short interruptions
4.      VOLTAGE SAG-CHARACTERIZATION: Voltage sag magnitude; voltage sag duration – fault clearing time; measurement of sag duration; three phase unbalance; phase angle jumps; other characteristics of voltage sag; load influence; on voltagesag.
5.      MITIGATION OF INTERRUPTION AND VOLTAGE SAGS: Overview of mitigation methods; power system design; redundancy through switching; redundancy through parallel operation; system equipmentinterface.

#### REFERENCE BOOKS

1.      Bollen, Math. H.J., “Understanding power quality problems”, Standard Publishers andDistributor
2.      Bollen, Math. H.J., “Understanding power quality problems voltage Sags and Interruptions” Standard Publishers and Distributor
3.      Hingorani, H.J., “Understanding Facts Concepts and Technology” Standard Publishers andDistributor.

EL-508- A

BIO-MEDICAL INSTRUMENTATION      L T P   Cr

3 0 0   3

1. THE NERVOUS SYSTEM: The anatomy of the nervous system; neuronal communication; the organization of the brain; neural receptors; the somatic nervous system and spinal reflexes; the automatic nervous system; measurement from the nervous system.
2. BIO-ELECTRIC SIGNALS AND ITS MEASUREMENT: Origin of bio-electric signals; recording systems; source of low level recording circuits; preamplifiers; main amplifier and driver stage; writing systems; types of recorders and transducers used.
3. BIO-MEDICAL RECORDERS AND DISPLAY SYSTEMS: ECG; EEG; EMG; photo-cardiograph and electrodes used for ECG; EEG and EMG; oscilloscopes used for biomedical measurements; multi-channel display; External pacemaker; implantable pace maker; programmable pace maker; leads and electrodes used; DC defibrillators; electrodes used; implantable defibrillators.
4. BLOOD GAS ANALYSERS: B.P measurement; patient monitoring system; blood PH measurement; blood PO<sub>2</sub>; PCO<sub>2</sub>; complete blood gas analyser.
5. SPECIAL MACHINES: MRI and ultrasonic imaging systems; x-ray machine; x-ray computed tomography; basic NMR components; physics of ultrasonic rays; A-scanner; B-scanner; echocardiograph; display devices for ultra sonic imaging; Lasers; ruby laser; argon laser; helium- neon laser; CO<sub>2</sub> laser; Nd-YAG laser

#### REFERENCE BOOKS

1. Khandpur, R.S, "Introduction to Bio-medical Instrumentation" TMH
2. Cromwell, Leslie, "Bio-medical Instrumentation" Pearson Education

EL-509-A VLSI TECHNOLOGY L T P Cr

3 0 0 3

1. REVIEW OF MOS TECHNOLOGY: Introduction to IC technology; MOS transistor enhancement mode and depletion mode operations; fabrication of NMOS; CMOS and BiCMOS devices; equivalent circuit for MOSFET and CMOS.
2. MOS CIRCUITS AND LOGIC DESIGN: MOS device design equations; CMOS and BiCMOS-inverters; latch up in CMOS circuitry and BiCMOS latch up susceptibility; Basic physical design of simple logic gates using n-MOS; p-MOS and CMOS; CMOS logic gate design considerations; CMOS logic structures; clocking strategies.

3. CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION: Resistance estimation; capacitance estimation; inductance; switching characteristics; CMOS gate transistor sizing; powerdissipation.

4. VLSI FABRICATION: Crystal growth; wafer preparation; epitaxy; oxidation; lithography; etching; diffusion; dielectric and poly-silicon film deposition; ion implantation; yield and reliability;metalization.

5. CMOS TESTING & DESIGNING : The need for testing; functionality test; manufacturing tests; a walk through the test process; manufacturing test principles; fault models; design strategies for test; design for testability; ad-Hoc testing; scan based test techniques; Incrementer / decrementer; left/right shift serial/parallel register; comparator for two n-bit number; a two-phase non- overlapping clock generator with buffered output on both phases; design of an event driven element for EDLsystem

#### REFERENCE BOOKS

1. Rabaey, Chandrakasan and Nikolic “Introduction to Digital Integrated Circuits” PearsonEd.
2. Neil H.E., Weste and Eshraghian Kamran; “Principles of CMOS VLSI Design” PearsonEd.
3. Sze S.M., “VLSI Technology”McGraw-Hill.
4. Botkar K.R., “Integrated Circuits” KhannaPublisher

EC-507-A WIRELESS COMMUNICATION L T P Cr

3 0 0 3

1 INTRODUCTION: Introduction to wireless communication system; various generation wireless networks; cellular concepts; interface and system capacity; trunking and grade of service improving coverage and capacity in cellularsystem.

2 FADING AND MOBILE CHARACTERISTICS REPRESENTATION: Small scale fading; frequency selective fading; fading effect due to Doppler spread; coherence BW and coherence time; Rayleigh fading distribution; Ricean fading; Nakagami distribution; level crossing.

CODING: Diversity; coding and equalization.



3 MODULATION TECHNIQUES: Modulation technique for mobile radio; pulse shaping techniques; linear modulation

techniques; constant envelope modulation; spread spectrum modulation techniques; rake receiver.

4 MULTIPLE ACCESS TECHNIQUES: Multiple Access Technique for wireless communication; FDMA, TDMA, CDMA, spectral effect of multiple access Schemes.

GSM SERVICES AND FEATURES: Architecture; frame structure; GSM channel; signal processing in GSM

5 DESIGN PARAMETERS OF MOBILE UNIT: Design Parameter at base and mobile unit; Antenna configurations; Noise, power and field strength.

#### REFERENCE BOOKS

1. Rappaport T.S, "Wireless Communications", Prentice Hall, 1996.
2. William C.Y. Lee, "Mobile Communications Design Fundamentals", 2nd Edition, John Wiley, February 1993.
3. Gordon L. Stuber, "Principles of Mobile Communication", Kluwer Academic, 2nd Edition, 2001.
4. W. Stallings, "Wireless Communication Network", Prentice Hall of India, 2003.
5. Schiller, J., "Mobile Communication", Addison Wesley, 2002.
6. Goodman, D.J., "Wireless Personal Communication Systems", Addison Wesley 1997.

EC-508-A ARTIFICIAL INTELLIGENCE L T P Cr

3 0 0 3

1 PREDICATE CALCULUS IN AI: Introduction; the Propositional calculus; the predicate calculus; expressions using inference rules; knowledge representation through predicate calculus.

2 STRUCTURES AND STRATEGIES FOR STATE SPACE SEARCH: Introduction; graph theory; strategies for state space search; heuristic search; algorithms for heuristic search; admissibility; monotonicity and informedness; game playing (minimax) using heuristic; back tracking strategies; graph search strategies; heuristic graph search;

control strategies of state space search; recursion-based search; pattern- directed search production systems.

3      **KNOWLEDGE REPRESENTATION:** Issues in knowledge representation; a brief illustration of AI representational systems; knowledge representation using predicate logic; semantics net; concept of frames; metaknowledge.

**RULE BASED SYSTEMS:** A forward deduction system; backward deduction system; combination of forward and backward system; control knowledge for rule based deduction systems.

4      **ARTIFICIAL NEURAL NETWORKS:** Introduction; different learning laws and architectures; learning through error back propagation; radial basis function; neural computing model: Hopfield net, Boltzmanmachine.

**UNCERTAINTY HANDLING:** Bayesian networks; Dempster-shafer theory; certainty factors; introduction to fuzzy logic.

5      **EXPERT SYSTEMS:** Introduction; architecture of expert system; knowledge acquisition and representation methods in expert systems; few applications of expert systems. Prolog Programming: an introduction and brief overview of the language.

## REFERENCE BOOKS

1.      Luger, George, “Artificial Intelligence: Structure and Strategies for complex problem solving”, Pearson Education,2004.
2.      Bratko, Iven, “Prolog: Programming for artificialintelligence” Person Education., Addison Wesley,2000.
3.      Nilsson, Nils J., “Artificial Intelligence: A New synthesis, Harcart Asia Pvt. Ltd.,1998.
4.      Kataipoulos, S.V., “ArtificialIntelligence”
5.      Yazani, Masound, “Artificial Intelligence”, Intellect,1986.
6.      Jack., M. Zwadu, “Introduction toANN”

EL-512- A      **NON-CONVENTIONAL ENERGY SYSTEMS AND ENERGY**

**CONSERVATION      L T P   Cr**

3 0 0   3

1. ENERGY CLASSIFICATION: Sources; utilization; economics; power generation terminology; energy conversion matrix; and review of various principal fuels for energy conversion such as solar; biogas; wind; tidal etc.
2. WIND & SOLAR ENERGY: Basic principles of wind energy conversion; site selection considerations; wind data and energy estimation; classification of WEC systems; magnus effect; wind energy collectors; storage and applications of wind energy; safety systems, Solar radiation and its measurement; solar energy collectors; storage and applications.
3. ENERGY FROM BIOMASS: Introduction; biomass conversion technologies; biogas generation; classification of biogas plants; details of construction of some main digesters; methods for maintaining biogas production; problems related to bio-gas plant etc.
4. ENERGY PRODUCTION FROM OCEANS & THERMAL ENERGY: Introduction; OTEC; open cycle; closed cycle OTEC systems; energy utilization; hybrid cycle etc. operation methods of utilization of tidal energy; prospects in India, conversion of mechanical energy; conversion of electrical energy; conversion of electromagnetic energy; conversion of chemical energy; conversion of nuclear energy etc; study of typical energy converters such as high performance motors; special generators driven by biogas engines; wind turbines etc. mini-hydro generators; energy efficient motors.
5. ENVIRONMENTAL IMPACT OF POWER PLANT OPERATION: Introduction; particulate emissions; gaseous pollutants; thermal pollution; solid-waste pollution; Magneto hydro dynamics power generation, thermo electric power generation (Seebeck, Peltier Thomson effects), thermionic generation

#### REFERENCE BOOKS

1. Mukund, R. Ptall, "Non-Conventional Energy Sources"
2. Culp, A.W., "Principles of Energy Conversion" by Tata McGraw Hill Publishing Co.Ltd.

EL-514-A POWER PLANT ENGINEERING L T P Cr

3 0 0 3

1. INTRODUCTION: Power development programme of India; factors controlling the choice of steam; IC engine; gas turbine; nuclear and hydroelectric power plants; determination of important

specifications of the plant; analysis of cost of power generation; peak power plants etc. recent advances in powerplants.

2.      **THERMAL POWER PLANT:** Types of thermal power stations; steam power stations based on fossil fuels; economy and thermal scheme of the steam power stations; thermal power plant equipment; boilers; super heaters; economizers; condensers; combustion chamber and gas loop; cooling towers; selection of auxiliary equipment etc. **DIESEL ELECTRIC POWER PLANTS:** Outline; types of engines used for diesel power plants; thermodynamic cycles and cycle analysis; different systems of diesel power plant; supercharging; performance; latest trends in diesel research.

3.      **GAS TURBINE POWER PLANTS:** Gas turbine plants; classification and comparison of different types; analysis of closed cycle and open cycle constant pressure gas turbine plants; methods to improve the thermal efficiency of a simple open cycle constant pressure gas turbine power plant; governing systems; arrangements of combined cycles; repowering system; combined cycle with gas production from coal; combined cycles using PFBC system; combined cycles with organic fluids; optimum design of gas turbine unit for combined cycle plant; parameters affecting thermodynamic efficiency of GT cycle and combined cycle performance; economics and future of combined cycle.

4.      **ELEMENTS OF HYDROPOWER GENERATION:** Rainfall and its measurement; run –off and its measurement; hydrographs; flow duration curves; mass curves and

storage; different hydroelectric power plants; design; construction and operation of different components of HE power stations; selection of prime movers; governing of water turbines etc.

5.      **ELEMENTS OF NUCLEAR POWER PLANTS:** Nuclear reactors; general components; types; problems associated; nuclear fuels; types of nuclear wastes; effects of nuclear radiation.

**POLLUTION AND ITS CONTROL:** Air and water pollution by thermal power plants and its control acid rains; thermal pollution by thermal and nuclear power plants; radio active pollution of environment by nuclear power plants; noise pollution and noise control; methods suggested to reduce the pollution.

#### REFERENCE BOOKS

1.      Arora, S., “Power Plant Engineering”, Dhanpat Rai & Co.
2.      Uppal, S.L., “Power Plant Engineering”, Khanna Publisher

1. INTRODUCTION TO EHV AC TRANSMISSION AND LATEST TRENDS: Role of EHV AC transmission and description of energy sources and their development; standard transmission voltages; power handling capacity and line loss; giant power pools; costs of the transmission lines and equipments; tower configurations; mechanical considerations in line performance; thermal ratings of lines and cables; transformer technology; SF<sub>6</sub> circuit breakers; lightning and lightning protection

2. VOLTAGE GRADIENTS OF CONDUCTORS: Electrostatics; field of sphere gap; field of line charges and their properties; charge-potential relations for multi-conductor lines; surface voltage gradients on conductors; gradient factors; distribution of voltage gradient on sub conductors of bundle; design of cylindrical cages for corona;

voltage gradients on conductors in the presence of ground wires on towers.

3. CORONA EFFECTS: I<sup>2</sup>R and Corona loss; q-v diagram; attenuation of traveling waves due to corona loss; audible noise; generation and characteristics; AN measurement and meters relation between single-phase and three phase AN levels; day-Night equivalent noise level.

RADIO INTERFERENCE: Corona pulses; properties of pulses train and filter response; limits for RI fields; frequency spectrum of the RI field of line; lateral profile; modes of propagation; CIGRE formula; RI excitation function; measurement of RI; RIV and excitation function; design of filter and TV interference.

4 ELECTROSTATIC FIELD OF TRANSMISSION LINES: Calculation of ES field of AC lines; meters and measurement of ES fields; ES induction in unenergised circuit of a DC line; induced voltages in insulated ground wires; electromagnetic interference.

5. INSULATION CHARACTERISTICS OF LONG AIR GAPS: Types of electrode geometries used in EHV; breakdown characteristics of long air gaps; breakdown mechanisms of short and long air gaps; breakdown models of long gaps with non-uniform fields.

POSITIVE SWITCHING SURGE FLASHOVER: Saturation

problems; CFO and withstand voltage of long air gaps; statistical procedure; CFO voltage of long air gaps – Paris's theory.

DESIGN OF EHV LINES BASED UPON STATE: State limit

and transient over voltages; voltage stability; series and shunt capacitance etc.

#### REFERENCE BOOKS

1. Begamudre, R.D., "Extra High Voltage A.C. Transmission Engg", New Age International Ltd.
2. Hingorani, Narain G, "Understanding Facts, Concepts and Tech of Flexible", Standard Pub.
3. Edward Hughes, "A.C. Transmission Systems"
4. Kuffel, E., "High Voltage Engineering", Newness Indver
5. Naidu, M.S., "High voltage Engineering", Tata McGraw Hill, 2000

6. Padiyar, K.P., "H.V.D.C Power Transmission System", New Age, 2001
7. Wadhwa, C.L., "High Voltage Engineering", New Age International 2002
8. Razevig, D.V. Khanna, "High Voltage Engineering", 2002
9. Ravindra, Arora, "High Voltage Engineering" New Age

EL-516-A DISTRIBUTED CONTROL SYSTEM AND SCADA L T P Cr

3 0 0 3

#### UNIT I- DCS STRUCTURE

DCS Architecture, Database organization in DCS, System Elements of DCS, Field station , Intermediate station , Central computer station , Reliability parameters of DCS

UNIT II- HMI IN AUTOMATION – Automation system structure, Instrumentation subsystem, Control subsystem, Human Interface subsystem, Operator Panel, Construction of the panel.

#### UNIT III- INTRODUCTION TO SCADA – Definition of SCADA,

Application area of SCADA, Major elements of SCADA, Advantages and disadvantages of SCADA, Comparison of SCADA, DCS, PLC and Smart Instrumentation.

#### UNIT IV- REAL TIME SYSTEMS AND SCADA SOFTWARE –

Definition and introduction of real time control, real time control for continuous process, communication access and master- slave concept, determination of scan interval.

#### SCADA SOFTWARE COMPONENTS-

Concept of FBD technique, comparison of centralized and distributed processing, HDLC Protocol.

#### UNIT V- SCADA HARDWARE –

Remote Terminal Unit (RTU), structure of RTU, CPU, Analog I/O, Pulse I/P, Digital I/Os, Communication Interface, Power supply, RTU Rack and Enclosure, Test and maintenance of RTU, Requirements of RTU system, ANSI/IEEE C37.1 Protocol.

#### MASTER TERMINAL UNIT –

Hardware structure, Functions of MTU, Configuration of MTU, Redundant MTU system.

#### List of Books

1. Distributed Compute control for Industrial Automation- By- Dobrivoje Popovic and Vijay Bhatkar. Marcel Dekker Inc.,1990,
2. Overview of Industrial , By KLS Sharma, Elsevier Publication,
3. Practical SCADA for Industry, By David Bailey, Edwin Wright. Newnes, (an imprint of Elsevier),2003
4. SCADA- Supervisory Control and DATA Acquisition System, By- Stuart A. Boyer, ISA Publication (3rd Edition),
5. Computer based industrial control , By Krishnakant, PHI, New Delhi, 5thEdition

### SCHEME FOR M. TECH. (ECE)

M. TECH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-501-A	Numerical Techniques	3	1	0	4
2	EC-501-A	SignalTheory	3	1	0	4
3	EC-502-A	Digital SignalProcessing	3	1	0	4
4	EC-504-A	DigitalCommunication& InformationTheory	3	1	0	4
5	EC-552-A	DigitalSignal ProcessingLab	0	0	2	1
6	EC-553-A	SimulationLab	0	0	2	1
Total			12	4	4	18

M. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	

1	EC-505-A	Microprocessor and its Applications	3	1	0	4
2	EC-506-A	Advanced Digital Signal Processing	3	1	0	4
3	EC-510-A	Digital System Design	3	1	0	4
4	EC-511-A	Embedded Systems and Applications	3	1	0	4
5		Elective -I	3	0	0	3
6	EC-555-A	Microprocessor Lab	0	0	2	1
7	EC-560-A	Digital System Design Lab	0	0	4	2
8	EC-565-A	Seminar-I	0	1	0	1
9	EC-657-A	Minor Project	0	0	6	3
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>26</b>

### SCHEME FOR M. TECH. (ECE)

M. TECH.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-601-A	General and Special Purpose Digital Signal Processing	3	1	0	4
2	EC-602-A	Analog MOS Integrated Circuit for Signal Processing	3	1	0	4
3	EC-605-A	Statistical Signal Processing	3	1	0	4
4		Elective -II	3	0	0	3
5	EC-651-A	DSPProcessors and Application Lab	0	0	2	1
6	EC-654-A	Seminar-II	0	0	4	2
7	EC-653-A	Dissertation Preliminary**	0	0	10	5
		<b>Total</b>	<b>12</b>	<b>3</b>	<b>16</b>	<b>23</b>



M. TECH.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-656-A	Dissertation	0	0	46	18+5
2	EC-658-A	Seminar-III	0	0	4	2
3	EC-660-A	TeachingPractice- I***	0	0	4	2
4	EC-661-A	teachingPractice-II	0	0	4	2
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>58</b>	<b>29</b>

### SCHEME FOR M. TECH. (ECE) ELECTIVE -1

M. TECH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-507-A	Wireless Communication	3	0	0	3
2	EC-508-A	ArtificialIntelligence	3	0	0	3
3	EC-509-A	OpticalFibre CommunicationSystem	3	0	0	3
		<b>Total</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>

## SCHEME FOR M. TECH. (ECE) ELECTIVE -1I

M. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-512-A	RadarSystem AnalysisandDesign	3	0	0	3
2	EC-513-A	SonarSignal Processing	3	0	0	3
3	EC-514-A	DigitalImage Processing	3	0	0	3
<b>Total</b>			<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>

MA-501-A      NUMERICALTECHNIQUES    LTP    Cr

310      4

Unit-I:      LINEAR      EQUATIONS:      Matrix      theory;      solution      of  
generallinearsystemofequations;existenceanduniquenessofsolution;echelon form of matrix; ill-  
conditiond      matrices;      eigen      value      and  
eigenvectors;unitarymatrices;HermitianandNormalmatrices;GausseliminationandGauss-  
jordanmethodsforhomogenousandnon-homogenous systems oflinear equations;round off error.

Unit-II:NON-LINEAREQUATIONSANDINTERPOLATION

PROBLEMS:Bisectionmethod;linearinterpolationmethods;Newton'smethod;Muller'smethod;Bairstow's  
smethodsforthequadraticfactors;Lagrangianpolynomial;divideddifferences;interpolationwith cubic  
spline; Bexier curves and B-spline curves;polynomial approximationofthe surfaces;leastsquaremethod.

Unit-III: SOLUTION OF ORDINARY DIFFERENTIAL

EQUATION AND INTEGRATION: Derivatives from differencetable; higher order derivatives;  
extrapolation      techniques;      integrationformulas-  
Simpson'srrule,trapezoidalrule;Gaussianquadrature;adaptiveintegration;multipleintegrals.ModifiedEuler

methods; Milne's method; Adam's Moulton method; convergence criteria; errors and error propagation; comparison of different methods.

Unit-IV: BOUNDARY VALUE PROBLEMS; Shooting method; Rayleigh-Ritz method; Collocation and Galerkin method; characteristic value problem; eigen values by iteration and QR method; application of eigen values.

Unit-V: SOLUTION OF PARTIAL DIFFERENTIAL

EQUATION: Laplace's equations on a rectangular region; iterative method for the Laplace equation; Poisson equation; A.D.I method; solution of parabolic differential equation by Crank-Nicholson method; theta method; solution of wave equation by finite differences.

REFERENCE BOOKS:

1. Kreyszig, Erwin, "Advanced Engineering Mathematics".
2. Greenberg, Mchale, D "Advanced Engineering Mathematics".
3. Jain, R.K. and Iyengar, S.R.K., "Advanced Engineering Mathematics".

EC-501-A SIGNAL THEORY LTP Cr

3 1 0 4

1 PROBABILITY AXIOMS: Conditional probability; Baye's theorem; random variable concept; discrete and continuous random variables; cumulative distribution function (CDF); probability density function (PDF); conditional PDF; expected value; variance; functions of random variable; expected value of the derived random variable.

2

MULTIPLER RANDOM VARIABLES: Joint CDF/PDF; Functions of multiplier random variable; multiple function of multiplier random variables independent / uncorrelated random variables; sum of random variable; moment generating function; random sums of random variable; central limit theorem

3 RANDOM PROCESS: Introduction to random process; specification of random processes; nth order joint PDF; stationary and independence; Markov process; Markov property; Gaussian

process; Poisson process; Mean and correlation of random processes; stationary; wide sense stationary; ergodic processes; mean square continuity; mean square derivatives.

4 POWERSPECTRUM: Random processes as input to linear time invariant systems; power density spectrum; cross-power density spectrum and their properties; relationship between power spectrum and autocorrelation function; relationship between cross-power spectrum and cross-correlation function; Gaussian process as inputs to LTI system.

5 ESTIMATION THEORY: Bayes estimation: mean square error criterion, absolute value criterion, uniform cost function criterion; Cramer's–Rao inequality for non-random and random parameters.

## REFERENCE BOOKS

1. Papoulis, A. and Pillai, S. U., "Probability, Random Variable and Stochastic Process", 4th Edition, McGraw Hill, 2002,
2. Krishnan, V., "Probability and Random Processes", John Wiley & Sons.
3. Payton, Z. and Peebles, J. R., "Probability, Random Variables and Random Signal Principles", 4th edition, McGraw Hill, 2000
4. Stark, H. and Woods, J. W., "Probability and Random Processes with Application to Signal Processing", Prentice Hall, 2002.

EC-502-A DIGITAL SIGNAL PROCESSING LTP Cr

3 1 0 4

1 DISCRETE TIME SIGNALS AND SYSTEMS: Introduction; discrete-time signals-sequences i.e. basic sequences and operations; discrete time systems; memory-less systems; linear time invariant systems; causality; stability properties of linear time-invariant systems; frequency-domain representation of discrete-time signals and systems; Representation of sequences by Fourier transforms; symmetry properties and theorem of Fourier transform; discrete-time random signals.

## 2 FREQUENCY TRANSFORMATIONS

Z-TRANSFORMS: Introduction; properties of Z-transform; region of convergence; inverse Z-transform-partial fraction expansion; power series expansion; application of Z-transform; system function; poles and zeros.

FFT: Frequency transformations in the analog and digital domain. Discrete Fourier Transform (DFT)-properties of DFT; linear convolution using DFT; computation of DFT using fast Fourier transform (FFT)

3 DIGITAL FILTERS STRUCTURES: Basic structures of infinite impulse response (IIR) and finite impulse response (FIR); filters – direct form; cascade form; parallel form; feedback in IIR system; transposed forms design of FIR and IIR filters using all standard procedures

ERRORS IN DIGITAL FILTERING: Errors resulting from rounding and truncation; round-off effects in digital filters; finite word length effects in digital filter.

4 MULTIRATE DIGITAL SIGNAL PROCESSING (MDSP): Sampling rate conversion; multistage implementation of sampling rate conversion; application of multi rate DSP for design of phase shifters; narrow band low pass filters; quadrature mirror filters, digital filter banks.

5 HARDWARE IMPLEMENTATION OF DSP: Introduction to DSP processor; architecture of DSP processors; DSP devices : VonNeumann model, Harvard architecture.

#### REFERENCE BOOKS

1. Alan, V. Oppenheim and Ronald, W. Schaffer, "Digital Signal Processing", Prentice Hall of India, 1998
2. Mitra, Sanjit K., "Digital Signal Processing", Tata McGraw Hill, 2002
3. Proakis, "Digital Signal Processing", Prentice Hall of India, 2002

EC-504-A DIGITAL COMMUNICATION & INFORMATION THEORY LTP Cr

3 1 0 4

1 WAVEFORM CODING TECHNIQUES: Quantization; pulse code modulation (PCM); PCM generator and receiver; Compounding in PCM; delta modulation; adaptive delta modulation; differential PCM; comparison of digital pulse modulation method.

2 DIGITAL MODULATION TECHNIQUES: Introduction; ASK, PSK, FSK, MSK, QPSK, BPSK; detection of binary modulation techniques in the presence of noise; error probability in ASK, PSK, FSK; spread spectrum.

3 INFORMATION THEORY: Concept of information and entropy; Shannon theorem; channel capacity; self information; discrete and continuous entropy; mutual and joint information; redundancy.

4 CODING THEORY: Source encoding & channel encoding; error detection and correction; various codes for channel coding; rate distortion functions.

5 ERROR CONTROL CODE: Introduction to block coding and optimal decoding; binary hamming code; structure of linear code; decoding of linear block code; Reed-Muller code; structure of cyclic code; Bose Chaudhary Hocquenghem (BCH) codes; cyclic hamming code.

## REFERENCE BOOKS

1. Proakis, J.G., "Digital Communication", 3rd edition, Tata McGraw Hill, 1990.
2. Sklar, Bernard, "Digital Communications: Fundamentals and Applications", Prentice Hall of India, 2003.
3. Hawkins, Simon and Wiley, John, "Communication System", 3rd edition, 2004.
4. Wilson, S.G., "Digital Modulation and Coding", Prentice Hall of India, 1996.

EC-552-A      DIGITAL SIGNAL PROCESSING LAB LTP      Cr

0 0 2    2

## LIST OF EXPERIMENTS USING MATLAB

1. Write a Program for generation of unit impulse, unit step, ramp, exponential, sinusoidal and cosine sequence.
2. Write a Program for computing inverse Z-transform of a rational transfer function.
3. Write a Program for linear convolution
4. Write a Program for plotting the frequency response of first order system.
5. Write a Program for computing Discrete Fourier Transform (DFT).
6. Design a Butterworth Low pass IIR filter using Bilinear Z-transform method.
7. Design FIR Low pass filter and High pass filter using Rectangular window.
8. Transform an analog filter into a digital filter using Impulse Invariant method.
9. Design a Chebyshev Low pass filter.
10. Design FIR low pass filter using Kaiser Window.
11. Determine the execution time of the FFT function.
12. Demonstrate the effectiveness of high-speed convolution FFT algorithm

Note: At least 10 experiments are to be performed from the above list.

## LIST OF EXPERIMENTS

1. Simulate & Study the result of design of the Frequency Response of an RC Coupled Amplifier using P-Spice.
2. Simulate using S-Pice and verify the Operation of a Differentiator Circuit using 741 Op-amp and show that it acts as a Highpass filter.
3. Simulate using S-Pice and verify the Operation of an Integrator Circuit using 741 Op-amp and show that it acts as a Low pass filter.
4. Simulate using P-Spice the application of Op-amp 741 as a Square Wave Generator.
5. Simulate and find how many cycles are present in the output of a Pulsed Amplifier.
6. Simulate the design of Logarithmic Amplifier using Op-amp 741.
7. Simulate and study the characteristics of Common Source FET Amplifier using P-Spice.
8. Simulate and study the V-I Characteristics of MOSFET.
9. Simulate & Implement a given logic Expression using PLA with P-Spice.
10. Simulate 16:1 Multiplexer and 1:16 Demultiplexer and determine its truth table.
11. Simulate 4-bit Comparator using P-Spice.
12. Simulate D, S-R, J-K & T Flipflop using NAND gates & study its operation.
13. Simulate using P-Spice a 3-bit Synchronous Counter & determine its count sequence.
14. Simulate using P-Spice a 3-bit Shift Register & determine its truth table.

Note: At least 10 experiments are to be performed from the above list.

1      MICROCOMPUTER HARDWARE: Microprocessor; architecture; system bus; memory organization; I/O; addressing modes; instruction types.

INTERRUPTS: Timing and machine cycles; peripheral interfacing – DMA controller; CRT controller-8275; floppy disk interface and floppy disk controller-8272.

2      PROCESS CONTROL COMPUTER SYSTEMS: Process control languages; types of computers – mainframes; minicomputers; microcomputers; performance evaluation techniques.

DEVELOPMENT TOOLS: Development systems for micros; software tools; logic analyzer; cross assemblers; compilers; and simulators.

3      MICROPROCESSOR AND MICROCOMPUTER SELECTION : Matching processors and applications; defining the application; software requirements; memory requirements; interfaces; coprocessor; future needs and expandability; power requirements; maintenance; cost effective design.

4      DATA COMMUNICATION: Information coding; asynchronous and synchronous data communication; data communication standards : RS232C and RS485; USART; IEEE-488 GPIB

5      APPLICATIONS: Stepper motor interface; temperature controller with an analog and digital computer using a temperature sensor; microprocessor based speed-monitoring unit of DC motor; frequency measurement.

#### REFERENCE BOOKS

1. Rafiquzzaman, “Microprocessor-Microprocessors and Microcomputer-Based System Design”, CRC Press, 1990.
2. Slater, “Microprocessor based Design: A Comprehensive Guide to Effective Hardware Design”, Prentice Hall of India, 2002.
3. Mathur, A.P., “Introduction to Microprocessors”, Tata McGraw Hill, 1997.
4. Bray “Intel Microprocessor 8086/8088: Architecture, Programming and Interfacing”, Prentice Hall of India.
5. Ghoshal, S. “Microprocessor Based System Design”, Macmillan, 2000.



1. PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION: Relationship between the auto correlation and the model parameters; the Yule-Walker method for the AR Model Parameters; the Burg method for the AR model parameters; unconstrained least-squares method for the AR Model parameters; sequential estimation methods for the AR Model parameters; selection of AR model order.

2. FOURIER TRANSFORM: Multi-dimensional Fourier transform; Fourier transform: power and limitations; short time Fourier transform; Gabor transform: discrete time Fourier transform and filter banks.

3. ADAPTIVE SIGNAL PROCESSING: FIR adaptive filters; steepest descent adaptive filter; LMS algorithm; convergence of LMS algorithms; application: noise cancellation; channel equalization; adaptive recursive filters; recursive least squares.

4. MULTIRATE SIGNAL PROCESSING: Decimation by a factor  $D$ ; interpolation by a factor  $I$ ; filter design and implementation for sampling rate conversion: Direct form FIR filter structures; polyphase filter structure.

WIENER FILTERING: Introduction, The principle of orthogonality; IIR Wiener filters; FIR Wiener filters Wiener Prediction; the Levinson; Durbin algorithm; Lattice Wiener filtering; lattice predictor properties.

5. WAVELET TRANSFORMS: Continuous wavelet transform; wavelet transform ideal case; perfect reconstruction filter banks

and wavelets; recursive multi-resolution decomposition; Haar wavelet; Daubechies wavelet.

HOMOMORPHIC SIGNAL PROCESSING: Introduction; homomorphic system for convolution; properties of complex spectrum.

## REFERENCE BOOKS

1. John, G. Proakis, Dimitris, G. Manobakis, "Digital Signal Processing, Principles, Algorithms and Applications", Third edition, Prentice Hall of India, 2000.
2. Monson, H. Hayes, "Statistical Digital Signal Processing and Modeling", Wiley, 2002.

3. Glenn,Zelniker,Fred,J.Taylor“AdvancedDigitalSignalProcessing”,CRCPress-Publication,2004.
4. Rabiner, L.R. and Schaber, R.W., “Digital Processing of SpeechSignals”,Pearson Education, 1979.
5. RobertoCrist,“ModernDigitalSignalProcessing”,ThomsonBrooks/Cole, 2004
6. Raghuveer, M. Rao, Ajit, S. Bopardikar, “Wavelet Transforms,IntroductiontoTheoryandapplications”,PearsonEducationAsia, 2000.

EC-510-A DIGITALSYSTEMDESIGN LTP Cr

3 1 0 4

1

INTRODUCTIONTOCOMPUTERADDEDDESIGN:Hardwaredescriptionlanguage(HDL),VH  
SICHardwaredescriptionlanguage(VHDL),dataobjects,datatypes,operators.

2

INTRODUCTIONTOMODELING:Entitydeclaration;architecturebody;behavioralflowofmodeli  
ng;assignmentsequentialcasearrayetc.;structuralmodelinganddataflowmodeling.

COMBINATIONALANDSEQUENTIALCIRCUITS:VHDL

modelsofcombinationalandsequentialcircuits;memoryimplementationofBooleanfunction;codeconverter;  
ALU.

3

HARDWAREANDSOFTWAREOFDESIGNUNIT:Hardwareandsoftwarefirmwareconsideratio  
nindesigningcontrol units for arithmetic logical processors; I/O processor  
withdifferentmethodsofthedatahandling,electronicsswitching;processinterface design.

PROGRAMMABLE LOGIC DEVICES: Programmable  
logicarrays(PLA)anddesigningwithPLA,PAL,FPGA, CPLD.

4

APPROACHESTOSEQUENCIALANALYSISANDDESIGN:Statediagram;analysisofsequenti  
alsynchronouscircuits;design steps for sequential synchronouscircuits; statereduction; design of output  
decoders; counters; shift registers andmemory.

5 ASYNCHRONOUSFINITESTATEMACHINES:Scope;asynchronous analysis; design of  
asynchronous machines;

cycles and races; plotting and reading the excitation map; essential hazards map entered variable (MEV), MEV approach to asynchronous design.

#### REFERENCE BOOKS

1. Fletcher, "Engineering Approach to Digital Design", Prentice Hall of India, 1993.
2. Bhasker, "A VHDL Primer, Pearson Education", Prentice Hall PTR, 2006.
3. Mano, "Digital Logic and Computer Design", Prentice Hall of India, 1994
4. Wakerly, "Digital Design: Principles and Practices", Pearson Education, 2005.
5. Smith, D., "HDL Chip Design", Doon Publications 1996.

EC-511-A      EMBEDDED SYSTEMS AND APPLICATIONS      LTP      Cr

3 1 0      4

1 INTRODUCTION TO EMBEDDED SYSTEM : categories of embedded systems; hardware architecture; CPU; processor architecture interrupts; CISC & RISC; memory; I/O devices; DMA, ADC & DAC; serial peripheral integrate; inter – integrated circuits bus-TCP/IP protocol.

2

SOFTWARE ARCHITECTURE: services provided by an operating system; architecture of embedded operating system; categories of embedded operating system.

PROCESS OF EMBEDDED SYSTEM DEVELOPMENT:

waterfall model; requirements engineering; design tradeoffs; co-design; hardware design; software design; implementation; integration & testing; configuration management; managing embedded-system development projects.

3 COMMUNICATION INTERFACES: RS-232/UART; RS-422/485; IEEE 1394; USB; Ethernet; wireless interfaces; IEEE 802.11; Bluetooth.

REPRESENTATIVE EMBEDDED SYSTEMS: digital

thermometer; handheld computer; GPS navigation system; internet phone; software: defined Radio; smart cards; RF tags.

4 EMBEDDED OPERATING SYSTEM: features of O/S; POSIX; difference in various O/S, embedded NT; Windows XP embedded and embedded Linux.

5.MICROCONTROLLERARCHITECTURE:IntroductiontoPICmicrocontrollers,Architectureandpipelining,programmmemoryconsiderations,Addressingmodes,CPUregisters,Instructionset;simple operations.

#### REFERENCEBOOKS

1. Prasad,K.V.K.K.,“EmbeddedSystem”,DreamtechPress,2005.
2. Kamal,Raj, “EmbeddedSystemandApplications”,TMS,2002

EC-555-A      MICROPROCESSORLAB      LTP      Cr  
0 0 2      2

#### LISTOFEXPERIMENTS

1. Familiarizationwith architecture andoperationofsingleboardmicrocomputer.
2. Performing mathematical and logical operations on a single boardmicrocomputer.
3. FamiliarizationwithDEBUGprogramanditscommandstoexecute anddebug
- 1.AssemblyLanguagePrograms(ALP).
4. Writea programfor a 16bitprocessorto
  - a. Findthelargest numberinadata array.
  - b. Findthesmallest numberinadataarray.
5. Writeaprogramfora16bitprocessortofindthesumofaseriesof 16bitnumbers.
6. Writea programfor speedcontrolofDCseries motor.
7. Designamicroprocessorbasedtemperaturemonitoringunit.
8. Writeaprogramforatrafficlight controlwithemergencycontrolusingInterrupts.
9. Familiarizationwitharchitectureandoperationofan8bitMicrocontroller.
10. Writean ALPto generate10 KHzsquare wave.
11. WriteanALPtointerfaceMicroprocessorandLCDdisplay.
12. Write an ALP to interface one microcontroller with other usingserialcommunication

Note: At least 10 experiments are to be performed from the above list.

EC-565-A      SEMINAR-I    LTP    Cr

0 0 2    1

The student has to undertake extensive literature survey on a topic with the approval of the course coordinator. The course coordinator shall not be below the rank of Assistant Professor. The work may involve extensive search of print, audio-video materials, internet surfing etc.

The work of monitoring will be done by the course coordinator and evaluation by the course coordinator and the HOD or his nominee.

EC-560-A      DIGITAL SYSTEM DESIGN LAB      LTP    Cr

0 0 2    2

#### LIST OF EXPERIMENTS

1. Write VHDL code for 3 to 8 priority encoder.
2. Write structural code for 16:1 multiplexer.
3. Write VHDL code of full adder using two half adder.
4. Write VHDL code of BCD to 7 segment code converter using Data Style of modeling.
5. Design a three bit up/down counter using T flipflop.
6. Design a four bit synchronous counter with parallel load using T and D flipflops.
7. Write Behavioral VHDL code for module-12 up counter with synchronous reset.
8. Write VHDL Code for left to right shift registers with enable pin.
9. Create an entity that represents 3 to 8 binary encoder using two instances of 2 to 4 entity.
10. Design four bit comparator using Behavioral and Structural type of modeling.
11. Design an ALU capable of performing arithmetic and logical operations.

12. Design a module-6 counter which counts in the sequence 0,1,2,3,4,5,0,1. The counter counts the clock pulse if its enable pin is equal to 1

Note: At least 10 experiments are to be performed from the above list.

EC-565-A      SEMINAR-I      LTP      Cr  
0 0 2      1

The work of Dissertation Preliminary is to be presented by the student in the form of Seminars II.

The work of monitoring will be done by the guide and evaluation by the committee consisting of guide, course coordinator and the HOD or his nominee.

EC-657-A      MINOR PROJECT      LTP      Cr  
0 0 6      3

The student is required to do the design/fabrication/coding/simulation of equipment/process/system of his/her choice and to be approved by the course coordinator.

The course coordinator will evolve the evaluation procedure under the guidance of HOD.

EC-601-A      GENERAL & SPECIAL PURPOSE DIGITAL SIGNAL PROCESSORS      LTP      Cr  
3 1 0      4

1 INTRODUCTION: Computer architectures for signal processing; Harvard Architecture; pipelining.

HARDWARE DESIGN: Hardware multiplier accumulator; special instructions; Replication on chip memory/cache; extended parallelism: SIMD, VLIW and static superscalar processing.

2 GENERAL PURPOSE DIGITAL SIGNAL PROCESSORS : Fixed point DSP's; Architecture of first generation fixed point DSP processors; Architecture of second generation fixed point DSP's; Architecture of third generation fixed point DSP's; Architecture of fourth generation fixed point processors; floating point digital signal processors.

3 SELECTING DIGITAL SIGNAL PROCESSORS: Architectural features; execution speed; type of arithmetic; word length; support for development tools; packaging of a DSP; Clock frequency and MIPS rating.

4 IMPLEMENTATION OF DSP ALGORITHMS ON GENERAL PURPOSE DSP's: FIR digital filtering; IIR digital filtering; FFT processing; multirate processing.

SPECIAL PURPOSE DSP HARDWARE: Basic requirements of special purpose DSP's; hardware digital filters; hardware FFT processors; architecture of hardware FFT processors; double buffering in real time FFT.

5 APPLICATIONS OF DSP: Speech Coding and Decoding; Speech Encryption and Decryption; Speech Recognition.

## REFERENCE BOOKS

1. Ifeachor, Emmanuel C., and Jervis, Barrie W., "Digital signal processing – A practical approach", Second Edition, Pearson Education, 2004.
2. Proakis, John G. and Manolakis, Dimitris, "Digital Signal Processing – Principles, Algorithms and applications", Pearson Education, 2006.
3. Chassaing, R and Horning, D.W., "Digital Signal Processing with the TMS320C2S", Wiley Publications, 1990.
4. Sharkawy, Mohammed EL., "Digital Signal Processor Applications with Motorola's DSP56002",

1 OVERVIEW OF MOS TECHNOLOGY: Analog signal processing; basic MOS semiconductor devices: n-MOS; p-MOS; CMOS inverter.

2 FABRICATION PROCESS: Basic fabrication of MOS, n-MOS, p-MOS, CMOS, Bi-MOS, pn-junction; resistor, capacitor.

3 USE OF DEVICE MODELS IN CIRCUIT ANALYSIS: MOS models, Bipolar models; monolithic resistors and capacitors.

4 ANALOG CMOS SUBCIRCUIT: MOS switch, CMOS current source, current mirrors—Wilson; cascade.

#### DIGITAL TO ANALOG AND ANALOG TO DIGITAL

CONVERSION: medium speed, high speed.

5 SWITCHED CAPACITOR CIRCUIT: Switch capacitor amplifier; switched capacitor Integrator; Z domain or first order and second order switched capacitor circuit.

#### NON-FILTERING APPLICATIONS OF SWITCHED

CAPACITOR CIRCUITS: Gain stage; programmable: capacitor arrays; switched: capacitor rectifiers; detectors; oscillators; application in field of signal processing.

#### REFERENCE BOOKS

1. Allen, "CMOS Analog Circuit Design", Oxford University Press, 2002.
2. Schaumann, "Design of Analog Filters", Oxford University Press, 2001
3. Warner and Grung, "MOSFET Theory and Design", Oxford University Press, 1999.
4. Gregorian and Temes, "Analog MOS Integrated Circuits for Signal Processing", John Wiley, 1986.

EC-605-A STATISTICAL SIGNAL PROCESSING LTP Cr

1 INTRODUCTION TO DIGITAL FILTER DESIGN: FIR filter and IIR filter.



## DIGITAL FILTER DESIGN USING LEAST-SQUARE

METHOD: Least square error criterion in the design of Pole-zero filters; FIR least squares inverse filters.

2 SPECTRAL ESTIMATION AND ANALYSIS: Nonparametric methods: Periodogram; Bartlett and Welch modified periodogram; Blackman-Turkey Methods.

3 SPECTRAL ESTIMATION AND ANALYSIS: Parametric methods: wide sense stationary random process; rational power spectra: autoregressive (AR) process; moving average (MA) process; ARMA process; relationship between the filter parameters and the autocorrelation sequence.

4 FORWARD AND BACKWARD LINEAR PREDICTION: Forward linear prediction; backward linear prediction; relationship of an AR process to linear prediction: Yule-Walker method, Levinson-Durbin algorithm.

5 WIENER FILTERS FOR FILTERING AND PREDICTION: FIR Wiener filter; orthogonality principle in the linear mean-square error (MSE) estimation, IIR Wiener filter. ADAPTIVE ALGORITHMS TO ADJUST COEFFICIENTS OF DIGITAL FILTERS: Least means square (LMS); recursive least square (RLS) and Kalman filter algorithms.

## REFERENCE BOOKS

1. Proakis, John G., Dimitris G. Manolakis, and D. Sharma: Digital Signal Processing, Principles, Algorithms, and Applications, Pearson Education, 2006
2. Ingle, Vinay K. and Proakis, John G., "Digital Signal Processing Using MATLAB", Brooks/Cole/Thomson Learning, 2001.
3. Lfeachor, Emmanuel C., and Jervis, Barrie W. "Digital Signal processing, A Practical Approach", Pearson Education, 2002
4. Mitra, Sanjit. K, "Digital Signal Processing a Computer Based Approach", Tata McGraw Hill, 2001.

EC-651-A DSP PROCESSORS AND APPLICATION LAB LTP Cr

002 2

## LIST OF EXPERIMENTS

1. Familiarization with the architecture and operation of first generation fixed point DSP Texas Instruments TMS320C10.
2. Familiarization with the architecture and operation of second generation fixed point DSP Texas Instruments TMS320C50.
3. Familiarization with the architecture and operation of third generation fixed point DSP Texas Instruments TMS320C54x.
4. Familiarization with the architecture and operation of fourth generation fixed point DSP Texas Instruments TMS320C62x.
5. Write an assembly language program for TMS320C10 based FIR digital notch filter.
6. Write an assembly language program for TMS320C10 based FIR digital lowpass filter.
7. Write an assembly language program for TMS320C10 based FIR digital high pass filter.
8. Write an assembly language program for TMS320C10 based FIR digital band pass filter.
9. Write an assembly language program for TMS320C25 based FIR digital notch filter.
10. Write an assembly language program for TMS320C25 based FIR digital band pass filter.
11. Write an assembly language program for TMS320C25 based FIR digital lowpass filter.
12. Write an assembly language program for TMS320C25 based FIR digital high pass filter.

Note: At least 10 experiments are to be performed from the above list.

EC-654-A SEMINAR-II LTP Cr

0 0 4 2

The work of Dissertation Preliminary is to be presented by the student in the form of Seminars II.

The work of monitoring will be done by the guide and evaluation by the committee consisting of guide, course coordinator and the HOD or his nominee.

EC-653-A      DISSERTATION

PRELIMINARY      LTP      Cr

0 0 15   5

EC-656-A      DISSERTATION      LTP      Cr

0 0 54   18

EC-658-A      SEMINAR-III   LTP      Cr

0 0 4   2

The work of Dissertation Phase-I is to be presented by the student in the form of Seminars III.

The work of monitoring will be done by the guide and evaluation by the committee consisting of guide, course coordinator and the HOD or his nominee.

EC-660-A      TEACHING PRACTICE-I      LTP      Cr

---      2

See note as given under course EC-661.

EC-661-A      TEACHING PRACTICE-II      LTP      Cr

---      2

Teaching practice comprises of two non-  
two letter mandatory courses to be done under the guidance of HOD. Here, the student is required to be engaged in

eaching of two UG courses (I and II) of his/her choice during the period between VI<sup>th</sup> to VII<sup>th</sup> Sem. of the M. Tech. Degree Programme. The students shall register for Teaching Practice only at the time he plans to take up teaching of UG course, but the credits earned will be counted in Sem-IV for Full Time students.

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EC-507-A WIRELESS COMMUNICATION LTP Cr

3 0 0 3

1 INTRODUCTION: Introduction to wireless communications system; various generation wireless networks; cellular concepts; interface and system capacity; trunking and grade of service improving coverage and capacity in cellular system.

2 FADING AND MOBILE CHARACTERISTICS REPRESENTATION: Small scale fading; frequency selective fading; fading effect due to Doppler spread; coherence BW and coherence time; Rayleigh fading distribution; Ricean fading; Nakagami distribution; level crossing.

CODING: Diversity; coding and equalization.

3

MODULATION TECHNIQUES: Modulation technique for mobile radio; pulse shaping techniques; linear modulation

techniques; constant envelope modulation; spread spectrum modulation techniques; rake receiver.

4

MULTIPLE ACCESS TECHNIQUES: Multiple Access Technique for wireless communication; FDMA, TDMA, CDMA, spectral effect of multiple access Schemes.

GSM SERVICES AND FEATURES: Architecture; frame structure; GSM channel; signal processing in GSM

5

DESIGN PARAMETERS OF MOBILE UNIT: Design Parameter at base and mobile unit; Antenna configurations; Noise, power and field stren.

## REFERENCE BOOKS

1. Rappaport T.S, "Wireless Communications", Prentice Hall, 1996.

2. William C.Y. Lee, "Mobile Communications Design Fundamentals", 2nd Edition, John Wiley, February 1993.
3. Gordon L. Stuber, "Principles of Mobile Communication", Kluwer Academic, 2nd Edition, 2001.
4. W. Stallings, "Wireless Communication Network", Prentice Hall of India, 2003.
5. Schiller, J., "Mobile Communication", Addison Wesley, 2002.
6. Goodman, D.J., "Wireless Personal Communication Systems", Addison Wesley 1997.

EC-508-A ARTIFICIAL INTELLIGENCE LTP Cr

3 0 0 3

1 PREDICATE CALCULUS IN AI: Introduction; the Propositional calculus; the predicate calculus; expressions using inference rules; knowledge representation through predicate calculus.

2 STRUCTURES AND STRATEGIES FOR STATE SPACE SEARCH: Introduction; graph theory; strategies for state space search; heuristic search; algorithms for heuristic search; admissibility; monotonicity and informedness; game playing (minimax) using heuristic; back tracking strategies; graph search strategies; heuristic graph search; control strategies of state space search; recursion-based search; pattern-directed search production systems.

3 KNOWLEDGE REPRESENTATION: Issues in knowledge representation; a brief illustration of AI representational systems; knowledge representation using predicate logic; semantics net; concept of frames; meta knowledge.

RULE BASED SYSTEMS: A forward deduction system; backward deduction system; combination of forward and backward system; control knowledge for rule based deduction systems.

4 ARTIFICIAL NEURAL NETWORKS: Introduction; different learning laws and architectures; learning through error back propagation; radial basis function; neural computing model: Hopfield net, Boltzmann machine.

UNCERTAINTY HANDLING: Bayesian networks; Dempster-Shafer theory; certainty factors; introduction to fuzzy logic.

5

EXPERT SYSTEMS: Introduction; architecture of expert system; knowledge acquisition and representation methods in expert systems; few applications of expert systems. Prolog Programming: an introduction and brief overview of the language.

## REFERENCEBOOKS

1. Luger, George, "Artificial Intelligence: Structure and Strategies for complex problem solving", Pearson Education, 2004.
2. Bratko, Iven, "Prolog: Programming for artificial intelligence" Person Education., Addison Wesley, 2000.
3. Nilsson, Nils J., "Artificial Intelligence: A New synthesis, Harcourt Asia Pvt. Ltd., 1998.
4. Kataipoulos, S. V., "Artificial Intelligence"
5. Yazani, Masoud, "Artificial Intelligence", Intellect, 1986.
6. Jack., M. Zwadu, "Introduction to ANN"

EC-509-A      OPTICAL FIBRE COMMUNICATIONS SYSTEM      LTP      Cr  
3-0-0      3

1      OVERVIEW: Overview of Optical Communication Systems. REVIEW OF OPTICS:  
Wave theory of light; reflection/refraction of plane waves; Fresnel's formulas;  
interface; diffraction; optical coherence; polarization of light.

2      PROPAGATION OF LIGHT IN FIBERS: Concepts of  
multimode and single mode fibers; dispersion and attenuation in fibers; comparison of different types of fibers and  
optical choice of fibers.

3      OPTICAL WAVEGUIDE: Planar Conducting waveguides; planar dielectric waveguides; optical  
fiber waveguides.

4      OPTICAL SOURCES AND TRANSMITTERS: LED, semiconductor lasers  
and their characteristics.

OPTICAL DETECTORS AND RECEIVERS: Photo  
detectors and their characteristics; receiver design; noise and sensitivity issues.

5  
SYSTEM DESIGN: Selection of detectors based on speed; sensitivity and signal to noise ratio; determination of crucial parameters for basic optical devices; translate design  
requirement into system parameters; optical link design; power and noise budget; jitter/rise time budget.

## REFERENCEBOOKS

1. Aggarwal, Govind P., "Fiber Optic Communication System", 3rd Edition, John Wiley Publication, 1989.
2. Palais, Joseph C., "Fiber Optic Communication", 4th Edition, Prentice Hall of India, 2005.
3. Ramaswami, R. and Swarajan, K. N., "Optical Networks: a Practical Perspective", Morgan Kaufmann Publishers, 1998.
4. Gowar, J., "Optical Fiber Communication System", Prentice Hall of India, 1995
5. Keiser, G., "Optical fiber communication", Tata McGraw Hill, 2000.
6. Senior, J. M., "Optical fiber Communication Principles and Practice", Prentice Hall of India, 1992

EC-512-A      RADAR SYSTEM ANALYSIS & DESIGN      LTP      Cr

3 0 0    3

1 RADAR FUNDAMENTALS: Radar classifications; range; range resolution; Doppler frequency coherence; radar equation; low pulse repetition frequency (PRF) radar equation; high PRF

radar equation; surveillance radar equation; radar losses, noise figure.

2

CONTINUOUS WAVE (CW) AND PULSED RADARS: Functional block diagram; CW radar equation; frequency modulation (FM); linear FM CW radar pulsed radar; range and Doppler ambiguities; resolving range ambiguities; resolving Doppler ambiguities.

3

RADAR DETECTION: Detection in presence of noise; probability of false alarm; probability of detection; pulse integration; detection of fluctuating targets; probability of detection calculation.

RADAR WAVE PROPAGATION: Earth atmosphere; refraction; four-third earth model; ground reflection; pattern propagation factor; diffraction; and atmosphere attenuation.

4

CLUTTER AND MOVING TARGET INDICATOR: Clutter definition; surface clutter; volume clutter; clutter spectrum; moving target indicator-single delay line canceller; double delay line canceller.

RADAR ANTENNAS: Directivity, Power gain; effective aperture; near and far fields; general arrays; linear arrays; planar arrays; array scan loss; conventional beamforming.

5 RADAR CROSS SECTION (RCS): RCS definition; dependency on aspect angle and frequency RCS dependence on polarization; RCS of simple objects; simplistic approach to calculating the RCS of complex objects.

## REFERENCEBOOKS

1. Mahafza, Bassem R., "Radar System Analysis and Design Using MATLAB", Chapman & Hall/CRC Press, 2005
2. Skolnik, Merrill, "Introduction to Radar Systems", Tata McGraw-Hill, 2001
3. Eddie, Byron, "Radar Principles, Technology, Applications", Pearson Education, 1995

EC-513-A SONAR SIGNAL PROCESSING LTP Cr  
3 0 0 3

### 1 OVERVIEW: Overview of sonar systems

SONAR BASICS: Propagation of sound in the ocean; noise in the ocean.

2

ANALYSIS OF SONAR SIGNALS: The sonar equation; signal/noise considerations; generation of underwater sound; nonlinear effects of depth.

3

DETECTION OF SONAR SIGNALS: Threshold concept; various types of detector; typical problems in detection of sonar signals; adaptive digital filters; digital Doppler nullification. SONAR ARRAY PROCESSING: Conventional beamforming; Adaptive beamforming; Beam Steering.

4 ACTIVE AND PASSIVE SONAR SIGNAL PROCESSING: Review of signal characteristics; ambient noise and platform noise; waveform selection and ambiguity functions.

5 SONAR SYSTEMS DESIGN IMPLEMENTATION:  
Passive sonar design consideration; active sonar design consideration.

## REFERENCEBOOKS

1. Chevalier, Francois Le, "Principles of Radar and Sonar Signal Processing", ARTECH House, 2002.
2. Urlick, R. "Principles of Under Water Sound", McGraw Hill, 1983
3. Waite, A.D., "Sonar for Practicing Engineers", 2002.



1      DIGITAL                  IMAGE                  FUNDAMENTALS:                  Elements                  of  
digital image processing systems; image acquisition; storage; processing communication display. Visual perception, simple image models; concept of uniform and non-uniform sampling and quantization; relationships between pixels-neighbors of pixel; connectivity labeling of connected components; relations; equivalence and transitive closure; distance measures; arithmetic/logic operation; imaging geometry basic and perspective transformation stereo imaging.

2      IMAGE TRANSFORMS and ENHANCEMENT: Discrete Fourier transform; 2-D Fourier transforms and its properties; fast Fourier transform and its uses; walsh; hadamard discrete cosine;

heir and slant transforms hostelling their algorithms and computer implementations.

Spatial and frequency domain methods point processing; intensity transformation; histogram processing image subtraction and averaging spatial filtering; LP, HP and homo-morphic felling; generation of spatial marks; colour image processing.

3      IMAGE  
RESTORATION: Degradation model; digitalization of circulate and block circulate metrics; algebraic approved in voice filtering; wiener filter; constrained least square restoration; interactive restoration in spatial domain geometric transformation.

4                  IMAGE COMPRESSION AND SEGMENTATION: Redundancy models; error free compression; Lossy compression; image compression standards; segmentation: detection of discontinuity; edge detection; boundary detection; thresholding; regional oriented segmentation use of motion in segmentation.

5      REPRESENTATION AND DESCRIPTION: Image analysis; pattern and their classes; decision theoretical methods; structural methods; interpretation.

## REFERENCE BOOKS

1.      Jain, Anil K, "Fundamentals of Digital Image Processing", Prentice Hall of India, Edition 1997.
  2.      Gonzalez, Rafael C., Woods, Richard E. and Eddins, Steven L., "Digital Image Processing using MATLAB", Pearson Education, 2004.
  3.      Castleman, Keenneth R, "Digital Image Processing", Pearson Education, 1995.
- Gonzalez, Rafael C. and Woods, Richard E., "Digital Image Processing", F Pearson Education, 2002.



## ***SCHOOL OF LAW***

### **SCHEME FOR LL. B – 3 YEARS COURSE**

<b>LL.B</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	LLB 101	LAW OF TORTS-1	4	0	0	4
2	LLB 103	LAW OF CONTRACT-1	4	0	0	4
3	LLB 201	Family Law-1	4	0	0	4
4	LLB 203	Constitutional Law-1	4	0	0	4
5	LLB 309	Media & Law (MV Accident and Consumer Protection Laws)	4	0	0	4
6	LLB 405	Administrative Law	4	0	0	4
7	LLB 151	Internship	0	0	2	1
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>2</b>	<b>25</b>

<b>LL.B</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	LLB 102	Law of Contract-II	4	0	0	4
2	LLB 104	Law Of Tort- II	4	0	0	4
3	LLB 202	Family Law-II	4	0	0	4
4	LLB 204	Constitution Law- II	4	0	0	4
5	LLB 206	Law Of crimes-I	4	0	0	4
6	LLB 306	Environmental Law	4	0	0	4
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>24</b>

### SCHEME FOR LL. B – 3 YEARS COURSE

LL. B			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	LLB 213	Corporate Law	4	0	0	4
2	LLB 215	Labour & Industrial Law-1	4	0	0	4
3	LLB 217	Property Law	4	0	0	4
4	LLB 219	Interpretation of Statutes	4	0	0	4
5	LLB 113	Jurisprudence (Legal Methods, Indian legal system, and the Basic Theory of Laws)	4	0	0	4
6	LLB 221	Professional Ethics, Lawyer's Accountability and bar- bench Relation. (Theory)	4	0	0	4
7	LLB 251	Professional Ethics, lawyers, Accountability and Bar- Bench Relations. (Practical)	0	0	8	4
8		Social Service	0	0	2	1
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>10</b>	<b>29</b>

LL. B			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	LLB 120	Public International Law	4	0	0	4
2	LLB 212	Law of Crimes-II (Criminal Procedure Cod,1978)	4	0	0	4
3	LLB 216	Labour & Industrial Law-II	4	0	0	4
4	LLB 218	Civil Procedure Code,1908 (Including Limitation act,1963& Specific Relief Act,1963)	4	0	0	4
5	LLB 220	Public interest lawyering,Legal aid &Para legal services	4	0	0	4
6	LLB 222	Arbitration ,conciliation &alternative dispute resolution system (Theory)	4	0	0	4

7	LLB 252	Arbitration ,conciliation &alternative dispute resolution system (practical)	0	0	2	1
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>2</b>	<b>25</b>

LL. B			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	LLB 120	Legal English & Communication	4	0	0	4
2	LLB 212	Law of Evidence	4	0	0	4
3	LLB 216	law of trust, Equity & Fiduciary Relation	4	0	0	4
4	LLB 218	Principlese of taxation	4	0	0	4
5	LLB 220	Land Laws including ceiling and other Local Laws	4	0	0	4
6	LLB 222	drafting, Pleading &conveyance(Theory)	4	0	0	4
7	LLB 252	drafting, Pleading &conveyance(Practical)	0	0	2	1
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>2</b>	<b>25</b>

LL. B			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	LLB 312	Intellectual Property Law	4	0	0	4
2	LLB 314	Information technology & Cyber Laws	4	0	0	4
3	LLB 316	Negotiable Instruments, Banking & Insurance	4	0	0	4
4	LLB 318	Competition Law	4	0	0	4
5	LLB 320	Human Rights Law	4	0	0	4

6	LLB 352	Moot Court, Pre- Trial Preparation & Participation in Trial Proceedings (including Interviewing techniques & pretrial Preparations)	0	0	8	4
7	LLB 354	Internship	0	0	2	1
		<b>Total</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>25</b>

## LL.B. 3 YEARS PROGRAMME

**SUBJECT : MEDIA AND LAW (MV ACCIDENT AND CONSUMER PROTECTION LAWS)**  
**SUBJECT CODE : LLB 309**  
**CLASS : LL.B. I YEAR**  
**SEMESTER : I**  
**CREDIT : 4**

**OBJECTIVE:** This Course will introduce students to the study of legal and ethical issues in the media. Students will develop an understanding and appreciation of these issues and the ability to analyse the important legal and ethical issues involved with the mass media industry.

### Unit I :Different Facets of Media and Introduction to basic ethics

1. Concept of Media.
2. Theories of Communication
3. Evolution of media
4. Media Ethics
5. Basic Ethical –Theory

### Unit II : Media in Constitutional Framework

1. Freedom of expression in Indian Constitution
2. Right to Privacy.
3. Right to information under the Constitution of India and The Right to Information Act

### Unit III: Legal dimensions of Media

1. Media and Criminal Law (Defamation /Obscenity /Sedition)
2. Media and Law of Torts (Defamation and Negligence)
3. Media and Legislature-Privileges of Legislature.
4. Media and Human Rights
5. Media& Judiciary: Contempt of Court
6. Media and Executive- Official Secrets Act
7. Media and Journalists- -Working Journalists (Conditions of Service Act)

### Unit IV: News

1. Getting Information
2. Free Press /Fair Trial
3. Ethical Issues in News :-
  - a) Business Pressure
  - b) Truth telling and Objectivity

- c) Social Justice
- d) Sources and Reporters
- e) Privacy

### **Unit V: Advertising**

1. Regulation of Advertising
2. Ethical issues in Advertising
  - a) Special Audiences
  - b) Truth Telling
  - c) Public Relations
3. Ethical issues in Entertainment
  - a) Violence
  - b) Offensive Material
  - c) Censorship
4. Special Regulation for Broadcasting

### **Books Recommended:**

#### **Text Book:**

1. Basu D.D., Law of the Press. Wadhwa and Company, Nagpur

### **Reference Books**

1. McQuil Denis. McQuil's Mass Com Theory, Sage Publication, London.
2. Nayyar Shamsi, Journalism: Ethics And Code, Anmol Publication, New Delhi.

# SCHOOL OF LAW

## LL.B. 3 YEARS PROGRAMME

**Subject** : LAW OF TORTS-I  
**Subject Code** : LLB 101  
**Class** : LL.B. I YEAR  
**Semester** : I  
**Credit** : 4

**Objective:** -The Law of Torts is primarily concerned with redressal of wrongful civil actions by awarding compensation. In a society where men live together, conflict interests are bound to occur and they may from time to time cause damage to one or the other. In addition with the rapid industrialization tortious liability has come to be used against manufacturers and industrial units. As the Law of Torts is basically a Judge made law, students are required to study it in the light of judicial pronouncements. They are required to equip themselves with the latest developments extending to the entire course. This paper is to make students understand the nature of Torts and conditions of liability with established cases along with the Motor Vehicle Act, 1988 and Consumer Protection Act 1986.

### UNIT-I

1. Nature & Definition of Tort,
2. Motive,
3. Capacity,
4. Joint Tortfeasors,
5. General defences,

### UNIT-II

1. Vicarious liability,
2. Remoteness of Damage,
3. Extinction of liability,
4. Strict liability and Absolute liability,

### UNIT-III

1. Negligence,
2. Nervous shock
3. Nuisance

### UNIT-IV

1. Trespass to land and goods,
2. Defamation,
3. Assault & Battery
4. Cyber Tort and constitutional Tort.

### UNIT-V

1. Evolution of Consumer Law,
2. The Consumer Protection Act, 2019
3. Offences under MV Act.
4. Remedies Under MV Act.

### BOOKS RECOMMENDED

1. Ratanlal & Dhirajlal. The Law of Torts (Lexis-Nexis 27th Ed. 2016) Ramaswamy Iyer's.
2. The Law of Torts (Lexis-Nexis, 10th Ed. 2007)
3. R.K. Bangia. Law of Torts (Allahabad Law Agency, Latest Ed. 2018)
4. . Avatar Singh & Harpreet Kaur. Introduction to the Law of Torts & Consumer Protection (Lexis-Nexis 3rd Ed. 2013)
5. SRA Roscdar. Law of Torts and Consumer Protection Act (Lexis Nexis 2nd Ed. 2016)



**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Law of Contract I  
**Subject Code** : LLB 103  
**Class** : LL.B. I YEAR  
**Semester** : I  
**Credit** : 4

**Objective:** -The objective of this paper is to make students familiar with various principles of contract formation enunciated in the Indian Contract Act, 1872.

#### **UNIT-I**

1. Definition of Contract, Agreement, Offer, Acceptance and Consideration (Section-2)
2. Communication and Revocation of Offer and Acceptance (Section 3-9),
3. Essentials of Contract (Section 10).
4. Competency to Contract (Section 11-12)
5. Leading Case: Lalman Shukla V. Gauri Dutt (1913) 11 ALL L.J. 489

#### **UNIT-II**

1. Consent, Free Consent, Consent by Coercion, Undue Influence, Fraud, misrepresentation and mistake (Section 14-22),
2. Legality of object and consideration (section 23-24),
3. Void Agreements (Section 25-30),
4. Contingent Contracts (Section 31-36) Leading Case: MohoriBibee Vs. DharmodasGhose (1903) 30 I.A. 114 (PC)

#### **UNIT-III**

1. Contract which must be performed (Section 37-39),
2. By whom contract must be performed(Section 40-45),

#### **UNIT-IV**

1. Time and Place for performance of Contract (Section 46-50)
2. Performance of Reciprocal Promises (Section 51-55),
3. Discharge of Contract (Section 56-57).
- 4.

#### **UNIT-V**

1. Certain Relations resembling to those created by Contract (Section 68-72)
2. Certain Relations resembling to those created by Contract (Section 73-75).
3. Privity of contract.
4. Contract which can be enforced.
5. Alteration and Ennovation of contract
6. Remedies against breach of contract.

#### **Leading Case Laws**

#### **BOOKS RECOMMENDED**

AS.Dalal. Law of Contract and Specific Relief Act (Bright Law House, 1st Ed. 2015)  
Pollock & Mulla, The Indian Contract Act, 1872, (Lexis Nexis, Nagpur, 14th Ed. 2013)  
S K. Kapoor, Law of Contract-I & The Specific Relief Act, (Central Law Agency, Allahabad, 13th Ed. 2013)  
Avatar Singh, Law of Contract and Specific Relief Act, 1963, (Eastern Book Company, Lucknow, 12th Ed. 2017)  
R. K. Bangia, Indian Contract Act, (Allahabad Law Agency, Allahabad, 14th Ed. 2015)  
Ritu Gupta, Law of Contract includes The Specific Relief Act, 1963, (LexisNexis, New Delhi, 1st Ed. 2015)

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject** : Family Law-I  
**Subject Code** : LLB 201  
**Class** : LL.B. I YEAR  
**Semester** : I  
**Credit** : 4

**Objective:** -Hindu law refers to the code of laws applied to Hindus, Buddhists, Janis and Sikhs. It also refers to the legal theory, jurisprudence and philosophical reflections on the nature of law discovered in ancient and medieval era. It gives us the base of the society i.e. family. It deals with different families' positions, traditions, rights and duties, family problems and legal solutions to them which directly relate to the society. The main objective of the subject is to resolve the socio-legal disputes arising in the society regarding marriage, divorce, property rights, partition, succession, maintenance, guardianship, adoption etc. It also sensitizes the students about Hindu society for their legal rights and duties.

#### **UNIT-I**

1. Application of Hindu Law,
2. Sources of Hindu Law,
3. Schools of Hindu Law,
4. Hindu Joint Family, Joint Families, Coparcenary, Classification of Property,
5. Karta of Joint Family, Position, Liabilities and Powers of Karta.,
6. Coparcener's Power of Alienation, Coparcener's Right to Challenge Improper Alienation,
7. Alienee's Rights and Remedies.

#### **UNIT-II**

1. The nature and concept of Hindu Marriage,
2. Essential Conditions for Valid Hindu Marriage, and Ceremonies of Marriage,
3. Registration of Hindu Marriages,
4. Remedy of Restitution of Conjugal Rights,

5. Void and Voidable Marriages,
6. Judicial Separation and Divorce,
7. Various Types of Grounds for Divorce and Judicial Separation,

#### **UNIT-III**

1. Nature and Scope of The Hindu Succession Act, 1956,
2. Effects of the Hindu (Succession) Amendment, 2005,
3. Rules of succession to the Property of Hindu Male, Succession to the Property of Hindu Female, Succession to the Mitakshara Coparcener's Interest,
4. General Rules of Succession, Partition, Subject matter of Partition, Persons who have a Right to Partition Right to Share.

#### **UNIT-IV**

1. Nature and Scope of The Hindu Minority and Guardianship Act, 1956,
2. Concept of Minority and Guardianship.  
Types of Guardians-
3. Natural Guardians and their Powers,
4. Testamentary Guardian: Appointment and Powers,
5. Certified Guardian,
6. Defecto Guardian
7. Guardian By Affinity,

#### **UNIT-V**

1. The Hindu Adoption & Maintenance Act, 1956,
2. Nature of Adoption,
3. Essential Conditions for Valid Adoption,
4. Effects of Adoption,
5. Registration of Adoption,
6. Personal Obligation,
7. Maintenance of Dependents,
8. Quantum of Maintenance,
9. Maintenance As a Charge on Property

#### **Leading Case**

#### **BOOKS RECOMMENDED**

RanganathMisra, Mayne's Treatise on Hindu Law & Usage (16th ed., 2008)  
 Satyajeet A. Desai, Mulla Principles of Hindu Law, (Vol. I & II 21st ed., 2010)  
 Paras Diwan and PeeyushiDiwan, Modern Hindu Law (Allahabad Law Agency, Reprint 2018)  
 Duncan M. Derrett, A Critique of Modern Hindu Law (1970)  
 Basant K. Sharma. Hindu Law.(Central Law Publication Sth Ed. 2017)

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject : Constitutional Law-I**  
**Subject Code : LLB 203**  
**Class : LL.B. I YEAR**  
**Semester : I**  
**Credit : 4**

**Objective:** - Constitution of India is the pillar on which the governance of our country rests. The course aims to examine the political, social and economic value structure of the Constitution of India. The balancing of positive responsibility of the state to establish a economy of growth, social justice and political aspiration of all sections of the Indian society through Constitutional Governance. The objective of this course is to make students understand the basic concepts of Indian constitution.

#### **UNIT-I**

1. Nature ,Silent features and Preamble of the Constitution of India
2. Union and its Territory
3. Citizenship

#### **UNIT-II**

1. Article-12 and 13.
2. Right to Equality(Art. 14),
3. Special Provision for Weaker Sections of the Society,
4. Reservation Policy.

#### **UNIT-III**

1. Fundamental Freedoms under Art.19,
2. Freedom of Press.
3. Protection in respect of conviction of offence (Art-20),
4. Right to Life and Personal Liberty Article 21).
5. Protection against Arrest and Detention (Art 22),

#### **UNIT-IV**

1. Right against Exploitation (Art-23 & 24),
2. Right to Religion (Art 25-28).
3. Cultural & Educational Rights of Minorities (Art.29 & 30),

## **UNIT-V**

1. Right to Constitutional Remedies(Art, 32), 226
2. Judicial Review ,Writ Jurisdictionand PIL
3. Directive Principles of State Policy,
4. Fundamental Duties.

### **Leading Case**

### **BOOKS RECOMMENDED**

1. Kagzi, M.C. Jain. The Constitutional of India, Vol. 1 & 2, New Delhi, India Law House, 2001)
- 2.Pylee, MV. Constitutional Amendments in India (Delhi, Universal Law, 2003)
3. Hasan, Zoya& E. Sridharan. India's Living Constitution: Ideas, Practices, Controversies (Delhi,Permanent Black, 2002 ed.)
4. Basu, Durga Das. Commentary on the Constitution of India, (Calcutta, DebidasBasu, 1989 Ed.)
5. Seervi, H.M. Constitutional Law of India (Vol. I & II, III, Bombay N.M. Tripathi, 1991)
- 6.Chaube, Shibnikinkar. Constituent Assembly of India (New Delhi, Wadhwa and Com.Pvt. Ltd. 2002 ed.)
7. Bakshi, P.M. The Constitution of India (Delhi Universal Law Publishing, 2002)
8. Jain Subhash C. The Constitution of India; Select Issues &Percetpions (New Delhi TaxmannPublications, 2000)

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject : Administrative Law**  
**Subject Code : LLB 405**  
**Class : LL.B. I YEAR**  
**Semester : I**  
**Credit : 4**

### **Objective-**

- 1) The objective of studying of administrative law is to understand the nature of administration and the rule of law.
- 2) To make students understand the nature, scope, concept, necessity and growth of Administrative law.
- 3) To familiarize the students with the conceptual and operational parameters of the general principles of the Administrative Law.
- 4) To make the students understand the difference between Constitutional law and administrative law.
- 5) To make the students aware of the working of Administration.

### **Course Outcome**

On completion of this course, the students will be able to:

- CO1. Define the objectives of Administrative law and the rule of Law
- CO2. Explain the nature, scope, necessity and development of Administrative Law and action.
- CO3. Identify the basic rules and principles followed to render administrative justice;
- CO4. Identify distinction between the Constitutional Law and Administrative Law
- CO5. Examine the functioning of the special bodies constituted as alternative means for administering justice viz., Administrative Tribunals, Ombudsman, Lokayukta, Lokpal;

This course has 5 units:

### **Unit-1: Introduction**

- 1. Meaning, Definition & Scope of Administrative Law
- 2. Sources & Development of Administrative Law
- 3. Relationship between Constitutional Law and Administrative Law
- 4. Separation of powers & Constitutional law
- 5. Rule of law & Constitutional law
- 6. Distinction between judicial, quasi-judicial and Administrative functions
- 7. Relationship between Constitutional law and Administrative Law

### **Unit-II: Delegated Legislation**

- 1. Delegated Legislation - Definition & Form
- 2. Necessity of Delegated Legislation
- 3. Reasons for the growth of Delegated Legislation
- 4. Types of Delegated Legislation
- 5. General Limitations upon Delegation of Powers - Principles:
  - i. Subsidiarity
  - ii. delegatus non potest delegare
- 6. Droit Administratif

### **Unit-III: Principle of Natural Justice and Rule of Law**

- 1. Natural Justice & Legal Justice
- 2. Basic principles of natural law:
  - i. No man can be judge of his own cause (Dr. Bonham's Case)
  - ii. Audi alteram partem (right to fair hearing)
- 3. Exceptions to the rule of Natural Justice
- 4. Effects of non-compliance with principles of Natural Justice
- 5. Rule against Bias: Principle against arbitrariness: Wednesbury Rule

### **Unit-IV: Adjudication & Judicial Review Power under the Administrative law**

- 1. Need for Administrative Adjudication
- 2. Modes of Administrative Decision making
- 3. Administrative Tribunals

4. Judicial Review of Administrative Actions: Constitutional Framework
5. Doctrine of ultra vires
6. Power to review own Decisions
7. Grounds for review:
  - i. Failure to exercise discretion
  - ii. Excess of discretionary authority
  - iii. Arbitrary exercise of discretion
8. Doctrine of proportionality
9. Doctrine of Legitimate Expectations

## **Unit-V: Administrative Discretion & Mechanism for Control of Administrative Actions**

### **A. Meaning of Discretionary Power & its rationale**

1. Scope of discretion & Grounds for challenging the exercise of Administrative Discretion
2. Abuse of discretion - Study of case-law:
  - a. Non-application of mind
  - b. Improper purpose
  - c. Irrelevant considerations
  - d. Fettering of discretion acting under dictation
3. Sovereign immunity in Administrative Law

### **B. Institutional controls on Administrative Actions**

- a. Public audit
- b. Commissions of Enquiry
- c. Ombudsman in India (Lokpal & Lokayuktha)
- d. The Right to Information Act

### **C. Methods of judicial review**

- a. Statutory appeals
- b. Writs
- c. Declaratory judgments and injunctions
- d. Civil Suits for Compensation

## **TEXTBOOKS:**

1. K. Takwani, Lectures on Administrative Law, Eastern Books Co, Lucknow
2. P. Mittal, Natural Justice Judicial Review & Administrative Law
3. HWR Wade & CF Forsyth, Administrative Law, OUP, 2009.
4. MP Jain, Cases & Materials On Indian Administrative Law, LexisNexis, New Delhi, 1 st edn. 1994
5. Tushar Kanti Soha, Administrative Law, Kanishka, 2001

## **ARTICLES:**

1. Ajoy P.B., Administrative Action and the Doctrine of Proportionality in India, <http://www.iosrjournals.org/iosr-jhss/papers/Vol11-issue6/D0161623.pdf>
2. Justice MarkandeyKatju., Administrative law and judicial review of administrative action, [http://www.ebcindia.com/lawyer/articles/2005\\_8\\_25.htm](http://www.ebcindia.com/lawyer/articles/2005_8_25.htm)
3. Anupa V. Thapliyal, Central Administrative Tribunals and Their Power to Issue Directions, Orders or Writs Under Articles 226 and 227 of the Constitution, <http://www.ebc-india.com/lawyer/articles/92v4a4.htm>
4. ShubhamManojKhare, Administrative Discretion & Limitation on Administrative Discretion By Article 14 & 16 of the Indian Constitution, [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1465519](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1465519)



5. D.Y.Chandrachud, Constitutional and Administrative Law in India,  
<http://scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=1142&context=ijli>

6. Prof. S.S. Vishweshwaraiah, Emerging Trends In Administrative Law,  
<http://elearning.vtu.ac.in/P3/CIP71/5.pdf>

7. A. T. Markose, 'Judicial Control of Administrative Action in India. A Study in Methods.' <http://www.jstor.org/stable/pdfplus/1337434.pdf?acceptTC=true>

8. Y Pardhasaradhi, Ravinder Kaur, Administrative Reforms for Good Governance,  
<http://socialsciences.in/article/administrative-reforms-good-governance>

9. 162nd Report of the Law Commission on Central Administrative Tribunal,  
<http://lawcommissionofindia.nic.in/101-169/report162.pdf>

**LL.B 3 YEAR**  
**2nd SEMESTER**

# **LINGAYA'S UNIVERSITY**

## **SCHOOL OF LAW**

### **SYLLABUS**

#### **LL.B. 3 YEARS PROGRAMME**

**SUBJECT** : Law of Torts-II  
**SUBJECT CODE** : LLB104  
**CLASS** : LL.B. 1st YEAR  
**SEMESTER** : II  
**CREDIT** : 4

**OBJECTIVE:** The Law of Torts-II is primarily concerned with Specific Torts. In a society where men live together, conflicts of interests are bound to occur and they may from time to time cause damage to one or the other. In addition, with the rapid industrialization, tortious liability has come to be used against manufacturers and industrial units. As the Law of Torts is basically judge made law, students are required to study it in the light of judicial pronouncements. They are required to equip themselves with the latest developments extending to the entire course.

#### **Unit I: Negligence, Torts against Persons:**

1. Negligence:
  - a. Theories of Negligence
  - b. Standards of care, duty of care, carelessness, inadvertence
  - c. Doctrine of Contributory Negligence
  - d. Res ipsa loquitur
2. Torts Against Persons: Assault Battery, Mayhem False Imprisonment, Malicious Prosecution
3. Nervous Shock

#### **Unit II: Torts against Property:**

1. Torts against Property: Trespass to Land, Trespass ab initio, Dispossession, Trespass Movable Property, Trespass to Goods, Conversion
2. Nuisance: Definition, Elements constituting Nuisance, Categories Acts of Nuisance

#### **Unit III: Principles of Liability in Torts:**

1. Categories of Liability
2. Fault Liability
3. Vicarious Liability
4. Vicarious Liability of State
5. Strict Liability - Ryland v Fletcher
6. Absolute Liability: Liability without Fault M.C. Mehta v. Union of India (Sriram Food & Fertilizers Co-Oleum Gas Leakage) case - Liability for harm caused by inherently dangerous industries - Ultrahazardous activities.

#### **Unit IV: Remedies and Damages:**

1. Personal Capacity
2. Who can not sue
3. Who can not be sued
4. General Remedies in torts
5. Damage and its Kinds
6. Remoteness of Damages (In Re Problem And Wagon Mound Case)
7. Judicial & Extra Judicial Remedies
8. Joint Tortfeasors

#### **Unit V: Defamation:**

1. Definition
2. Kinds of Defamation
3. Libel & Slander
4. Innuendo
5. Defences in Defamation

#### **REFERRED CASE LAWS:**

1. Donoghue v. Stevenson (1932) All ER Rep. 1
2. Municipal Corporation of Delhi V, Subhagwanti, AIR 1966 SC 1750
3. Malay Kumar Ganguly v. Sukumar Mukherjee & Ors., AIR 2010 SC 1162
4. Rylands v. Fletcher (1868) LR 3 HL 330.

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**SUBJECT : LAW OF CONTRACT-II**  
**SUBJECT CODE : LLB 102**  
**CLASS : LL.B. I YEAR**  
**SEMESTER : II**  
**CREDIT : 4**

**Objective:-** This paper will impart comprehensive information on indemnity, guarantee, agency, partnerships, sale of Goods Act and Negotiable instrument.

#### **UNIT-I**

##### **(a) Contract of Indemnity**

1. Meaning of Contract of Indemnity
2. Right to Indemnity holder.
3. Nature and extent of liability of the indemnifier.
4. Commencement of liability of the indemnifier.
5. Time of commencement of Indemnifier's Liability
6. Are Insurance Contract the Contracts of Indemnity?

##### **(b) Contract of Guarantee**

1. Meaning & Features of Contract of Guarantee.
2. Difference between Contracts of Indemnity & Contract of Guarantee.
3. Nature & Extent of Surety's Liability.
4. Meaning & Revocation of Continuing Guarantee.
5. Rights of Surety against Principal Debtor, Creditor & Co-Surety.
6. Extent and Discharge of Surety's Liability.

#### **UNIT-II**

##### **(a) Contract of Bailment**

1. Definition & Essentials of Contract of Bailment.
2. Duties of Bailor.
3. Duties of Bailee's
4. Right of the Bailee & General & Particular Lien.
5. Duties & Rights of Finder of Goods.

##### **(b) Contract of Pledge**

1. Definition of pledge under the Indian contract act.
2. Distinction between Bailment & pledge.
3. Rights of the pawqner and pawnee.
4. Pawnee's right of sale as compared to that of an ordinary bailee.
5. Pledge by certain specified persons mentioned in the Indian Contract Act.

##### **(c) Contract of Agency**

1. Meaning of Essentials of Contract of agency
2. Different kinds of agent- Auctioneers, Brokers & Del Credere Agents .
3. Distinction between agent and servant
4. Duties and rights of agent.
5. Extent of Agent's Authority- Actual , Apparent, Authority in Emergency.
6. Liability of the agent towards the principal.

7. Methods of termination of agency contract.

### **UNIT-III**

#### **Specific Relief Act, 1963**

1. Recovering Possession of property (section 5-8)
2. Specific performance of Contracts (section 9-24)
3. Rectification of Instruments (section 26)
4. Rescission of Contract (section 27-30)
5. Cancellation of Instruments (section 31- 33)
6. Declaratory Decrees( section 34-35)
7. Preventive Relief or Injunctions( section 36-44)

### **UNIT-IV**

#### **The Sale of Goods act, 1930**

1. Definition, Distinction between Sale and Agreement to Sale .
2. Conditions and warranties.
3. Passing of property.
4. Rights of Unpaid Seller and Remedies for Breach of Contract.

#### **Book Recommendation:**

- **Avtar Singh.** Law of Contract and Specific Relief, Eastern Book company, 2013 (11<sup>th</sup> Edn)
- **Pollock & Mulla,** Indian Contract and Specific Relief Act, Lexis nexis, @013 (14<sup>th</sup> Edn)
- **S.K. Kapoor , Contract- II, Central Law Agency, 2015**
- **B.M. Prasad and Manish Mohan ,** Khergamvala on the Negotiable Instrument Act, 2013, Lexis Nexis, 2013 (21<sup>st</sup> Edn)
- **P. Mulla,** The Sale of Goods and Indian Partnership Act, Lexis, Nexis, 2013 (10 Edn)
- **Bhashyam and Adiga,** The Negotiable Instruments Act (19956), Bharath, Allahbad.
- **M.S. Parthasarathy (ed.),J.S. Khergamvala,** The Negotiable Instrument act.
- **J.P. Verma (ed.), Singh and Gupta,** The Law of partnership in India (1999), Orien Law House, New Delhi.

## **LL.B. 3 YEARS PROGRAMME**

**Subject** : Family Law –II  
**Subject Code** : LLB 202  
**Class** : LL.B. I YEAR  
**Semester** : II  
**Credit** : 4

**Objective:** -To familiarize students with the concept and intricacies of different aspects of Family Law, majorly relating to the Hindus and Muslims. On Completion of this course content the students should have acquired the reasonable level of knowledge/competence relating to area of Inheritance, Partition, Succession, Wills, Charitable Trusts, etc.

### **Unit I: Joint Hindu Family**

1. Concept of joint Hindu Family and coparcenary under Mitakshara and Dayabhaga law and their incidence.
2. Property in Hindu Law: Separate and Coparcenary Property
3. Karta of Joint Hindu Family :
  1. Who can be the Karta?
  2. Position of the Karta.
  3. Powers, Duties and Liabilities of the Karta.
  4. Alienation of Joint Family Property by the Karta
  5. Pious obligation of the son to repay the debts incurred by the Karta

### **Unit II: Partition**

1. Meaning of 'Partition' Bringing the joint family status to an end
2. Subject matter of partition
3. Person entitled to demand Partitions and to a share on Partition
4. Partition, how effected
5. Rules relating to division of property on partition
6. Reopening of Partition & reunion
7. Difference between Mitakshara & Dayabhaga Laws regarding Partition

### **Unit III: Principles of Inheritance**

#### **A. Hindu Law: The Hindu succession Act, 1956:**

1. General rules of Succession to a Hindu male dying intestate
2. General rules of Succession to a Hindu female dying intestate
3. Stridhan and Women's Estate
4. General principles of inheritance and disqualification of Heirs.

#### **B. Muslim Law**

1. Principles of Inheritance under Muslim Law (Sunni Law): Primary Heirs.
2. Brief Introduction to Hiba (Gift). Will(Wasiyat), and Marzul Maut (Death Bed Transaction)

#### **Unit IV: Religious and Charitable Endowments**

##### **A. Hindu law**

1. Endowments:
  - (a) Meaning, Kinds and Essentials
  - (b) Public and private temples – Powers and Obligations of Mahant and Shebait
  - (c) Idol as a Litigant: Removal and Replacements of Idol
  - (d) Hindu religious and charitable endowments laws and important case law thereunder
  - (e) Law relating to charitable endowments

##### **B. Muslim Law**

2. Waqf:
  - (a) Meaning, Kinds, Rights, Obligations and Characteristics
  - (b) Objects and purpose of Waqf- Advantages and disadvantages
  - (c) Mosque: objects, kinds and requisites
  - (d) The Wakf Acts 1923,1954, and 1995 and important case law thereunder

#### **Unit V: Pre Emption under Customary Law**

- (a) Origin, Meaning; Classification:
- (b) Subject Matter
- (c) Requisite formalities
- (d) Constitutional validity.
- (e) Legal force of Pre-Emption as an argument questioning title

#### **Referred Case Laws:**

1. Munilala v. Bishwanath. AIR 1968 SC 450
2. Najm-Un-Nissa v.Ajaib Ali.(1900)
3. Radhakrishnan v. Sridhar. AIR 1960 SC 1368.
4. Pasha Begum v. Syed Shabber Hasan, AIR 1956 Hyd L.
5. Mohd. Ismail v. Abdul Rashid AIR 1956 AirT.
6. Ahmad Arif vs Wealth TaxCommission AIR 1971,SC
7. Shahar Bano vs Aga Mohammad 1907
8. Bibi Sadique Fatima vs Mahmood Hasan AIR 1978.
9. Md. Ismail vs Thakur Sabir Ali AIR 1962.
10. Khaliluddin vs Shri Ram 1934.
11. M Kazim vs A Ashghar Ali AIR 1932.
12. M.P. Gopalakrishnan Nair and Anr. V. State of Kerala andf Ors. [2005] INSC 265 (20 April 2005)
13. K. Mukundaraya Shenoy v. The State of Mysore AIR 1960 Kar 18.
14. T. Krishnan v. G.D.M. Committee AIR1978 Ker 68.
15. Ratilal v. State of Bombay AIR V1953 Bom 242.
16. A.V.K.V. Temple v. State of Uttar Pradesh 1997(4) SC 124.



17. Hunooman Prasad Pandey v. Mussumat Babooee Mumraj Koonweree,(1856) 6 MIA 393
18. Balmukund v. Kamlawati.AIR 1964 SC 1385
19. R. Kuppayee v. Raja Gounder (2004) ISCC 295.
20. M/s Nopany Investment (P) Ltd.v. Santokh Singh (HC) 2007 (13) JT 448
21. A. Raghaavamma V.A. Chenechamma AIR 1964 SC 136

**SCHOOL OF LAW**

**LL.B. 3 YEARS PROGRAMME**

**Subject** : Constitutional Law – II  
**Subject Code** : LLB 204  
**Class** : LL.B. I YEAR  
**Semester** : II  
**Credit** : 4

**Objective:** - Constitution of India is the pillar on which the governance of our country rests. The course aims to examine the political, social and economic value structure of the Constitution of India. The balancing of positive responsibility of the state to establish an economy of growth, social justice and political aspiration of all section of the India Society through constitutional governance.

The objective of the paper is to inspire the students with the laws relating to system of Governance at the Union and State Level.

### **Unit I: The Union Executive**

1. Forms of Government –Presidential and parliamentary
2. The nature and extent and executive power – the position, Powers and function of the president
3. Procedure for the election and impeachment of president.
4. Constitutional position of the President.
5. Vice President – Power, Function, Election and removal.
6. Council of Ministers.
7. Attorney General of India.

### **State Executive**

1. Constitutional position of Governor.
2. The position, Powers and function of the president
3. Advocate general for the state.
4. Comparison between Presidential Power and Power of Governor.

### **Unit II: Union Legislature & State Legislature**

1. Powers of Chairman- Deputy Chairman, Speaker and Deputy Speaker- their removal from office – salaries and privileges of parliament and its member.
2. Legislative procedure various stages in the enactment of a statute – sittings of house- procedure relating to ordinary bills, money bills and other financial bills.
3. Composition and duration of the house – the Legislative procedure and privileges by the house.
4. The Doctrine of Pleasure.

### **Unit III: Judiciary**

#### **Union Judiciary**

1. Establishments and constitution of the Supreme Court.
2. Qualification, Appointment & removal of Judges.

3. Original, Appellate and Advisory jurisdiction of Supreme Court.

#### **State Judiciary**

1. High Court judges appointment, qualification, condition of services.
2. Removal and Transfer of Judges.
3. Powers and jurisdiction of High Court.
4. Subordinates Courts- appointments of district judges- control over subordinate courts.
5. Doctrine of Stare Decisis.

#### **Unit IV: Legislative relations**

1. Distribution and Legislative Powers between the Union and State
2. Freedom of Trade, Commerce and Intercourse

#### **Unit V: Miscellaneous Provisions**

1. Civil Service under Constitution.
2. Government Liability in contract and torts.
3. Election Commission: Constitution, Powers of election commission.
4. Emergency Provision
5. Constitutional Amendments

#### **Referred Case Laws:**

1. In Re Presidential reference case, Constitutional of India AIR 1951 S.C.332
2. Ram Jawaya Kapur v. State of Punjab AIR 1955 S.C. 549
3. Indira Gandhi v. Raj Narain AIR 1975 S.C. 2299
4. S.R. Bommai v. Union of India. 1994(3) S.C.C 1
5. A.D.M. Jabalpur v. Shin Shank Shukla, 1976 Suppl. S.C.R. 172
6. A.P. Sampooran Madhya Nished Samithi & Ors. v. State of A.P. AIR 1997 A.P. 312
7. U.N. Rao v. Indira Gandhi AIR 1971 S.C. 1002
8. Keshavanad Bharau v. State of Kerala. 1976(2) S.C.R. 347,523.
9. National Human Rights Commission v. State of Arunachal Pradesh-AIR 1996 S.C. 1234
10. Minerla Mills v. Union of India AIR 1980 S.C. 1804
11. Prafulla Kumar v. Pramila of Commerce AIR 1947 P.C. 60
12. Union of India v. V.H.S. Dhillon AIR 1972 SC 1061
13. K. Nagraj v. State of A.P. 1985 (1) SCC 527
14. P.V. Narsimha Rao v. State 1998 (94) SCC 626
15. Tej Kiran v. Sanjiva Reddy AIR 1970 S.C. 1573
16. Roop Ashok Hurrah v. Ashok Hurrah 2002 (3) SCC 406
17. Tirupathi Balaji Developers (P) Ltd. v. State of Bihar AIR 2004 SC 2351
18. A.K. Roy V. UOI 1982 (2) SCR 272
19. State of Maharashtra v. A. 1 Lakshmirutty AIR 1987 SC 331
20. Kihoto Hollohah v. Zachillu 1992 suppl.(2) SCC 651
21. G. Vishwanathan. v. Speaker T.N. Assembly 1996 (2) SCC 353
22. M. Kashinath Jalmi v. Speaker Legislative Assembly Goa 1993(2) SCC 703

23. D.C. Wadhwa v. State of Bihar 1987 (1) SCC 379
24. Krishan Kumar v. State of Bihar 1998(5) SCC 643
25. Makhan Singh v. State of Punjab AIR 1964 SC. 381
- 26.

**Books Recommended:**

Text Books:

1. J.N. Pandey- Constitutional Law of India. Central Law Agency
2. M.P. Jain- Constitutional Law, Wadhwa and Company, Nagpur

Reference Books:

1. V.N. Shukla- Constitution of India. Eastern Book Company.
2. D.D.Basu - Introduction to the Constitution of India, Lexis Nexis India
3. H.M. Seervai - Constitutional Law of India, Universal Law Publishing Company Ltd
4. K.C. Wheare - Modern Constitution, Thomas and Hudson 1990
5. P.M. Bakshi - The Constitution of India Universal Law Publication.

**SCHOOL OF LAW**

**LL.B. 3 YEARS PROGRAMME**

**Subject** : Law of Crime-I  
**Subject Code** : LLB 206  
**Class** : LL.B. I YEAR  
**Semester** : II  
**Credit** : 4

**Objectives:** - This paper will deal with the basic principles of criminal law determining Criminal liability and punishment as well as Marital offences.

**Unit I: Introduction to Substantive Criminal Law**

- a. Extent and operation of the Indian Penal Code
- b. Definition of Crime
- c. Constituents Elements of Crime: Act us Reus and Mens rea
- d. Stages in commission of a Crime- Intention, Preparation, and Attempt etc.

**Unit II: General Exceptions (Sections 76-106)**

- a. Definitions
- b. Mistake
- c. Judicial and Executive acts
- d. Accident
- e. Necessity
- f. Infancy
- g. Insanity
- h. Intoxication
- i. Consent
- j. Good Faith
- k. . Private Defence against Body and Property

**Unit-III: Incoherent Forms of Crime**

- a. Joint and Constructive Liability
- b. Criminal Conspiracy
- c. Attempt
- d. Abetment

**Unit-IV: Punishment**

- a. Offence against the State
- b. Offence against Public Tranquillity
- c. Theories of Punishment with special reference to Capital Punishment

**Unit V: Marital Offence**

- a. Offences relating to marriage (Chapter-XX)-Bigamy, Adultery etc.
- b. Offence of cruelty by the Husband or relatives of Husband(Chapter-XXA/Section 498A)

**Text Book References:-**

1. Ratanlal Dhiraj Lal, The Indian Penal Code, Lexis Nexis, Butterworths Wadhwa, Nagpur, 2012
2. K.D. Gaur, TextBook on Indian Panel Code, Universal Law Publishing Co., New Delhi, 2012
3. P S A Pillai, Criminal Law, Lexis Nexis, 14<sup>th</sup> Edition,2019
4. Bare Act of Indian Penal Code, 1860

**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Environment Law  
**Subject Code** : LLB 306  
**Class** : LL.B. I YEAR  
**Semester** : II  
**Credit** : 4

**Objective:-** The paper seeks to inculcate a general awareness of the major problems of environmental protection in three categories : (1) Protection of the environment, (2) Pollution abatement, and (3) Protection of natural and living resources, and the major legal framework obtaining in the Indian Law.

**UNIT-I**

**General Introduction to Environmental Studies**

1. Natural resources and its kinds.
2. Concept of pollution of the environment.

3. Impact of pollution natural resources (Forest, water, minerals, food energy, land, air).
4. Source of environmental Law.
5. India's ancient tradition and environment Law.
6. Evolution of the Indian laws re protection of the environments.

## **UNIT-II**

### **Environmental Pollution and Prevention**

1. Definition and causes of pollution
2. Types of Pollution:
  - (a) Air pollution
  - (b) Water pollution
  - (c) Soil pollution
  - (d) Marine pollution
  - (e) Noise pollution
  - (f) Thermal pollution
  - (g) Nuclear hazards
3. Air (prevention and Control of pollution) Act 1981 and judiciary's initiative
4. Water (Prevention and control of pollution ) Act 1974 and judiciary's initiative
5. \Environmental Protection act 1986.
6. Noise pollution and judiciary's initiative.
7. Coastal zone management.

## **UNIT-III**

### **Protection of Forest Habitat**

1. Forest law in India
2. Sustainable use of forest.
3. Role of central government in forest protection.
4. Wildlife protection Act 1972.
5. Judicial initiative for wildlife protection act.

## **UNIT-IV**

### **Resource Management**

1. Land resources management
2. Wetlands management.
3. Water resources management.
4. Ground water management.
5. Environment impact assessment.

## **UNIT-V**

### **Contribution of Indian Judiciary**

1. Articles in constitution of India
2. Polluter pays principle.
3. Precautionary principle.
4. Public Trust Doctrine
5. Compensation and rehabilitation.

## **Referred Case Laws**

1. Mr. M.c. Mehta & Anr Etc. v. Union of India & Ors. Etc 1986 SCr (1) 312
2. Municipal Council Ratlam V Vardhichand Air 1980 Sc 1622.
3. Narmada Bachao Andolan Union of India 2000 (10) SC 664.
4. Sachidanand pandey v State of West Bengal Air 1987 SC 1109.
5. Damodar Rao v. S.O. Municipal Corporation AIR 1987 AP 171.
6. Adivasi Majdoor Kisan Ekta Sangathan and Another v Ministry of Environment and Forest and Others NEAA No. 26 of 2009 Appeal no 3/2011 (T).
7. Sunil Kumar Chugh v Secretary, Ministry of Environment and Forest, New Delhi Appeal No. 66 of 2014.
8. Sterlite Industries (India) Ltd. V. Union of India & Others (1981) 2 SCR
9. Rural Litigation and Entitlement Kendra, Dehradun v State of UP AIR 1987 SC 2187.
10. T.N. Godavarman Thirumulpad v Union of India 2006 (14) SCALE 87.

**LL.B 3 YEAR**  
**3rd SEMESTER**



## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject** : Corporate Laws  
**Subject Code** : LLB 213  
**Class** : LL.B.  
**Semester** : III  
**Credit** : 4

#### **LLB 3 YEARS OF PROGRAMME**

**Objectives:** - The fundamental assumptions of corporate law are a well-recognized subject in the legal curriculum and the title of a voluminous literature, its exact scope is not obvious since the word company has no strict legal meaning. This paper revolves around all the basics. Core issues, eminent doctrines/ principles that enhance the faith of the stakeholders towards the corporation thereby helping to understand the corporate culture within the country. Therefore the emphasis in this course is on the fundamental principles, concepts, and doctrines revolving around the subject matter of corporate law covering from pre incorporating to the establishment, management and to winding up of companies' act 2013 and its implications on the corporate sector.

#### **Unit I: Company Form and Structure**

- (a) Corporate Personality, personification- Concept & Jurisprudential aspects
- (b) Company- Definition, Nature, characteristics
- (c) Classification of companies
- (d) Doctrine of piercing the corporate veil- Statutory exceptions and Judicial interpretations
- (e) Promotion of companies- legal position of promoters, Duties and Liabilities
- (f) Pre-incorporation Contracts

#### **Unit II: Company –Registration and Incorporation**

- (a) Memorandum of Association- Importance and Contents
- (b) Articles of Association- Significance and interrelationship.
- (c) Doctrine of Ultra Vires- Applicability, consequences
- (d) Doctrine of Constructive Notice- Rule of presumption
- (e) Doctrine of Indoor Management- concept & Exceptions
- (f) Prospectus (meaning, issue and kinds)

#### **Unit III: Corporate Fund Raising**

- (a) Share/equity Capital- Meaning and nature of shares, Kinds of Shares.
- (b) Right issue, Bonus Issue- Rationale, mechanism
- (c) Allotment- principles & procedure
- (d) Debenture/ Debt Capital- Concept, Meaning and kinds.
- (e) Debenture vis-à-vis Debenture holder.

#### **Unit IV: Corporate management**

- (a) Directors- Meaning, Types, Qualifications, Disqualifications.
- (b) Legal position of Directors.
- (c) Shadow, De-facto and de- jure Director.
- (d) Powers and duties of directors
- (e) Meeting- Kinds and Requisites of valid meeting.

#### **UNIT V: Corporate Abuse and Remedies**

- (a) shareholders democracy
- (b) Majority Powers and Minority Rights.
- (c) Principle of Non- Interference (Rule established in Foss v Harbottle)
- (d) Protection against Oppression
- (e) Protection against Mismanagement.

#### **UNIT VI: Corporate Collapse**

- (a) Winding Up- Meaning and Types
- (b) Modes of Winding Up and Types
- (c) Modes of Winding Up and Procedure
- (d) Winding Up by the Tribunal
- (e) Voluntary Winding Up
- (f) Merger and Acquisition of company (e.g. Like Arcelor Mittal and Air India Case)
- (g) Reconstruction and Amalgamation

#### **Text Books:**

1. Ramaiyaya, Guide to Companies act, 2013
2. Charlesworth & Morse, Company Law
3. Gower & Davies, Principles of Modern company law& Practice Taxman
4. Sekhar K, SEBI Capital Issues, Debentures and Listing, wadhwa and Company, Nagpur
5. C.R. Dutta on the Company law , 4th Edn . 2008 by Kamal Gupta.
6. Pennington, company Law.
7. K. Majumdar, Dr. G.K. Kapoor Company Law & Practice , taxman
8. Nicholas Bourne, Principles of Company law
9. Agrawal & Baby on SEBI Act, Taxman Publications.
10. Palmer, Company Law
11. Nicholas Bourne, Principles of Company Law.
12. H.L.J. Ford and A.p Austen, Ford's Principles of Corporations law, ( 1999) Butterworths
13. Jonathan Charkham, fair share: The Future of shareholders Power and Responsibility.

## LL.B. 3 YEARS PROGRAMME

**Subject : Labour and Industrial Law-I**  
**Subject Code : LLB 215**  
**Class : LL.B.**  
**Semester : III**  
**Credit : 4**

**Objectives:** -To apprise the students with application of various laws for the raising of living standards of labourers and peaceful resolution of Industrial DISPUTES. In this regards the functions of Labour Court, strike, Lockout, Role of Trade Unions and the factories act etc. are explained in detail.

### **Unit-I: THE INDUSTRIAL DISPUTE ACT 1947**

1. Object and main features of the Act.
2. Definitions: Appropriate Government, Employer, Industry, Industrial Dispute, Workmen, Public Utility Service, Industrial Establishment or Undertaking,
3. Authorities under the Act (Section 3-9 and 11-15)
4. Notice of change (Section 9-A)
5. Reference of Disputes to Boards, Court and Tribunal (Section 10-A)
6. Voluntary Reference of Disputes to Arbitration (Section 10-A)
7. Power of labour Court and Tribunal to give relief in case of Discharge or Dismissal of Workmen (Section 11-A)
8. Awards and Settlement (Section, 16-21)

### **UNIT-II THE INDUSTRIAL DISPUTES ACT 1947**

1. Definition of Strike and Lockout (section-2), other Statutory Provision of ID Act, 1947 relating to strikes and Lockouts (section- 22-28)
2. Layoff and Retrenchment (section 2, 25A-26E and 25 F- 25H)
3. Compensation to Workmen in case of Transfer of Undertakings (section 25 FF),
4. 60 Days' Notice to be given Intention to Close Down the Undertaking (section 25 FFA)
5. Compensation to workmen in case of closing down of undertaking (section 25 FFF), special provision relating to lay off, retrenchment and closure in certain establishments (section 25K- 25 S)
6. Unfair labour practice (section 25 I-25 U), scope of section 33 and 36 of ID Act, 1947.

### **UNIT –III THE TRADE UNIONS ACT, 1926**

1. Development of Trade Unions Law in India,
2. Definition: Executive, Registrar, Trade Union,
3. Registration of Trade Union (section 3-9), Cancellation of Registration (section-10)
4. Appeals (section-II),
5. Incorporation of Registered Trade Union (Section 13),

### **UNIT –IV: THE TRADE UNIONS ACT, 1926**

1. Right and Liabilities of Registered Trade Union (Section 15-18)
2. Right to inspect Books of trade Union (section 20)
3. Right of Minor to be Membership of trade Union (Section 21)
4. Disqualification of Office Bearers of Trade Unions (Section -21a)
5. Proportion of Office Bearers to be connected with an Industry (section 22)
6. Change of Name and Amalgamation of Trade Union (section 23 to 26)
7. Dissolution and Returns (Section 27 & 28)

### **UNIT –V: THE FACTORIES ACT, 1948**

1. Definition : Adult, Adolescent, Child Hazardous Process, Manufacturing Process, Worker, factory,
2. Approval of Licensing and Registration of Factories (Section 6)
3. Notice by Occupier and Duties of Occupier (Section 7)
4. Inspector and Certifying Surgeons (section 8 to 10)
5. Statutory Provisions relating to Health and Safety (section 11 to 41)
6. Welfare (section 42 to 50)
7. Working Hours of adult (51-66)
8. Employment of Young Persons (section 67-77)
9. Annual Leave with wages (section 78-84)

### **Books Recommended**

1. C.B. Memoria and Satish Memoria. Dynamics of industrial relations. (Himalaya publishing House- Mumbai 2007 part II and III. Latest ED.)
2. Dr. V. G. Goswami. Labour and industrial law, (Central Law Agency Allahabad, 2005, part VI. Latest )
3. Nirmal singh and S. K. Bhatia. Industrial relations and Collective bargaining, (Deep and deep publications Pvt. Ltd.- Delhi Ed. 2000.)
4. Srivastava K. Industrial Peace and labour in india, (Kitab mahal Allahabad, Ed. 2003)
5. Indian law Institute. Labour Law labour Relations, (Ed. 2002)
6. Km Pillai. Labour problems and remedies, (Universal Book Traders, Delhi Ed. 2006)
7. SN Mishra. Labour and Industrial Law, (Central law agency , Faridabad , Haryana Ed)
8. HL Kumar. Labour problems and remedies, ( Universal Book Traders, delhi, Ed. 2006)
9. Giri VV, Labour Problems in India Industry, (Asian Publishing House, Bombay, ed. 1965)
10. C.B. Memoria and Satish Memoria. Dynamics of industrial relations,(Himalay Publishing House- Mumbai Ed. 2007 Part VIII)
11. Dr. V. G. Goswami. Labour and Industrial law ( Central law agency Allahabad, Ed. 2005 part II, III, IV)

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject : PROPERTY LAW**  
**Subject Code : LLB 217**  
**Class : LL.B. II YEAR**  
**Semester : III**  
**Credit : 4**

**Objectives:** - Property Law is one of the basic fundamental laws. It mainly deals with transfer of Immovable Property among the Living persons, the students are made aware regarding the basic Principles of Transfer of Property as well as specific transfer like Election, Part Performance, Sale, Mortgage, Lease, Charge and Gift. This paper is very useful in practice for advocates since most of the Common disputes are directly and indirectly associate with the Right to Property.

#### **Unit I:**

1. Object and Scope of the Transfer of Property, 1882,
2. Interpretation Clause(Section-3), Definition of Transfer of Property,
3. Subject Matter of Transfer,
4. Persons competent to Transfer, Oral Transfer,
5. Condition restraining alienation ,restriction repugnant to interest created
6. Transfer for the benefit of Unborn Person

#### **Unit II:**

1. Rule Against Perpetuity,
2. Vested and Contingent Interests,
3. Conditional Transfer

4. Doctrine of Election
5. Apportionment,
6. Transfer of Property by Ostensible Owner(Section-41)

**Unit III:**

1. Transfer by unauthorized Person who subsequently acquires Interest in Property Transferred,
2. Transfer by One Co-owner,
3. Joint Transfer for Consideration,
4. Priority of Rights created by Transfer,
5. Fraudulent Transfer,
6. Doctrine of LIS-Pendent,
7. Doctrine of Part-Performance

**Unit IV:**

1. Definition of Sale,
2. Rights and Liabilities of Buyer and Seller
3. Marshaling by Subsequent Purchaser,
4. Definition of Mortgage and kinds of Mortgage (Section58-59)
5. Rights and Liabilities of Mortgagor (Section 60 to 66),
6. Rights and Liabilities of Mortgage (Section 67 to 77),
7. Priority (Section 78 to 80).

**Unit V:**

1. Charge (Section 100)
2. Definition of Lease,
3. Rights and Liabilities of Lessor and Lessee (Section105 to 108),
4. Different Modes of Determination of Lease (Section 111),
5. Gift (Section 122 to 129)

**BOOKS RECOMMENDED:**

1. D.F. Mulla. Transfer of Property Act (Lexis Nexis 11th Ed. 2013)
2. Shukla S.N. Transfer of Property, reprint (Allahabad Law Agency, Ed, 2017)
3. Sinha R.K. The Transfer of Property Act (Central Law Agency Ed. 2016)
4. Tripathi G.P. The Transfer of Property Act (Central Law Publication 19th Ed. 2016)

# SCHOOL OF LAW

## LL.B. 3 YEARS PROGRAMME

**Subject : INTERPRETATION OF STATUTES**  
**Subject Code : LLB 219**  
**Class : LL.B. II YEAR**  
**Semester : III**  
**Credit : 4**

**Objectives:** - In the construction (interpretation) of statutes, the principle aim of the court must be to carry out the Intention of Legislature. A statute is presumed to make no changes in the common law. For the Law student it is very necessary to know the fundamentals of interpretation, therefore, they are taught different principles of interpretation used by courts to find out the real intention and object of legislation. It is very helpful in legal profession.

### **Unit I:**

1. Statute: Meaning and Classification,
2. Interpretation-Meaning, Object, Purpose
3. Basic Principles of Interpretation, Difference between Interpretation and Construction, Rule of Construction-Literal, Golden and Mischief Rules,
4. Limitations of the Court

### **Unit II:**

1. Internal Aid,
2. External Aid,
3. Interpretation of Mandatory and Directory Provisions,
4. Interpretation of Penal and Taxing Statutes

### **Unit III:**

1. Interpretation of Indian Constitution
2. Rule of Ejusdem Generis
3. Rule of Noscitur-a-sociis

### **Unit IV:**

1. Rule of Pari Materia,
2. Rule of Stare Decisis,
3. Contemporanea Expositio eat optima Et Fortissima in Lege
4. Bentham's Theory of Legislation
5. Pains and Pleasure,
6. Greatest Happiness of Greatest Number,
7. Utilitarianism

### **Unit V:**

1. What is Legislation
2. Who Legislate,
3. Restriction on the Legislature,
4. Legislation is a Science,
5. The Method of Law Reform,
6. Principles of Legislation, Relationship between Law and Public Opinion,

### **BOOKS RECOMMENDED:**

1. G.P.Singh. Principles of Statutory Interpretation, (Lexis Nexis 14th Edition, 2016)
2. Avtar Singh. Introduction to Interpretation of Statutes, (Lexis Nexis 4th Edition, 2014)
3. V.P. Sarathi. Interpretation of Statutes, (E.B.C. 5th Edition, 2010)
4. Kafaltiya A.B. Interpretation of Statutes, (E.B.C 2016 Latest Ed. )
5. D.N.Mathur. Interpretation of Statutes, (Central Law Publication 2013 Latest Ed.)
6. RD. Srivastava. Interpretation of Statutes and Legislation, (Central Law Publication 6<sup>th</sup> Edition, 2013).

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject** : Jurisprudence (Legal Method, Indian Legal System, and the basic Theory of law)  
**Subject Code** : LLB 113  
**Class** : LL.B. II YEAR  
**Semester** : III  
**Credit** : 4

**Objectives:** -It includes sources of Law, Administration of Justice, Law and Morality, Schools of Jurisprudence, Legal Rights and Duties, Ownership and Possessions, Legal Personality, Obligation and Liability etc. The subject is very important for Law Students as it helps in understanding the evolution and nature of Law and the fundamental functions of Law from

different perspectives. Moreover, the students are also exposed to the information relating to functioning of various legal systems. This helps in making laws and tackling socio-legal problems prevalent in our country by studying the remedial measures in India.

#### **Unit I:**

1. 1 Definition, nature and province/scope of Jurisprudence
2. Theory of Natural Law and jurisprudence,
3. Analytical school-  
Austin's theory of Law  
Kelson's pure theory of Law  
Bentham's theory of Law

#### **Unit II:**

1. Historical school
2. Sociological School
3. Realist school

#### **Unit III:**

1. Administration of Justice
2. Socio-Economic Approach and Philosophy  
Law and Social Change  
Legal Aid  
Public Interest Litigation

#### **Unit IV:**

Sources of law —

1. Custom,
2. Precedent
3. Legislation

#### **Unit V:**

1. Rights and Duties
2. Possession and Ownership
3. Persons

#### **BOOKS RECOMMENDED-**

1. B.S: Mani Tripathi, The Legal Theory, (Allahabad Law Agency, Allahabad, 18th Ed. 2012)
2. N.V. Paranjapai, Studies in Jurisprudence and Legal Theory, (Central Law Agency, Allahabad 7thEd.2013)
3. Nomita Aggarwal, Jurisprudence, (Central Law Agency, Allahabad, 10th Ed. (rep)2016)



4. S.P: Dwivedi, Jurisprudence & Legal Theory, (Central Law Agency, Allahabad 7th Ed. 2017)
5. Salmond, John William, Sir, Jurisprudence or the theory of the law, (Hard Press Publishing (2013)
6. R.W.M. Dias, Jurisprudence, (Jain Law Book Agency, Delhi, 12th Edition, 20 14)
7. Edgar Bodenheimer, Jurisprudence, (Harvard University Press, 1974 (Revised Ed.)
8. Amartya Sen, The Idea of Justice, (Cambridge, Mass.: Belknap Press/Harvard University Press,Ed. 2009)
9. Granville Austin, Indian Constitution, (The Cornerstone of a Nation, New Delhi, OxfordUniversity Press, Ed. 2007)

# **LINGAYA'S UNIVERSITY**

## **SCHOOL OF LAW**

### **SYLLABUS**

#### **LL.B. 3 YEARS PROGRAMME**

<b>SUBJECT</b>	<b>: Professional Ethics, Lawyer' Accountability and Bar Bench Relations. (Theory)</b>
<b>SUBJECT CODE</b>	<b>: LLB221</b>
<b>CLASS</b>	<b>: LL.B. 2ND YEAR</b>
<b>SEMESTER</b>	<b>: III</b>
<b>CREDIT</b>	<b>: 4</b>

**OBJECTIVE:** To explain the students about the importance of ethics in Legal profession, various qualities of advocates, various skills to maintain Bench Bar relation, role of BCI and State Bar Council and various types of contempt of Court as well as leading cases on professional misconduct.

#### **UNIT-I**

1. Meaning of Legal Profession
2. Background to Legal Profession in India
3. Meaning and Necessity of Professional Ethics
4. Standards of Professional Conduct and Etiquette

#### **UNIT-II**

1. Status and Virtues of an Advocate
2. Qualifications and Disqualification for Enrolment
3. Qualities of an Advocate
4. Right and Various Duties of Advocate
5. Bench-Bar Relation

#### **UNIT-III**

1. Establishment of Bar Council of India
2. Functions and Powers of Bar Council
3. Establishment of State Bar Councils
4. Functions and Powers of State Bar Councils 4.

#### **UNIT IV**

1. Meaning and Scope of Professional and other Misconducts
2. Background to Law of Contempt
3. Categories of Contempt of Courts
4. Contempt by Lawyers and Judges

#### **UNIT V**

1. Powers of State Bar Council to Punish for Professional and other Misconduct
2. Powers of High Court to Punish Contempt of Subordinate Courts

**BOOKS RECOMMENDED:**

1. S.P. Gupta. Professional Ethics, Accountancy for Lawyers & Bench Bar Relations, (latest Ed.2012)
2. Kailash Rai, Professional Ethics, Accountancy for Lawyers & Bench Bar Relations (Latest.Ed 2014)
3. Dr. Sirohi, Professional Ethics, Accountancy for Lawyers & Bench Bar Relations (Latest Ed.2010)

**SCHOOL OF LAW****SYLLABUS****LL.B. 3YEARS PROGRAMME**

**SUBJECT : Professional Ethics Lawyer's Accountability and Bank Bench Relations (Practical)**

**SUBJECT CODE : LLB 251**  
**SEMESTER : III**  
**CREDIT : 4**

**Objective:** This course will be taught in association with the practicing Lawyers / retired Judges/ retired Law Teachers. The students will be given Assignment by the subject teacher. Students will record answer to all the Assignment by preparing a Project File. The Project File will be evaluated by the Board of Examiners at the time of Practical/ Viva-voce examination. The course shall comprise of the following:

#### **UNIT: I**

- (1) Historical Perspective and Regulation of Legal Profession.
- (2) Admission, Enrolment and Rights of Advocate, Bar Councils.
- (3) Nature and Characteristics of:
  - (a) Ethics of Legal Profession,
  - (b) Legal Profession

#### **UNIT: II**

- (1) Contempt of Court:
  - (a) Civil Contempt
  - (b) Criminal Contempt
  - (c) Punishment for Contempt
  - (d) Defences Against Contempt.
  - (e) Constitutional Validity of Contempt Law.
  - (f) Contempt by Lawyers, Judges, State, and Corporate Bodies

#### **UNIT: III**

Strike by the Lawyers

#### **UNIT: IV**

Extent of Professionalization of Legal Profession

- (a) Code of Ethics for Lawyers
- (b) Professional Misconduct and its Control

#### **UNIT: V**

1. Bar-Bench Relations
2. Accountability of Lawyers towards Court, Clients and Society
3. Role of Law and Legal Profession in Social Transformation

#### **BOOKS RECOMMENDED**

1. Gupta S.P., Professional Ethics, Accountancy for Lawyers & Bench Bar Relations.
2. Rai Kailash, Professional Ethics, Accountancy for Lawyers & Bench Bar Relations.
3. Sirohi (Dr.), Professional Ethics, Accountancy for Lawyers & Bench Bar Relations.



# **LL.B 3 YEAR**

## **4th SEMESTER**

**SCHOOL OF LAW**

**LL.B. 3 YEARS PROGRAMME**

**Subject** : Public International law  
**Subject Code** : LLB 120  
**Class** : LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**OBJECTIVE:** To apprise the students about the similarities and difference between Municipal law and International Law, various sources, explanation of the term. State including types of states, recognition of state, extradition, asylum, diplomatic agents, Amicable and Coercive modes of settlement of dispute, War, Blockade, evolution of Human Rights and its National and International perspective.

### **UNIT-I**

1. Definition, Nature and Sanctions of International Law,
2. Relationship between International Law and Municipal Law,
3. Sources and subjects of International Law including position of individual

## **UNIT-II**

1. State Territory,
2. State Jurisdiction,
3. Recognition of States and Governments,
4. Acquisition and loss of State Territory,

## **UNIT-III**

1. State Succession,
2. Extradition,
3. Asylum,
4. Settlement of Disputes

## **UNIT-IV**

1. Nature, Definition and Effects of War,
2. Belligerent Occupation,
3. War Crimes,
4. Contraband,
5. Blockade,
6. Prize Counts,
7. Enemy Character, Rules of Warfare

## **UNIT-V**

1. Human Rights: Concept of Human Rights,
2. Provisions of U.N. Charter relating to Human Rights,
3. Universal Declaration of Human Rights, 1948 and its Legal Significance,
4. Covenant on Civil and Political Rights, 1966
5. Covenant on Economic, Social and Cultural Rights,
6. National Commission on Human Rights

## **BOOKS RECOMMENDED**

1. Starke's International Law (Oxford University Press Butterworth & Co. publisher Ltd. 11th Ed. 2013)
2. V.K. Ahuja. Public International Law (Lexis Nexis, 1st Ed. 2016)
3. V.C. Govindaraj. Conflict of Laws-Cases and Materials (Lexis Nexis, 1st Ed. 2017)
4. Aggarwal, H.O. Public International Law and Human Rights (Central Law Publications Ed. 2012)
5. Kappor, S.K. International Law (Central Law Publications 2013)
6. Harris, D.J. Cases and Material on International Law (Sweet & Maxwell Ed. 2013)
7. Greig, DW. International Law (Butterworths and Co. (Publishers) Ed. 2007)

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject** : LAW OF CRIMES-II (CRIMINAL PROCEDURE CODE)  
**Subject Code** : LLB 212  
**Class** : LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**Objectives:** - Of all the branches of law, criminal law is the most important branch of law, because it closely touches and concerns man in his day-today affairs. The Criminal Procedure is an inseparable part of the penal law. Without the Criminal Procedure code, the substantive criminal law will become Worthless and meaningless. Our law of criminal procedure is mainly contained in the Code of Criminal Procedure 1973. It provides the machinery for the detection of crime, apprehension of suspected criminals, collection of evidence, determination of the guilt or innocence of the suspected person and the imposition of suitable punishment on the guilty person. With this perspective this subject is designed to make the student understand how the Criminal Procedure Code controls and regulates the working of the machinery set up for the investigation and trial of offence.

#### **Unit I:**

1. Constitution of Criminal Courts and Offices (Section 6-25),
2. Power of Courts (Section 26-35),
3. Power of Superior Officers of Police (Section-36),
4. Arrest of Persons (Section 41-60),
5. Difference between Summons and Warrant,
6. Difference between cognizable and non-cognizable offences,
7. Rules regarding Proclamation and attachment( Section 82-86),
8. Difference between Bailable and non-bailable offence,
9. Difference between compoundable and non-compoundable offences

#### **Unit II:**

1. Provisions as to Bail and Bonds (Section 436-450),
2. Order for maintenance of wives, children and parents (Section 125-128),
3. Information to the Police and their powers to Investigate (Section 154-176),
4. Jurisdiction of Criminal courts in Inquiries and Trials (Section 177-189),



5. Complaints to Magistrate and commencement of Proceeding Before Magistrate (Section 200-210)

**Unit III:**

1. The Charge (Section 211-224),
2. Trial before a Court of Session (Section 225-237)
3. Trial of Warrant cases by Magistrates (Section 238-250)
4. Trial of Summons Cases by Magistrate (Section 251-259),
5. Summary Trials (Section 260-265), Plea Bargaining (Section 265-A, 265-L)
6. **Pleas of Autrefois Acquit and Autrefois Convict (Section 300),**

**Unit IV:**

The Juvenile Justice (Care and Protection of Children) Act 2015 Section (1-55)

**Unit V:**

1. The Judgement (Section 353-365),
2. Submission of Death Sentence for confirmation Section (366- 371),
3. Appeals (Section 372-394),
4. Reference and Revision (Section 395-405),
5. Transfer of Criminal Cases (Section 406-412),
6. Limitation for taking cognizance of Certain Offences (Section 467-473),
7. The Probation of Offender Act 1958, Section (1-5 and 12-14)

**BOOKS RECOMMENDED:**

1. C.K. Thakker 'Takwani' & MC. Thakker, Criminal Procedure (Lexis Nexis, New Delhi, 4th Ed. 2014)
2. K.N. Chandrasekhar Pillai, Criminal Procedure (Eastern Book Company, Lucknow, 16th Ed. 2016)
3. Ratan Lal & Dhirajlal, The Code of Criminal Procedure, (Lexis Nexis, New Delhi, 22nd Ed, 2017)
4. NV. Paranjape, the Code of Criminal Procedure, (Central Law Agency, Allahabad, 6th Ed. 2017)
5. Law Commission Reports
5. Forty first Report of the Law commission of India on the Code of Criminal Procedure, 1898
6. Thirty seventh Report of the Law commission of India on the Code of Criminal Procedure, 1898
7. Fourteenth Report of the Law commission of India on the Reform of Judicial Administration

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject** : LABOUR AND INDUSTRIAL LAW- II  
**Subject Code** : LLB 216  
**Class** : LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**Objectives:** - To apprise the students with application of various laws for the raising of living Standards of labourers. In this regard we teach students about applications of The Workmen's Compensation Act, 1923, the Minimum Wages Act, Law of Gratuity and the Equal Remuneration Act, 1976 in detail.

#### **Unit I: The Employee's Compensation Act, 1923**

1. Main Features of the Act,
2. Definitions Compensation, Dependent, Employer, Workman, Partial Disablement, TotalDisablement,
3. Employer's Liability for Compensation(section-8),
4. Notice and claims of the Accident (section-10),
5. Commissioner (Section 19 to 29),
6. Appeals (section 30),
7. Medical Examination (Section 11)

#### **Unit II: The Minimum Wages Act, 1948**

1. Objects and Constitutional Validity of the Act,
2. Salient Features of the Act
3. Definitions: Employer, Cost of Living Index, Scheduled Employment, Wages,
4. Minimum Wages, Fair Wage and Living Wage,
5. Fixation and Revision of Minimum Rates of Wages, Working Hours,
6. Determination of Wages and Claims (section 3, 20 and 21),

#### **Unit III: Payment of Wages Act, 1936**

1. Definition, Employer, industrial and other Establishment, Wages,
2. Payment and Deduction from Wages (Section 3-13),
3. Inspector (section 14), :
4. Authority to Hear claims(section 15)
5. Appeal (section-17)

#### **Unit IV: The Industrial Employment (Standing Orders) Act, 1946,**

1. Procedure for Certification & Adoption of Standing Orders.
2. Certifying Officer,
3. The Employees' State Insurance Act, 1948
4. Employees' State Insurance Corporation,
5. Standing Committee, Medical Benefit Council,
6. Contributions, Benefits, Employees Insurance Court

**Unit V: The Equal Remuneration Act, 1976-**

1. Definition Clause
2. Payment of Remuneration at Equal Rates(section 4 to7)
3. Inspector,
4. Penalties and Cognizance of Offences under the Act ,

**The Payment of Bonus Act, 1965-**

1. Eligibility, Disqualification for Bonus (section 8,9)
2. Minimum & Maximum Bonus (5,10,11);
3. Proportionate Reduction (5, 13)
4. Recovery of Bonus Due (5, 21)
5. Customary Bonus, Productivity Bonus.

**The Payment of Gratuity Act, 1972.**

1. Definitions, Eligibility, Payment, Determination,
2. Recovery and Protection of Gratuity, Sec. 2-A, 4, 7, 8, and 13

**BOOKS RECOMMENDED:**

1. C.B. Memoria and Satish Memoria, Dynamics of industrial Relations, (Himalaya PublishingHouse-Mumbai Part II and III. Ed. 2007
2. Dr. V.G. Go swami. Labour and Industrial law, (Central Law Agency Allahabad,, Part VI. Ed.2005)
3. Nirmal Singh and S.K. Bhatia, Industrial Relations and Collective Bargaining, (Deep and DeepPublications Pvt, Lid. - Delhi, Ed. 2000.)
4. Srivastava K. Industrial Peace and Labour in India, (Kitab Mahal Allahabad, Ed. 2003)
5. Indian Law Institute. Labour Law and Labour Relations, (Ed. 2002)
6. KM Pillai, Labour and Industrial Law, (Allahabad Law Agency, Faridabad Haryana, Part I. Ed. 2005)
7. S.N. Mishra, Labour and Industrial Law, (Central Law Publications, Allahabad, Part I. Ed. 2004)
8. HL Kumar, Labour problems and remedies, (Universal Book Traders, Delhi, Ed. 2006)

**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Civil Procedure Code, 1908  
**Subject Code** : LLB 218  
**Class** : LL.B.  
**Semester** : IV  
**Credit** : 4

**Objectives:** - The paper will focus on the civil procedures followed in instituting a suit. The students will be familiarized with certain important concepts and practical skill development activity will provide insights into the actual working of the court procedures.

**Unit I: Introduction**

- a. Definitions : Decree, Decree Holder, Foreign Court, Foreign Judgment, Judgment, Judgment Debtor, Legal Representative, Mesne Profits, Order (Sec.2)
- b. Jurisdiction of Civil Courts, Nature of Suits (Sec.9)
- c. Stay of Suits, Res-judicata, Foreign Judgment (Sec.10, Section 11 and Section 13-14)
- d. Place of Suing, Transfer of Suits (Sections. 15-25)
- e. Joinder of Parties, Representative Suits, Splitting of Claims and Relief. Joinder of Cause of Action (Order I & II)

**Unit II: Initial steps in a suit and Execution of a decree**

**A. Initial steps involved in a suit**

- a. Rules of pleadings, Complaint and Written Statement (Order VI, VII and VIII)
- b. Summons to defendants and witnesses (Sections. 27-32 & Order V & XVI)
- c. Appearance and non-appearance of parties and Inspection (Order IX and X)

**B. Execution**

- a. Power and Jurisdiction of Executing Court (Secs.36- 47, 49-50)
- b. Procedure in Execution (Secs.51-54 & Order XXI Rules 1& 2, Rules 10- 25),- Stay of Execution (Rules 26-29)
- c. Mode of Execution (Rules 30-36), Arrest and detention (Secs.55-59 & Order XXI Rules 37-40)
- d. Attachment of Property and Adjudication of Claims and Objections (Secs.60-64 & Order XXI Rules 41-59)
- e. Sale, Procedure in Sale and Distribution of Assets (Sections.65-73 & Order XXI Rules 64-96)

**Unit III: Appeal, Reference, Review and Revision**

- a. Appeals from Original Decrees, Procedure in Appeals and Powers of Appellate Court (Sections 96- 99A, 107-108 & Order XLI)
- b. Appeals from Appellate Decrees (Secs. 100-103 & Order XLII)
- c. Appeals to the Supreme Court (Sec. 109)
- d. Reference to High Court (Sec. 113, Order XLVI)
- e. Review (Sec. 114 & Order XLVI)
- f. Revision (Sec. 115)

#### **Unit IV: Suits in Particular Cases**

##### **A. Suits in Particular Cases**

- a. Suit against Government (Secs. 79-82)
- b. Suit in case of Minors and Indigent Persons (Order XXXII and XXXL)

##### **B. Interim Orders**

- a. Commissions (Sec. 75- 78, Order XXV1),
- b. Arrest before Judgment
- c. Interpleader Suits (Sec. 88 & Order XXXV),
- d. Attachment before Judgment
- e. Temporary Injunctions

#### **Unit V: Indian Limitation Act**

- a. Salient features of the Limitation Act, Limitation of Suits, Appeals and Application (Secs. 3-11)
- b. Exclusion of Time (Sec. 12-15)
- c. Effect of Death, Fraud, Acknowledgement, Payments etc. on Limitation (Secs. 16-22)
- d. Acquisition of Ownership by Possession (Sec. 25-27)

#### **Text Book Reference:**

- a. C.K. Takwani, Code of Civil Procedure, Eastern Book Company, 2010
- b. M.R. Malik, Ganguly's Civil Court, Practice and Procedure, Eastern Law House, 2012.
- c. Mulla, Code of Civil Procedure.

**SCHOOL OF LAW  
SYLLABUS  
LL.B.3 YEARS PROGRAMME**

<b>SUBJECT</b>	<b>: PUBLIC INTEREST LAWYERING, LEGAL AID &amp; PARA LEGAL SERVICES</b>
<b>SUBJECT CODE</b>	<b>: LLB 220</b>
<b>CLASS</b>	<b>: LL.B. IIND YEAR</b>
<b>SEMESTER</b>	<b>: IV</b>
<b>CREDIT</b>	<b>: 4</b>

**OBJECTIVE:** This course will address the theory and practice of public interest work and help you to develop some of the writing and advocacy skills needed to conduct a public interest law practice. We will discuss various models of public interest lawyering and ethical issues confronting lawyers in this area. You will also have the opportunity to draft various documents essential to a public interest practice, both in a litigation (affidavit, motion) and a non-litigation (letter, press release, fundraising proposal) context. Some of the assignments will be done individually, and some with a partner, as working with others is a central part of "real world" lawyering.

**UNIT- I**

1. Public Interest Litigation- Meaning, Scope and Object, Characteristics
2. Origin and Development of Public Interest Litigation in India
3. Rule of Locus Standi
4. Public Interest Litigation and Private Interest Litigation
5. Social interest Litigation

**UNIT- II**

1. Legal Aid - Meaning and Object
2. Origin and Development of Legal Aid Scheme
3. Fundamental Sources of Legal Aid Scheme
4. Provisions regarding legal aid Under the Constitution of India
5. Provisions regarding free legal aid Under Criminal Procedure Code
6. Provisions regarding free legal aid Under Civil Procedure Code

**UNIT- III**

1. Lok Adalat- meaning and importance
2. Composition, Organization and working of Lok Adalats
3. Jurisdiction and Powers of *Lok Adalats*
4. Permanent Lok Adalat- Composition Jurisdiction and working

**UNIT- IV**

1. Para Legal Services- Meaning and objects
2. Public Utility services
3. Indian para legal services- importance
4. Role of para legal services in Legal education
5. Para Legal Services and Social Transformation

## UNIT- V

1. National Legal Services Authority-Constitution and Function and powers
2. State Legal Services Authority- Constitution and Function and powers
3. District Legal Services Authority- Constitution and Function and powers
4. Supreme Court Legal Services Committee-Constitution and Functions
5. High Court Legal Services Committee-Constitution and Functions
6. Taluk Legal Services Committee-Constitution and Functions

## RECOMMENDED BOOKS-

1. Dr. S.R. Myneni , Public Interest lawyering, Legal Aid and Para Legal Services, Asia Law House (2 Ed Rp 2017)
2. Mamta, Public Interest Litigation: Legal Aid and Lok Adalats, Edition: 4th Edition, 2015
3. Ajay Gulati Public Interest Lawyering, Legal Aid & Para Legal Services Ist Ed. (Rep.) 2013
4. Kailash Rai Public Interest Lawyering, Legal Aid & Para Legal Services 7th Ed. (Rep) 2016

## SCHOOL OF LAW

### LL.B. 3 YEARS PROGRAMME

**Subject : ARBITRATION, CONCILIATION & ALTERATIVE DISPUTE RESOLUTION SYSTEMS (THEORY)**  
**Subject Code : LLB 222**  
**Class : L.L.B. II YEAR**  
**Semester : IV**  
**Credit : 4**

**Objectives:** -To find out the various Dispute Resolution Techniques used at International and National level. To trace out the differences between most prominent dispute resolution methods including traditional litigation, arbitration (in many forms including International Commercial Arbitration mediation and conciliation etc. The system of ADR is less time consuming as well as informal. Therefore, cost of litigation is also subsequently reduced. With the help of this paper, the students learn new techniques of resolution of disputes in certain cases.

#### Unit I:

1. Evolution of ADR, ADR in India,
2. Advantages & disadvantages of ADR,
3. ADR Processes Pretial Mediation,
4. Mediation, Negotiation, Conciliation,
5. ADR in family disputes, Conciliation under CPC

#### Unit II:

1. Concept, Meaning & Growth of Lok Adalats,
2. Lok Adalats under Legal Services Authorities Act, 1987,
3. Nyaya Panchayats-Historical Perspectives,
4. Advantages of Nyaya Panchayats,
5. Composition & Jurisdiction of Nyaya Panchayats

**Unit III:**

1. Arbitration & Conciliation Act (Section 1-43),
2. Definition of Arbitration,
3. International Commercial Arbitration,
4. Objectives of the Act,
5. Arbitration Agreement
6. Composition and jurisdiction of Arbitral Tribunal,
7. Conduct of Arbitral Proceedings,

**Unit IV:**

1. Making of Arbitral Awards and Termination of Proceedings,
2. Recourse Against Arbitral Award,
3. Finality and Endorsement of Arbitral Award.
4. Appealable orders,
5. Lien on Arbitral Awards and Deposits as to costs,
6. Effect on Arbitration Agreement of Death and of parties insolvency

**Unit V:**

1. Arbitration & Conciliation Act (Section 44-60),
2. Foreign Awards-Definition,
3. Enforcement of Certain Foreign Awards,
4. New York Convention Awards,
5. Geneva Convention Awards,
6. Convention on Recognition and Enforcement of Foreign Arbitral Awards (Schedule I), Protocol on Arbitration Clauses (Schedule II),
7. Convention on Execution of Foreign Arbitral Awards (Schedule III),
8. Conciliation under Arbitration and Conciliation Act, 1996 (Sections 61-81),
9. Role of Conciliator, Confidentiality in conciliation.

**BOOKS RECOMMENDED:**

1. Anupam Kurlwal, An Introduction to Alternative Dispute System (ADR), (Central Law Publication, Allahabad, Ed. 2014).
2. S.C. Tripathi, Arbitration and Conciliation Act, 1996 with Alternative means of settlement of dispute, (Central Law Publication, Allahabad, Ed. 2015).
3. Avtar Singh, Law of Arbitration and conciliation, (Eastern Book Company, Lucknow, Ed. 2013).
4. Ashwinie Kumar Bansal, International Commercial Arbitration Practice and Procedure, (Universal Law Publishing Co., New Delhi, Ed. 2012)
5. G.K. Kwatra, Arbitration and conciliation Law of India, (Universal Law Publication Co. New Delhi, Ed. 2014).



## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject : ARBITRATION, CONCILIATION & ALTERNATIVE DISPUTE RESOLUTION SYSTEMS (PRACTICAL)**  
**Subject Code : LLB 252**  
**Class : LL.B. II YEAR**  
**Semester : IV**  
**Credit : 4**

**Objectives:** - The Course will be taught partly through class room lectures including simulating exercise and partly through extension programme like Lok-Adalat, etc. The Course will be taught in association with practicing lawyers / retired Judges / retired Law Teachers. The Class room instructions shall include lessons on the concepts and practice of Arbitration, Conciliation and Alternate Dispute Resolution. Students shall be required to maintain the Diary of the Sessional Work for this paper in which they shall record the written exercises assigned to them by the subject teacher during the session and their observations about the field work / training work of Lok Adalat etc. organized by the Law Department of the College / University and attended by them. The course shall comprise the followings:

#### **Unit I:**

1. Existing Justice Delivery System in India - Effectiveness and Menaces.
2. Reforms in the Legal System for Achieving Effective and Speedy Resolution of Disputes Public Interest Litigation

#### **Unit II:**

1. Alternate Dispute Resolution System - Objectives, Meaning and Advantages.
2. Types of ADR System - Mini Trial, Mediation — Arbitration, Neutral Fact Finding Expert, Early Neutral Evaluation, Court-annexed Arbitration, Mediation and Hybrid Process, Judicial Settlement Conferences etc., Multi-Door Court House.

#### **Unit III:**

1. Other Amicable Settlement Process-n LOK ADALAT
2. Arbitration Agreement, International Commercial Arbitration, Composition and Jurisdiction of Arbitral Tribunals.

#### **Unit IV:**

1. Conduct of Arbitral Proceedings and its Termination and Making of Arbitral Award
2. Finality and Enforcement of Arbitral Award - Recourse Against Arbitral Award, enforcement of Foreign awards (New York Convention Awards and Geneva Convention Awards).

#### **Unit V:**

1. Conciliation - Commencement of Proceedings, Appointment and Role of Conciliators, Submission of Statement to Conciliators, Settlement Agreement, Termination, Cost and Deposits of Proceedings, Protection for Conciliation Proceedings.
2. Mediation - Meaning, Advantages, Techniques, Common Errors of Mediation Advocacy.

#### **BOOKS RECOMMENDED**

- (a) Rao P.C., Alternative Dispute Resolution,

- (b) Basu N.D., Law of Arbitration and Conciliation.
- (c) Kwatra G.K., The Arbitration and Conciliation Law of India.
- (d) Bansal A.K., Law of International Commercial Arbitration,
- (e) Saraf B.P. & Jhunjhnuwala M., Arbitration and Conciliation.
- (f) Mathotra O.P., The Law and Practice of Arbitration and Conciliation
- (g) Shaffer Thomas L., Legal Interviewing and Counselling in Nutshell.
- (h) Binder David A. & Bergman Paul et al, Lawyers as Counsellors
- (i) Law Commission of India Report :Law Commission of India Report on Grama Nyayalayas Law  
Commission of India Report on Urban Litigation- Mediation

# **LL.B 3 YEAR 5th SEMESTER**

**SCHOOL OF LAW**

**LL.B. 3 YEARS PROGRAMME**

**Subject : LEGAL ENGLISH AND COMMUNICATION SKILLS**  
**Subject Code : LLB 121**

**Class : LL.B. III YEAR**  
**Semester : V**  
**Credit : 4**

**Objective-** This course will focus on enhancement of student's thought, ideas and vision for practical application in their professional life. Combined with communication skills, the paper will help in developing critical and analytical skills among the students. Further business communication will make their professional communication effective.

### **Course Outcome**

CO1: To introduce students to English legal resources in order to understand the legal language.  
CO2: To enable the students to use legal vocabulary and terminology.  
CO3: To enable successful and efficient communication (oral) appropriate to each situation.  
CO4: To introduce students to various forms of legal writing appropriate to their specific needs.  
CO5: To provide students with opportunities to develop basic English skills (written) in respect to topics dealt with in class.

### **COURSE OUTLINE**

#### **UNIT I: Comprehension and Composition**

- a) Reading comprehension of general and legal texts
- b) Paragraph and precise Writing
- c) Abstract writing
- d) Drafting of Reports and Notices

#### **UNIT II: Language and Law**

- a) Meaning and communication approaches: types, directions and challenges.
- b) Culture and language sensitivity
- c) Legal sensitivity
- d) Legal maxims
- e) Sounds of spoken language: Phonetics

#### **UNIT III: Literature and Law**

- a) Play 'Justice' By John Galsworthy (Justice Was A 1910 Crime Play By The British Writer John Glasworthy)
- b) The Trial Of Bhagat Singh
- c) Biography/Autobiography Of Martin Luther and Nelson Mandela

#### **UNIT IV: Business Communication**

- a) Theories of business communication: Importance of communication
- b) Communication Process
- c) Significance of Feedback
- d) Barriers to effective communication, ways to overcome the barriers

### **UNIT V:E-correspondence**

- a) E-correspondence:Meaning and concept
- b) E-Mail:Guidelines for smart E-mail
- c) Constructing the message
- d) Tools for presenting messages

### **Textbooks:**

1. J.S Singh & Nishi Behl, legal language, writing and general English, Allahabad Law Agency,2009
2. N.R. Madhav Menon, Clinical Legal Education, Eastern Book company, 2011(Reprint)

### **References:**

Jenny Chapman, Interviewing and counseling, Routledge Cavendish, 2000(2<sup>nd</sup> Edn)  
 Stephens P. Robbins, Organizational Behaviour, Perason Education India, 2013 (15<sup>th</sup> Edn)  
 John Galsworthy, Justice, F.Q. Books, 2010 4.Varinder Kumar, Raj Bodh, et. Al., Business Communication, Oscar Publication, 2010

## **SCHOOL OF LAW**

### **LL.B. 3 YEARS PROGRAMME**

**Subject** : Law of Evidence  
**Subject Code** : LLB 311  
**Class** : L.L.B. III YEAR  
**Semester** : V  
**Credit** : 4

**Objectives:** - The law of evidence is one of the most important branches of adjective law. Evidence is the pivot on which the whole edifice of administration of justice rests. It involves several questions, such as what is evidence, typology of evidence, how it is produced before a Judicial Authority and what is the role of the evidence in the administration of justice. The study of the law of evidence is most important in the field of legal education

- To acquaint the students with basic principles of the law of evidence;
- To enable them to understand the importance of evidence in the system of administration of justice.

- To enable them to analyse critically the rules of evidence and its application to a given fact situation.

#### **Unit I:**

1. History of Law of Evidence
2. Meaning Nature, Scope and Object of Evidence,
3. Types of Evidence,
4. Fundamental Rules of Law of Evidence,
5. Fact in issue and relevant facts, Fact Proved, not proved, disproved (S. 3),
6. Presumption(S-4), Relevancy of Facts (S-5-16),

#### **Unit II:**

1. Res Gestae (Section - 6), Occasion, cause & effect of fact in Issue (Section 7),
2. Motive, Preparation & Conduct (S-8),
3. Identification (S-9),
4. Conspiracy (S-10),
5. Facts not otherwise Relevant (S-11),
6. Relevancy of State of Mind & State of Body & Bodily feeling (Section-14),
7. Evidence of similar occurrences (Section-15)

#### **Unit III:**

1. Meaning of Admission & Confession (17-31),
2. Difference between Admission & Confession,
3. Circumstances under which confession is admissible and not admissible,
4. Evidentiary value of admission & confession,
5. Dying Declaration, Expert Opinion,

#### **Unit IV:**

1. Evidence of Character in Civil & Criminal Cases
2. Principles relating to direct evidence (S-60),
3. Law relating to admissibility of documentary evidence (S. 61-66),
4. Proof as to genuineness of document i.e. execution & attestation(S 63-67),
5. Public Document and Private documents(S 74-78),
6. Exclusion of oral by documentary evidence(S-91-99),

#### **Unit V:**

1. Meaning of Proof & Presumption,
2. On whom burden of proof lies, Standard of Proof in Civil & Criminal Cases
3. Estoppel: Meaning & Scope (115-117), Principles Governing Doctrine of Estoppel,
4. Witness: Meaning, Types (126-127), Who may be a Witness,
5. Privileges of certain witnesses & Communication (135-136),
6. Examination of Witness (137-166)

#### **BOOKS RECOMMENDED:**

1. S. Sarkar Ahmed Ejaz, Law of Evidence, (Ashoka Law House, Delhi, 6th Ed. 2002)
2. Vepa P Sarathi, Law of Evidence, (Eastern Book Company, 6th Ed. 2006)
3. Ranchhoddas Ratanlal Thakore and Dhiraj Lal, The Law of Evidence, (Wadhwa & Wadhwa, Nagpur, 22nd Ed. 2006)
4. MC. Sarkar, 8.C. Sarkar, Law of Evidence in India, Pakistan, Bangladesh, Burma and Ceylon, (Wadhwa & Wadhwa, Nagpur, 15th Ed. 2000)
5. Wigmore John Henry, Wigmore on Evidence, (Aspen Law & Business Publications 4<sup>th</sup> Ed. 1983)
6. Adrian Zuckerman, The Principles of Criminal Evidence, (Oxford University Press, London, 1989)

**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Law of Trust, Equity & Fiduciary Relation  
**Subject Code** : LLB 313  
**Class** : L.L.B. III YEAR  
**Semester** : V  
**Credit** : 4

**OBJECTIVE:** The objective of the course is to provide students with an overall understanding of the law of equity with special emphasis on fiduciary obligations, trusts, equitable assignment of property and equitable remedies. The paper is useful for students to understand and compare the Role of Equity in ancient and modern legal system.

**UNIT- I**

1. History, nature and principles of Equity-Emergence of law of trust from Equity
2. The making of Indian Law of Trust and provisions of law of Trust-Religious Trusts
3. Principles of Equity and Equitable Remedies
4. Equitable Relief in different branches of law with special reference to property law.

**UNIT-II**

1. Nature of Equity
2. History of Courts of Equity
3. Relations of law of Equity
4. The maxims of equity
5. Different Equitable remedies.

**UNIT – III**

1. Essentials of Trust
2. Fiduciary Relationship-Concept, kinds vis-a-vis Trusteeship
3. Trust and contract Power, condition, charge and personal obligations-distinguished
4. Classification of Trust and its importance

**UNIT IV**

1. Private Trusts
2. Public Trusts
3. Appointments, Retirement and removal of Trustee
4. Rights ,Power, Discretion and control of Trustees
5. Duties of trustee in relation to:  
(i) Trust property; and (ii) Beneficiary

**UNIT V**

1. The Administration of Trust

2. Liability for Breach of Trust
3. Rights and Remedies of the Beneficiary
4. Constructive Trusts
5. Appointment and Discharge of Trustees

**BOOKS RECOMMENDED:**

- Ahmad Aquil, Equity, Trusts and Specific Relief.
- Desai S.T., Equity, Trusts and Specific Relief.
- Hansbury & Mousley, Modern Equity.
- Jhabwala N.H, Elements of Equity, Trusts and Specific Relief.
- Rao GCV Subha, Equity, Trust and Fiduciary Relation
- Singh G.P., Principles of Equity. Snell, Principles of Equity.
- Tondon M.P., Principles of Equity and Trusts

**SCHOOL OF LAW**

**LL.B. 3 YEARS PROGRAMME**

**Subject : Principles of Taxation**  
**Subject Code : LLB 315**  
**Class : L.L.B. III YEAR**



**Semester** : V  
**Credit** : 4

**Objectives:** - Taxation is a general law made by governments to collect revenue from people and organizations. A tax formula contains at least three elements: the definition of the base, the rate, structure, and the identification of the legal taxpayer. The base multiplied by the appropriate rate gives a product, called the tax liability, which is the legal obligation that the taxpayer must meet at specified dates. A tax is identified by the characteristics of its base, such as income in the case of an income tax. The paper is helpful to the students in understanding the theoretical as well as practical aspects of Taxation Policy of the Government.

#### **Unit I:**

1. Definition: Income-Meaning, Concept, Application and Diversion of. Income, Agricultural Income, Assesse, Assessment year and Previous Year, Residential Status and Tax Liability of Assesse.
2. Distinction between Capital Receipt and Revenue Receipt.
3. Capital Expenditure and revenue.
4. Types of Taxes, Distinction between Direct and Indirect Tax.

#### **Unit II:**

1. Heads of Income
  - Salary
  - Income from house property
  - Capital gains
2. Income of other persons included in Assessee's Total Income
3. Set out and Carry Forward of Losses

#### **Unit III:**

1. Assessment Procedure
2. Rectification of Mistakes
3. Deduction under Section 80 C, 80 CCE, 80 G, 80 U
4. Deductions under Section 80 C, 80 D, 80 CCE, 80 G, 80 U

#### **Unit IV:**

1. Appeal, Reference and Revision
2. Penalties (Section 271 to 275)
3. Income Tax Authorities
4. Liability in Special Cases (Sec 159-181)

#### **Unit V:**

1. Rebate of Income Tax (Sec 87-88)

2. Relief from Income Tax (Sec 89)
3. Double Taxation Relief (Sec 90-91)
4. Collection, Recovery and Refund (Sec 190 to 234 and Sec 237-245)

**BOOKS RECOMMENDED:**

1. Kailash Rai, Taxation Law, (Allahabad Law Agency 16th Ed. 2017)
2. V.K. Singhania. Students Guide to Income Tax (Taxman Publication Pvt. Ltd. Ed. 2015)
3. Kanga & Palkiwala. The Law and Practice of Income Tax (N.M. Tripathi Pvt. Ltd. LatestEd.)
4. Sampath lyengar. Law of Income Tax (Bharat Law House Pvt. Ltd. New Delhi, Ed.2014)gt.

**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Land Laws Including Ceiling and other Local Laws  
**Subject Code** : LLB 317  
**Class** : L.L.B. III YEAR  
**Semester** : V  
**Credit** : 4

**Objectives:** - To create awareness about the concept of Intellectual property, various conventions, Provision of copy Act, 1957, The Trade Mark Act 1999 and The Patents Act 1970. The students can understand the Process of Registration of Copyright work, trade mark and patents with the help of this paper.

**Unit I:**

**PUNJAB LAND REVENUE ACT 1887**

1. Definition of Key Words,
2. Revenue Officers: Their Power and Functions, Preparation of Revenue
3. Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, Sijra Nasab(Pedigree Table) Sirjra Axe(Map of the Village),
4. Arbitration (Sections 127-135), Concepts & Procedure of Partitions

**Unit II:**

**A. THE PUNJAB TENANCY ACT -1887**

1. Definition of Key Words under the Act,
2. Class of Tenants, Law relating to Rent, Law relating to
3. Occupancy of Tenant,
4. Law of Ejectment of Tenants

**B. HARYANA CEILING OF LAND HOLDING ACT - 1972**

1. Definition of Key Words(Section-3),
2. Concept of Permissible Area and Surplus Area (Ss-4 to 6),
3. Ceiling on Land, Acquisition and Disposal of Surplus Area(SS 7 to 15),,
4. Appeal by the
5. Aggrieved Party (Section-18)

**Unit III:**

**HARYANA RENT CONTROL ACT, 1973**

1. Definitions (SS 1-4),
2. Rights & Duties of Tenants,
3. Rights and Duties of Landlords,
4. Grounds of Ejectment of Tenants.

#### **Unit IV:**

##### **HARYANA PANCYAYATI RAJ ACT 1994 (SS 1 to 54) (Chapter 1 to 6)**

1. Definition of Key Words,
2. Constitution of Gram Sabha and Gram Panchayat,
3. Gram Panchayat's Duties,
4. Functions and Powers, Finance and Taxation,
5. Control of Gram Panchayat,
6. Sources of Income and Expenditure of Gram Panchayat.

#### **Unit V:**

##### **HARYANA PANCHAYATI RAJ ACT 1994, PANCHAYATI SAMITI (CHAPTER 7 TO 11) AND SECTION 55 TO 116)**

1. Definition of Key Words,
2. Conduct of Business of Panchayat Samities,
3. Servant of Panchayat Samities,
4. Duties and Powers of Panchayat Samiti, Finance and Taxation,
5. Sources of Income of Panchayat Samiti, Control of Panchayat Samiti

#### **BOOKS RECOMMENDED:**

- Harshali Chowdhary, Punjab & Haryana Land Laws, (Central Law Publications, Allahabad, 1st Ed, 2016)
- Badruddin, Commentary on Revenue Laws, Panchayat Laws and Rent Laws, (The Law House, Rohtak, 4th Ed, 2015) ;
- Neety Kaul, Land Laws in Punjab and Haryana (Chawla Publications (P) Ltd., Chandigarh, 6th Ed. 2014),
- P. Narula, Punjab and Haryana Land Laws, (Allahabad Law Agency, Ed. 2012)

**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Drafting, Pleading & Conveyance (Theory)  
**Subject Code** : LLB 321  
**Class** : L.L.B. III YEAR  
**Semester** : V  
**Credit** : 4

**Objectives:** - The Object is to present the substantive Law in the context of Pleading, Drafting, and Conveyance and show how those transactions are influenced by Legal considerations. A well drafted document instantly attracts the attention of the Court. It develops the skill of drafting of documents among students. It helps the students in making a good lawyer and Judge.

**Unit I:**

1. General Principles of Drafting
2. Fundamental Rules of Pleadings(Civil),
3. Complaint
4. Written Statement
5. Interlocutory Application
6. Amendment of Pleadings

**Unit II:**

1. Affidavit
2. Execution Petition
3. Memorandum of Appeal(Civil)
4. Revision (Civil) .
5. Writ Petition
6. Review

**Unit III:**

1. Petition under Hindu Marriage Act, 1955
2. Complaint (Criminal)
3. Claim petition under Motor Vehicle Act, 1988
4. Bail Application
5. Anticipatory Bail Application
6. Revision (Criminal)  
(138 NIAC + 125 W.P.C)

**Unit IV:**

1. Sale Deed
2. Mortgage Deed
3. Lease Deed
4. Gift Deed
5. Promissory Note
6. Power of Attornecy(GPA & SPA)
7. Will

**Unit V:**

1. Notice
2. Adoption Deed
3. Partnership Deed
4. Exchange Deed
5. Agreement Sale
6. Leave and License

**BOOKS RECOMMENDED:**

- Mulla, D-F.: The Code of Civil Procedure, 1908, (Lexis Nexis, New Delhi 11th Edition 2016)
- Sarkar, The Law of Civil Procedure, (Eastern Book Co., Lucknow 5<sup>th</sup> Ed. 2016)
- Chaturvedi, A.N., Pleading, Conveyancy & Drafting & Legal Professional, (11th Ed. 2016)
- Chaturvedi, R.N. Pleading, Drafting & Conveyancing, (Central Law Agency, Allahbad 4<sup>th</sup> Ed. 2016)
- Dr. A.B. Kafaltiya, Pleading Drafting & Conveyancing, (Universal Lexis Nexis, New Delhi 11th Ed. 2014)

**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Drafting, Pleading & Conveyance (Practical)  
**Subject Code** : LLB 351  
**Class** : L.L.B. III YEAR  
**Semester** : V  
**Credit** : 4

**Objectives:** - This course aims at acquainting the students about the various fundamentals of drafting to develop the skills of pleading and conveyancing. It provides an insight into the functions and objectives of pleadings and suggests tools to help approach the task of drafting Pleadings. The course contents of this study material have been so designed as to provide Practical orientation and develop necessary acumen ship in drafting legal documents. The object is to present substantive laws in the context of pleadings and conveyancing and to show how those transactions are influenced by the legal considerations. A well drafted document instantly attracts the attention of the court. Any failure however little in bringing out the material issues would be fatal to the matter under consideration

**Unit I:**

- General Principles of Drafting and relevant substantive rules
- Pleading and its essentials
- Importance in civil and criminal matter

**Unit II:**

- Plaint
- Written Statement
- Interlocutory Application
- Original Petition

**Unit III:**

- Affidavit
- Execution Petition
- Memorandum of Appeal and Revision in civil matters
- Petition under Article 226 and Article 32 of the Constitution of India

**Unit IV:**

- Complaints

- Criminal and Miscellaneous Petition
- Bail Application
- Memorandum of Appeals and Revision in criminal matters

**Unit V:**

- Sale Deed
- Mortgage Deed
- Lease Deed
- Gift Deed
- Promissory note
- Power of Attorney (General and Special)
- Will

**BOOKS RECOMMENDED:**

- Mulla, D.F.: The Code of Civil Procedure, 1908, (Lexis Nexis, New Delhi 11th Edition 2016)
- Sarkar, The Law of Civil Procedure, (Eastern Book Co., Lucknow 5<sup>th</sup> Ed, 2016)
- Chaturvedi, A.N., Pleading, Conveyancing Drafting & Legal Professional, (11th Bd. 2016)
- Chaturvedi, RN. Pleading, Drafting & Conveyancing, (Central Law Agency, Allahbad 4<sup>th</sup> Ed. 2016)
- Dr. AB. Kafaltiya, Pleading Drafting & Conveyancing, (Universal Lexis Nexis, New Delhi Ed. 2014)



**LL.B 3 YEAR**  
**6th SEMESTER**

## LL.B. 3 YEARS PROGRAMME

**Subject** : Intellectual Property Law  
**Subject Code** : LLB 312  
**Class** : L.L.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objective:-** To create awareness about the concept of Intellectual Properties, various conventions, provisions of Copy Right Act, 1957, The Trade Mark Act 1999 and the Patents Act 1970. The students can understand the process of Registration of Copyright work, trade mark and patents with the help of this paper.

### UNIT- I

1. Concept of Property vis-à-vis Intellectual Property
2. Basic concepts of Intellectual Property Law.
3. Nature of Intellectual Property Law
4. Origin and Development of Intellectual property- Copy Right, Trade Mark & Patent
5. Commercial Exploitation of Intellectual Property
6. Enforcement of Rights and Remedies Against Infringement.

### Unit-II

1. International Character of Intellectual Property
2. Intellectual Property and Economic Development
3. International Protection of Intellectual Property- overview of International Conventions
4. Berne Convention- WIPO Treaties 1996; Paris Conventions, TRIPS Agreements etc. India's Position vis-à-vis International Conventions and Agreements.

### UNIT-III

1. Object of Patent Law
2. Inventions- Patentable and Non-Patentable
3. Process Patent and Product patent.
4. Procedure for obtaining a patent
5. Rights and Obligations of a Patentee
6. Revocation and Surrender of Patents.
7. –Infringement of Patent.

### UNIT-IV

1. What is a Trade Mark
2. Functions of a trade Mark.
3. Trade Mark Registry and Register of Trade Mark.
4. Registration of Trade Marks.
5. Effects Of Registration.
6. Assignment and Transmission of Trade Marks.
7. Rectification and Correction of Register.
8. Passing off and Infringement action.

### UNIT-V

1. Meaning and Basis of Copyright.
2. Copyright Office and Copyright Board.
3. Subject Matter of Copyright.
4. Ownership, assignment and Infringement of Copyright.
5. Remedies for Infringement
6. Abridgement of the work and Term of Copyright
7. Right of Broadcasting Authorities.

### BOOK RECOMMENDED:

- David A. Einhorn Intellectual property Law in Cyberspace (3<sup>rd</sup> Ed. 2017)

- Xuan-Thao N. Nguyen, Robert W. Gomulkiewicz, and Danielle M. Conway. Intellectual property, Software, and Information Licensing: Law and Practice (Cumulative supplement 1st Ed. 2017)
- Jerrey A. Maine and Xuan- Thao N. Nguyen. Intellectual Property Taxation: Transaction and Litigation Issues ( Cumulative Supplement 2<sup>nd</sup> Ed. 2017)
- Aline C. Flower. Intellectual Property Technology Transfer ( Supplement 2<sup>nd</sup> Ed. 2016)
- Alexander I Poltroak: Parul J. Lerner. Essentials of Intellectual Property: Law Conomics, and Strategy (Wiley 2<sup>nd</sup> Ed. 2011)
- M.K.Bhandari. Intellectual Property Rights. (Central Law Publication, Ed. 2013)

## SCHOOL OF LAW

### LL.B. 3 YEARS PROGRAMME

**Subject** : Information Technology & Cyber Laws  
**Subject Code** : LLB 314  
**Class** : L.L.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objective:-**Both the personal and professional worlds are extremely dependent today on the Cyber World. The world is increasingly dependent on network information and communication technologies (ICT). However, with growing dependency, new threats to network and information security have emerged and there is ever-growing rapidly and where ICT are of crucial importance for its economy. Thus, an effort to spread awareness of Cyber Security is the need of the hour and particularly among the law fraternity as these are the persons who must handle the cases of cybercrime. Lawyers, Police, Govt. Officers, Law students and the NGO's must know about the details of the Information technology and the regulatory frame work for the control of Cyber-crimes as they are in contact with the public at large and provide remedial measures for the public problems.

#### UNIT-I

**1. Basis Concept of Technology and Law**

- Understanding the technology
- Scope of Cyber Laws.
- Cyber Jurisprudence

**2. Understanding Electronic Contracts**

- The Indian law of Contract
- Types of Electronic Contracts.
- Constitution of Electronic Contracts

**UNIT – II**

**1. Copyright in Information Technology**

- Copyright in internet
- Software piracy
- Multimedia and copyright issues

**2. Patents**

- Indian position on computer related patents
- International context of patents.

**3. Trademarks**

- Trade mark Law in India
- Infringement and passing off.

**UNIT-III**

**Information Technology Act 2000**

- Digital Signature
- E- Governance
- Regulation of Certifying Authorities
- Duties of Subscribers
- Penalties and Adjudication
- Offences under the act
- Making of Rules and Regulation

**UNIT- IV**

**1. Understanding Cyber Crimes**

- Crime in context of Internet
- Types of Crime in Internet,

**2. Indian penal Law & Cyber Crimes** (Fraud, hacking, Mischief, Trespass, Defamation, Stalking, Spam)

**UNIT- V**

**1. Issues of Internet Governance**

- i. Issues of Internet Governance, ii. Freedom of Expression in Internet, iii. Issues of Censorship, iv. Hate Speech, v. Sedition, vi. Libel, vii. Subversion, viii. Privacy Issues, ix. International position on Free speech in Internet.

**Book Recommended:**

**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : Negotiable Instruments, Banking and Insurance  
**Subject Cod** : LLB 316  
**Class** : L.L.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objectives:** - The main aim of the course is to apprise the students about the functioning of banks as the same is covered as general utility service. The students are imparted instruction so as to enable them to understand the multi-dimensional functional issues relating to banking system in India. The subject covered customer-banker relationship, as well as issue relating to Money Laundering etc. Further, the importance and relevance of Ombudsman in Banking is specially highlighted in the instruction imparted to the students. The objectives and structural aspects of RBI, Monopoly of Note Issue, Credit Control, and Determination of Bank Rate Policy are also discussed with the students. Moreover, a comprehensive knowledge regarding the Law of Negotiable Instruments is also given to the students.

**Unit I:**

- Banking Definition and Meaning
- Bank, Banker, Banking Company
- Commercial Banks and Essential Functions
- Agency Services, General Utility Services, Information Service
- Emergence of Multi- Functional Dimensions
- System of Banking-Unit Banking, Branch Banking, Group Banking and Chain Banking
- Banking Companies in India

**Unit II:**

- Customer: Meaning, Legal Character of Banker-Customer Relationship
- Right and Obligation of Banks
- Right to Set Off, Bankers Lien
- Duty of Confidentiality and Exception to the Duty
- Current Accounts, Deposits Accounts, Joint Accounts and Trust Accounts
- Special Types of Customers: Lunatics, Minors, Agents
- Administrators and Executors, Partnership Firms and Companies

#### **Unit III:**

- Control by Government and its Agencies
- Need for Elimination of Systematic Risk
- Avoidance of Money Laundering
- Control by Ombudsman

#### **Unit IV:**

- R.B.I. as Central Bank of India and its
- Characteristics and Functions of Central Banks
- Central Bank as Banker and Advisor of the State
- Central Bank as Bankers Bank
- Objectives and Organizational Structure of R.B.I
- Regulations of the Monetary system, Monopoly of Note Issue, Credit Control, Determination of Bank Rate Policy, Control and Supervision of other Bank

#### **Unit V:**

- Negotiable Instrument and its Kinds
- Holder and Holder in Due Course
- Parties, Payment in Due Course
- Negotiation, Presentment and Discharge from Liability
- Dishonour
- Civil Liability, Procedure for Prosecution, Extent of Penalty
- The Paying Bankers, Duty to Honour Customers Cheques, Exception to the Duty to Honour Cheques, Money Paid by Mistake, Good Faith and Statutory Protection to the Collecting Banker

#### **BOOKS RECOMMENDED:**

- M.L. Tannen. Banking Law and Practice in India (Eastern Book 2<sup>nd</sup> Ed. 2014)
- S.N. Gupta. The Banking Law and Practice in India (Allahabad Law Agency Ed. 2013)
- S.N. Gupta, Banks and the Customer Protection Law (Allahabad Law Agency Ed. 2017)
- Maurice Megrah & F.R. Ryder, Pagets Law of Banking (Ed. 2014)

- Lord Chorley, Law of banking (Central Law Agency 6<sup>th</sup> Ed. 2011)
- O.P. Faizi. The Negotiable Instruments Act (Butterworth) (Latest Ed.)
- R.K. Bangia. Negotiable Instruments Act (Latest Ed.)
- Avtar Singh, Negotiable Instrument Act (Central Law Agency, 9<sup>th</sup> Ed. 2015)

## **SCHOOL OF LAW**

### **SYLLABUS**

#### **LL.B. 3 YEARS PROGRAMME**

**SUBJECT : COMPETITION LAW**  
**SUBJECT CODE : LLB 318**  
**CLASS : LL.B. 3<sup>RD</sup> YEAR**  
**SEMESTER : VI**  
**CREDIT : 4**

**OBJECTIVE:** The key objectives of competition law are welfare, efficiency, and free and fair competition. There are distributive dimensions in competition law that are related to different notions of welfare. An important function of competition law is to prevent private restrictive business practices and public policies that may unnecessarily impede the redeployment of scarce resources from lower- to higher valued uses.

#### **UNIT 1**

##### **COMPETITION ACT 2002**

- i. Background
- ii. Prohibitions
- iii. Competition Commission of India
- iv. Competition Advocacy

#### **UNIT-2**

- i. SEBI Act, 1992
- ii. The Securitisation & Reconstruction of Financial Assets & Enforcement of Security. Interest Act, 2002

#### **UNIT-3**

- i. Regulatory Framework for Foreign Trade, Multinational Companies
- ii. Foreign Trade (Development Regulation) Act, 1992

## **UNIT-4**

### **FOREIGN EXCHANGE MANAGEMENT ACT, 1999**

- i. Background
- ii. Policies
- iii. Authorities

## **UNIT - 5**

### **REGULATION OF ABUSE OF DOMINANT POSITION:**

- i. Introduction, Dominance in the Market
- ii. Relevant Market, Appreciable Adverse Effect on Competition in the Market
- iii. Abusive Conducts under the Competition Act, 2002
- iv. Penalties - Prevention of Abuse of Dominance under Indian Competition Law

### **BOOKS RECOMMENDED:**

- Pardeep S. Mehta, Competition and Regulation in India, (CUTS International, 2011)
- Richard Whish & David Bailey, Competition Law, (Oxford, Online Resource Centre, 7th Ed.)
- Abir Rao & Jayant Kumar, Competition Law, (2010, 1st Ed.)
- Sanjiv Agarwal. Investor Guide to Stock Market (Latest Ed.)
- V.A. Avadhani. SEBI guidelines and listing of Companies (Himalaya Publishing House, Latest Ed.)
- Bal Krishan Marta. Security Market in India (Latest Ed.)
- Dr. Chandrate, Dr. S.D. Irrani. Capital Issues SEBI & Listing (Latest Ed.)
- R.P. Hooda. Indian Securities Market (Latest Ed.)
- B.L. Mathur. Indian Capital Market Challenges and Responses (Latest Ed.)
- Ravi Puliani and Mahesh Puliani. SEBI Manual (Latest Ed.)
- V.K. Aggarwal. Consumer Protection Law & Practice. (Latest Ed.)
- Competition Act 2002
- Security Contracts(Regulation) Act 1956
- SEBI Act 1992
- Depositories Act 1996
- Foreign Trade (Development & Regulation) Act, 1992
- FEMA 1999



**SCHOOL OF LAW**  
**LL.B. 3 YEARS PROGRAMME**

**Subject** : HUMAN RIGHTS LAW  
**Subject Cod** : LLB 320  
**Class** : L.L.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objectives:** - The objective of this course is to lay the foundation of the Human Rights Law and acquaint the students with basic human rights institutions.

**Unit I: Human Rights**

1. Concept of human Rights
2. Rights of Life guaranteed under the Constitution of India- Meaning and content
3. Sustainable development as human rights
  - a. Precautionary Principle
  - b. Polluter Pays Principle
  - c. Public trust doctrine
  - d. Principle of inter generation equity
  - e. Right to development of developing countries
4. The Protection of Human Rights Act, 1993

**Unit II: Protection of Human Rights in India**

1. Indian Constitution and human rights dimensions
2. Indian judiciary and protection of human rights
3. Judicial response to the protection of right to life and liberty
4. Police atrocities and compensation
5. Violation of Human Rights and Public Interest Litigation
6. Rights of accused, under trials and prisoners

**Unit III: Human Rights of child and Women**

1. Rights of Child
2. The Child Labour (Prohibition and Regulation) Act, 1986
3. Human Rights of Women- Gender equality
4. Sexual harassment of women at workplace-a violation of human rights

**Unit IV: Human Rights of Health Care and Human Rights of senior citizens**

1. Right to Live with dignity
2. Right to health care
3. Maintenance and Welfare of Senior Citizens Act, 2007

#### **Unit V: Human rights of Weaker Sections**

1. Rights of the poor
2. National Commission for Minorities Act, 1992
3. National Commission for Safai Karamcharis Act, 1993

#### **Referred Case Law:**

1. Lata Singh v. State of U.P., AIR 2006 SC 2522
2. Sube Singh v. State of Haryana, AIR 2006 SC 1117
3. Sona Chandi Oal Committee v. State of Maharashtra, AIR 2005 SC 635
4. Smt. Sumakiran Mallena v. Secretary Medical and Health, AIR 2008 (NOC) 374 (A.P.)
5. M.C. Mehta v. Kamal Nath, 1997(1) SCC 388
6. Indian Council for Enviro-Legal Action v. Union of India. 1996 AIR SCW 1096
7. Bombay Dyeing & Manufacturing Co. Ltd. v. Bombay Environmental Action Group & others, AIR 2006 SC 1489
8. State of Andhra Pradesh y. Challa Ramakrishna Reddy, AIR 2000 SC 2083
9. Jolly George Varghese y. Bank of Cochin, AIR 1980 SC 470
10. Association of Dead People v. State of U.P. AIR 2000 All 387,
11. Vincent Parikurlangara v. Union of India, AIR 1987 SC 990,
12. Consumer Education and Research Centre v. Union of India, (1995) 3 SCC 42,
13. Parmananda Katara v. Union of India, AIR 1989 SC 2039
14. Vishakha v. State of Rajasthan, (1997) 6 SCC 241
15. M.C. Mehta v. State of Tamil Nadu and others, AIR 1997 SC 699
16. Brijendra Thakur v. State of M.P. and others, AIR 2006 M.P. 28
17. R. D. Upadhya v. State of A.P., AIR 2006 SC 1946
18. Sunil Batra v. Delhi Administration, AIR 1978 SC 1575

#### **Recommended Books:**

##### **Text Books:**

1. Durga Das Basu, Human Rights in Constitutional Law, Parentice Hall of India, New Delhi
2. Krishan Lyer, V. R. Human Rights and the Law, Vedpal Law House Indore 1984.

#### **Reference Books:**

1. Dr. Gurbax Singh, Law Relating to Protection of Human Rights and Human Values, Vinod Publications (P) Ltd., Delhi.
2. Manoj Kumar Sinha, Implementation of Basic Human Rights, Lexis Nexis, India

3. Dr..H. O. Aggarwal, International law and human rights, Central Law Publications, Allahabad
4. Asha Bajpai, Child Rights in India. Oxford University Press
5. Nuzhat Parveen, Child Rights and the Law , Universal Law Publishing Co., Delhi.

## 7. SCHEME FOR BBA-LL. B – 5 YEARS COURSE

BBA-LL.B			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBALLB 101	Management Process & Organizational Behaviour	4	0	0	4
2	BBALLB 103	English -1 ( English Grammar)	4	0	0	4
3	BBALLB 105	Financial Accounting	4	0	0	4
4	BBALLB 107	Business Economics	4	0	0	4
5	LLB 101	Law of Torts -1	4	0	0	4
6	LLB 103	Law of Contract-I	4	0	0	4
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>24</b>

8.

9.

BBA-LL.B			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA LLB 102	Cost accounting	4	0	0	4
2	BBA LLB 104	E Commerce	4	0	0	4
3	BBA LLB 106	English-II	4	0	0	4
4	BBA LLB 108	Constitutional Law and Legal History	4	0	0	4
5	LLB102	Law of Contract -II	4	0	0	4
6	LLB 104	Law of Torts –II	4	0	0	4
7	Cs-1256	E- Commerce Lab	0	0	2	1
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>2</b>	<b>25</b>

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### 15.SCHEME FOR BBA-LL. B – 5 YEARS COURSE

BBA-LL.B			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA LLB 212	Marketing Management	4	0	0	4
2	BBA LLB 214	Human Resource Management	4	0	0	4
3	BCE 201	Environment Science	4	0	0	4
4	BBALLB 201	Family Law-I	4	0	0	4
5	BBA LLB 203	Constitutional law-I	4	0	0	4
6	BBA LLB 109	Jurisprudence (Legal methods, Indian Legal systems and Basic Theory of Laws)	4	0	0	4
Total			24	0	0	24

16.

BBA-LL.B			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBALLB 221	Financial Management	4	0	0	4
2	BBA LLB 222	Strategic Management	4	0	0	4
3	BCS 201	Management Information System	4	0	0	4
4	YTG	Business Statistics and Quantitative Analysis	4	0	0	4
5	BBA LLB 202	Family Law –II	4	0	0	4
6	BBA LLB 204	Constitutional law-II	4	0	0	4
7	BBA LLB 206	Public International Law	4	0	0	4
Total			28	0	0	28

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### 20.SCHEME FOR BBA-LL. B – 5 YEARS COURSE

BBA-LL.B			Semester			V
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SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA 403	Operation Management	4	0	0	4
2	BBALLB 311	Service Marketing	4	0	0	4
3	BBA LLB 301	Law of Crime -I: Indian Penal Code	4	0	0	4
4	BBA LLB 303	Corporate Law	4	0	0	4
5	BBA LLB 305	Labour & Industrial Law-I	4	0	0	4
6	BBA LLB 307	Professional Ethics, Lawyer's Accountability & Bar-Bench Relation (Theory)	4	0	0	4
7	BBA LLB 351*	Professional Ethics, Lawyer's Accountability & Bar-Bench Relation (Practical)	0	0	2	1
Total			24	0	2	25

21.

22.

BBA-LL.B			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA LLB 223	Entrepreneurship Deveelopment	4	0	0	4
2	BBALLB 225	Sales and Distribution Management	4	0	0	4
3	BBA LLB 302	Law of Crime-II: Criminal Procedure Code	4	0	0	4
4	BBA LLB 304	Law relating to Right to Information	4	0	0	4
5	BBALLB 306	Labour & Industrial Law-II	4	0	0	4
6	BBA LLB 308	Arbitration, Conciliation & Alternative Dispute Resolution Systems(Theory)	4	0	0	4
7	BBA LLB 352*	Arbitration, Conciliation & Alternative Dispute Resolution Systems(Practical)	0	0	2	1
Total			24	0	2	25

23.

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25.

## 26.SCHEME FOR BBA-LL. B – 5 YEARS COURSE

BBA-LL.B			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBALLB 313	Project Management	4	0	0	4
2	BBA LLB 401	Property Law	4	0	0	4
3	BBA LLB 403	Law of Evidence	4	0	0	4
4	BBALLB 405	Principles of Taxation	4	0	0	4
5	BBA LLB 407	Land Laws including Ceiling and other Local Laws	4	0	0	4
6	BBA LLB 409	Drafting, Pleading and Conveyancing (Theory)	4	0	0	4
7	BBA LLB 451	Drafting, Pleading and Conveyancing (Practical)	0	0	2	1
		<b>Total</b>	<b>24</b>	<b>0</b>	<b>2</b>	<b>25</b>

27.

28.

BBA-LL.B			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA LLB 315	Goods and Services tax (GST)	4	0	0	4
2	BBA LLB 402	Civil Procedure Code. 1908 (Including Limitation act 1963 & specific Relief act 1963)	4	0	0	4
3	BBA LLB 404	Intellectual Property Law	4	0	0	4
4	BBA LLB 406	Information Technology and Cyber Laws	4	0	0	4
5	BBA LLB 408	Administrative Laws	4	0	0	4
6	BBA LLB 452*	Moot Cour, Pre-Trial preparation an Participation in Trial Proceeding (including Interviewing Techniques)	2	0	6	5
		<b>Total</b>	<b>22</b>	<b>0</b>	<b>6</b>	<b>25</b>

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### 33.SCHEME FOR BBA-LL. B – 5 YEARS COURSE

BBA-LL.B			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA LLB 501	Banking & insurance Laws	4	0	0	4
2	BBA LLB 503	Investment Law	4	0	0	0
3	BBA LLB 505	Financial Market Regulation	4	0	0	4
4	BBA LLB 507	Foreign Trade	4	0	0	4
5	BBA LLB 509	Transportation Laws	4	0	0	4
6	BBA LLB 551*	Internship (lawyer/law firms)	0	0	10	5
Total			20	0	10	25

34.

35.

BBA-LL.B			Semester			X
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA LLB 502	Bankruptcy & Insolvency	4	0	0	4
2	BBA LLB 504	Corporate Governance	4	0	0	4
3	BBA LLB 506	Mergers and Acquisitions	4	0	0	4
4	BBA LLB 508*	Equity and Trust	4	0	0	4
5	BBA LLB 510*	Law of Project Finance	4	0	0	4
6	BBA LLB 552	Dissertation and Viva Voce	0	0	10	5
Total			20	0	10	25



## SCHOOL OF LAW

### B.B.A.L.L.B. 5 YEARS PROGRAMME

<b>Subject</b>	<b>:Management Process &amp; Organizational Behaviour</b>
<b>Subject Code</b>	<b>: BBALLB 101</b>
<b>Class</b>	<b>: B.B.A.L.L.B. I YEAR</b>
<b>Semester</b>	<b>: I</b>
<b>Credit</b>	<b>: 4</b>

**Objectives:** The course aims at providing fundamental knowledge and exposure to the concepts, theories and practices in the field of management.

#### Unit I

**Lectures:- 10**

**Management:** Concept, Nature, Process, Significance; Managerial levels, skills, Functions and Roles; Management vs. Administration; Coordination as Essence of Management. Development of Management Thought: Classical, Neo-Classical, Behavioral, Systems and Contingency Approaches.

**Planning:** Nature, Scope and Objectives of Planning; Types of plans; Planning Process; Business Forecasting; MBO: Concept, Types, Process and Techniques of Decision-Making; Bounded Rationality. **Organising:** Concept, Principles of an Organization; Span of Control; Departmentation; Types of an Organization; Authority-Responsibility; Delegation and Decentralization;

#### Unit II

**Lectures: - 12**

**Staffing:** Concept, Nature and Importance of Staffing. Motivating and Leading: Nature and Importance of Motivation; Types of Motivation; Theories of Motivation: Maslow, Herzberg, X, Y and Z; Leadership: Meaning and Importance; Traits of a leader; Leadership Styles – Likert's Systems of Management, Tannenbaum & Schmidt Model and Managerial Grid.

**Controlling:** Nature and Scope of Control; Types of Control; Control Process; Control Techniques – Traditional and Modern; Effective Control System.

#### Unit III

**Lectures: - 12**

**Organisational Behaviour-1:** Concept and nature of Organizational behavior, O.B. Models, Importance, Challenges and Opportunities,

**Individual & Interpersonal Behaviour:** Personality – Determinants and Traits; Emotions; Learning-Theories, Perception –Process and Errors, Attitudes- Formation, Theories, Relationship between Attitude and Behavior; **Interpersonal Behaviour:** Johari Window; Transactional Analysis – Ego States, Types of Transactions, Life Positions, Applications of T.A

#### Unit IV

**Lectures: - 10**

**Group Behaviour & Team Development:** Concept of Group and Group Dynamics, Stages of Group Development, Theories of Group Formation; Concept of Team Vs. Group; Types of Teams; Building and Managing Effective Teams.

**Organization Culture and Change Management:** Concept of Organizational Culture, Managing Conflict, Managing Change; Resistance to Change, Managing cross Cultures.

**Text Books**

1. Robbins, (2011). Fundamentals of Management: Essentials Concepts and Applications, Pearson Education.
2. Robbins, S.P. and Sanghi, S., (2009), Organizational Behaviour; 13th edition, Pearson Education.
3. Stoner, Freeman and Gilbert Jr. ((2010)) Management, 8th Edition, PearsonEducation.

**Reference Books**

1. Koontz, H.( 2014), Essentials of Management, McGraw Hill Education.
2. Ghillyer, A, W., (2008) Management- A Real World Approach, McGraw Hill Education.
3. Mukherjee, K, (2009), Principles of Management, 2nd Edition, McGraw Hill Education.
4. Luthans, Fred, (2008), Organizational Behavior, 11th Edition, McGraw Hill Education.

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** :English -I (English grammar)  
**Subject Code** : BBALLB 105  
**Class** : B.B.A.L.L.B. I YEAR  
**Semester** : I  
**Credit** : 4

**Course Content**

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**Unit I: Technology Integrated Communication-5 Sessions**

1.1.E-mail @ Work

- Do's & Don'ts of Email Writing
- Coping with Email overload
- Netiquette
- Indianisms in Email Writing

1.2. Professional Networking on LinkedIn

- Networking for Professional Growth
- Job search & Professional Networking
- Networking in the Twenty-First Century
- LinkedIn for Professional Networking

**Unit II: Legal Research Paper Writing Skills**

Legal Research Paper/ Article Writing

- Abstract Writing
- Bio-brief
- Legal Research Paper Drafting, Planning, Structure and Content.
- Referencing Styles (The blue book)

**Unit III: Legal Language through Literature (Selective)**

Choose any one of the given texts:

- John Grisham's *The Summons*
- Mahashweta Devi's story '*Draupadi*' on Gender Inequality
- Play '*Justice*' by John Galsworthy
- George Bernard Shaw *Arms and the Man*
- William Shakespearean Plays: *The Merchant of Venice* 'Trial Scene' / *Othello* / *Macbeth* / *Julius Caesar*
- Agatha Christie Novels: *The Murder of Roger Ackroyd* (1926)
- Play '*Final Solutions*' by Mahesh Dattani
- '*The Trial of Bhagat Singh*'
- Biography/Autobiography of Martin Luther and Nelson Mandela
- Play '*The Refund*' by Fritz Karinthy
- 'A Marriage Proposal' by Anton Chekhov

**Unit IV: Effective Presentation Skills**

Student presentations based on a pool of topics shared

- Defining the purpose of a Presentation
- Preparing an outline
- Organizing content
- Role of paralinguistic features in presentation

**Text Books**

1. Model Business Letters, Emails and other Business Documents – Shirley Taylor, 7th Edition- Pearson (2012)

2. Online Communication Strategies for Managers – Smeeta Mishra & Mathukutty M Monippally, McGraw Hill Education(India)Pvt Ltd(2014)
3. Maximum Success with LinkedIn – Dan Sherman, McGraw Hill Education (India)Pvt Ltd (2014)
4. 2009, Suzanne E. Rowe. The Author is an Associate Professor and the Director of Legal Research and Writing at the University Of Oregon School Of Law.
5. 29 Stetson L. Rev. 1193 (2000).
6. Brill, supra n. 1, at 17 (noting that “analysis is inherent in writing”);
7. 76 Neb. L. Rev. 561, 562 (1997) (arguing that communication is inseparable from analysis); 5. University Skills
8. Development Series, 47 J. Leg. Educ. 280, 280 (1997) (book review)
9. Laurel Currie Oates & Anne Enquist, The Legal Writing Handbook: Analysis, Research, and Writing 73–74, 199–200, 286–287, 354–355 (4th ed., Aspen Publishers 2006)
10. To kill a mocking bird Author - Harper LEE – Publisher: ARROW Publication: 2015
11. The Merchant of Venice Author – William Shakespeare Publisher: Maple Press Publication: 2013
12. The Summons Author: John Grisham Publisher: Random House Publication: Edition: 2011
13. The Trial of Bhagat Singh Author: A. G. NOORANI Publisher: Oxford University Press Publication: 2005
14. Refund Author: Fritz Karinthy Publisher: Samuel French Publication: 1938
15. Effective Presentation - Ros Jay and Antony Jay.
16. Basic Business Communication -Pg : 432 - 448, Lesikar and Flatley.

#### **Reference Books**

1. Business Communication-Pg : 99 - 110, K.K.Sinha.
2. Online Communication Strategies for Managers – Smeeta Mishra & Mathukutty M Monippally, McGraw Hill Education(India)Pvt Ltd(2014)
3. Laurel Currie Oates & Anne Enquist, The Legal Writing Handbook: Analysis, Research, and Writing 73–74, 199–200, 286–287, 354–355 (4th ed., Aspen Publishers 2006)
4. Business Correspondence & Report writing - R.C Sharma and Krishna Mohan.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Financial Accounting**  
**Subject Code : BBALLB 105**  
**Class : B.B.A.L.L.B. I YEAR**  
**Semester : I**  
**Credit : 4**

**Objectives:** The objective of this subject is to give understanding of the basic accounting principles and techniques of preparing the accounts for users of accounting information.

### **Course Contents**

#### **Unit I                      Hours: -10**

**Meaning and Scope of Accounting:** Objectives and nature of Accounting, Definition and Functions of Accounting, Book Keeping and Accounting, Interrelationship of Accounting with other Disciplines, Branches of Accounting, Limitation of Accounting, Accounting Principles and Standards: Accounting Principles, Accounting Concepts and Conventions, Meaning and relevance of GAAP, Introduction to Accounting Standards Issued by ICAI.

#### **Unit II                      Hours: -10**

**Journalizing Transactions:** Journal Entries, compound Journal entries, Opening Entry.

**Ledger Posting and Trial Balance:** Preparation of Ledger, Posting, Cash book, Sales and Purchase book and Trial Balance.

**Company Final Accounts:** Preparation of Final Accounts with adjustments, Trading Account, Profit & Loss Account, Balance Sheet.

#### **Unit III                      Hours: -12**

**Depreciation Provisions and Reserves:** Concept of Depreciation, Causes of Depreciation, Basic Features of Depreciation, Meaning of Depreciation Accounting, Objectives of Providing Depreciation, Fixation of Depreciation Amount, Method of Recording Depreciation, Methods of Providing Depreciation, Depreciation Policy, AS-6 (Revised) Provisions and Reserves, Change of method of Depreciation (by both current and retrospective effect).

**Contemporary Issues & Challenges in Accounting:** Human Resource Accounting, Green Accounting, Inflation Accounting, Price level Accounting, Social Responsibility Accounting

#### **Unit IV                      Hours: -12**

**Shares and Share Capital:** Introduction to Joint Stock Company, Shares, Share Capital, Accounting Entries, Under Subscription, Oversubscription, Calls in Advance, Calls in Arrears, Issue of Share at Premium, Issue of Share at Discount, Forfeiture of Shares, Surrender of Shares, Right Shares.

**Issue and Listing of Securities:** Stock Exchange of India, Control of SEBI, Regulating business in stock exchange (Elementary Knowledge only).

#### **Text Books**

1. Tulsian, P.C., (2012) Financial Accountancy, Pearson Education.
2. Maheshwari, S.N. and Maheshwari, S. K., (2012) An Introduction to Accountancy, Vikas Publishing House

#### **Reference Books**

1. Bhattacharyya, Asish K., (2010) Essentials of Financial Accounting, Prentice Hall of India.
2. Rajasekaran, (2012), Financial Accounting, Pearson Education.
3. Bhattacharya, S.K. and Dearden, J., (2010) Accounting for Manager – Text and Cases. VKP

**SCHOOL OF LAW**

## B.B.A.L.L.B. 5 YEARS PROGRAMME

**Subject : Business Economics**  
**Subject Code : BBALLB 107**  
**Class : B.B.A.L.L.B. I YEAR**  
**Semester : I**  
**Credit : 4**

**Objectives:** The objective of this subject is to give understanding of the basic concepts and issues in business economics and their application in business decisions.

## Course Contents

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<b>UnitI</b>	<b>Hours: -10</b>
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**Introduction to Business Economics and Fundamental concepts:** Nature, Scope, Definitions of Business Economics, Difference between Business Economics and Economics, Contribution and Application of Business Economics to Business. Micro vs. Macro Economics. Opportunity Costs, Time Value of Money, Marginalism, Incrementalism, Market Forces and Equilibrium, Risk, Return and Profits.

## **Unit II** **Hours: -12**

### **Consumer Behavior and Demand Analysis:**

Cardinal Utility Approach: Diminishing Marginal Utility, Law of Equi-Marginal Utility. Ordinal Utility Approach: Indifference Curves, Marginal Rate of Substitution, Budget Line and Consumer Equilibrium. Theory of Demand, Law of Demand, Movement along vs. Shift in Demand Curve, Concept of Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Income Elasticity of Demand, Cross Elasticity of Demand, Advertising Elasticity of Demand. Demand Forecasting: Need, Objectives and Methods (Brief)

## **Unit III** **Hours: -12**

**Theory of Production:** Meaning and Concept of Production, Factors of Production and Production function, Fixed and Variable Factors, Law of Variable Proportion (Short Run Production Analysis), Law of Return to a Scale (Long Run Production Analysis) through the use of ISOQUANTS.

## **Unit IV** **Hours: -10**

### **Cost Analysis & Price Output**

**Decisions:** Concept of Cost, Cost Function, Short Run Cost, Long Run Cost, Economies and Diseconomies of Scale, Explicit Cost and Implicit Cost, Private and Social Cost. Pricing Under Perfect Competition, Pricing Under Monopoly, Control of Monopoly, Price Discrimination, Pricing Under Monopolistic Competition, Pricing Under Oligopoly.

### **Text Books:**

1. Samuelson, P & Nordhaus, W. (2010) Economics, McGraw Hill Education.
2. Dwivedi, D.N. (2010) Managerial Economics, Vikas Publishing House.

### **Reference Books:**

1. Salvatore, D. (2014) Managerial Economics in a Global Economy, Oxford University Press.
2. Kreps, D. (2010) Microeconomics for Managers, Viva Books Pvt. Ltd.
3. Mankiw, NG, (2011), Principles of Economics, Cengage Learning.
4. Peterson, L. and Jain (2012), Managerial Economics, Pearson Education.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : LAW OF TORTS-I**  
**Subject Code : LLB 101**  
**Class : B.B.A LL.B. I YEAR**  
**Semester : I**  
**Credit : 4**

**Objective:** -The Law of Torts is primarily concerned with redressal of wrongful civil actions by awarding compensation. In a society where men live together, conflict interests are bound to occur and they may from time to time cause damage to one or the other. In addition with the rapid industrialization tortious liability has come to be used against manufacturers and industrial units. As the Law of Torts is basically a Judge made law, students are required to study it in the light of judicial pronouncements. They are required to equip themselves with the latest developments extending to the entire course. This paper is to make students understand the nature of Torts and conditions of liability with established cases along with the Motor Vehicle Act, 1988 and Consumer Protection Act 1986.

#### **UNIT-I**

6. Nature & Definition of Tort,
7. Motive,
8. Capacity,
9. Joint Tortfeasors,
10. General defences,



## **UNIT-II**

5. Vicarious liability,
6. Remoteness of Damage,
7. Extinction of liability,
8. Strict liability and Absolute liability,

## **UNIT-III**

4. Negligence,
5. Nervous shock
6. Nuisance

## **UNIT-IV**

5. Trespass to land and goods,
6. Defamation,
7. Assault & Battery
8. Cyber Tort and constitutional Tort.

## **UNIT-V**

5. Evolution of Consumer Law,
6. The Consumer Protection Act, 2019
7. Offences under MV Act.
8. Remedies Under MV Act.

## **BOOKS RECOMMEDED**

7. Ratanlal&Dhirajlal. The Law of Torts (Lexis-Nexis 27th Ed. 2016) RamaswamyIyer's.
8. The Law of Torts (Lexis-Nexis, 10th Ed. 2007
9. R.K. Bangia. Law of Torts (Allahabad Law Agency, Latest Ed. 2018)
10. . Avatar Singh &HarpreetKaur. Introduction to the Law of Torts & Consumer Protection
11. (Lexis-Nexis 3rd Ed. 2013)
12. SRA Roscdar. Law of Torts and Consumer Protection Act (Lexis Nexis 2nd Ed. 2016)

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Law of Contract I**  
**Subject Code : LLB 103**  
**Class : B.B.A LL.B. I YEAR**  
**Semester : I**  
**Credit : 4**

**Objective:** -The objective of this paper is to make students familiar with various principles of contract formation enunciated in the Indian Contract Act, 1872.

**UNIT-I**

6. Definition of Contract, Agreement, Offer, Acceptance and Consideration (Section-2)
7. Communication and Revocation of Offer and Acceptance (Section 3-9),
8. Essentials of Contract (Section 10).
9. Competency to Contract (Section 11-12)
10. Leading Case: LalmanShukla V. GauriDutt (1913) 11 ALL L.J. 489

**UNIT-II**

5. Consent, Free Consent, Consent by Coercion, Undue Influence, Fraud, misrepresentation and mistake (Section 14-22),
6. Legality of object and consideration (section 23-24),
7. Void Agreements (Section 25-30),
8. Contingent Contracts (Section 31-36) Leading Case: MohoriBibee Vs. DharmodasGhose (1903) 30 I.A. 114 (PC)

**UNIT-III**

3. Contract which must be performed (Section 37-39),
4. By whom contract must be performed(Section 40-45),

**UNIT-IV**

5. Time and Place for performance of Contract (Section 46-50)
6. Performance of Reciprocal Promises (Section 51-55),
7. Discharge of Contract (Section 56-57).
- 8.

**UNIT-V**

7. Certain Relations resembling to those created by Contract (Section 68-72)
8. Certain Relations resembling to those created by Contract (Section 73-75).
9. Privity of contract.

10. Contract which can be enforced.
11. Alternation and Enovation of contract
12. Remedies against breach of contract.

### **Leading Case Law**

### **BOOKS RECOMMENDED**

AS.Dalal. Law f Concract d specific Relief Act (Bright Law House, Ist Ed. 2015)

pollock&Mulla, 1ne maan Contract Ac, 1872, (Lexis Nexis, Nagpur, 14th Ed. 201 3)

S K. Kapoor, Law Concract-I & The Specific Relief Act, (Central Law Ageney, Allahabad, 13th Ed. 2013)

Avatar Singh, lLaw of Contract and Specific Relief Act, 1963, (Eastern Book Company, Lucknow, 12th Ed. 2017)

R. K. Bangia, ndianConcract Act, (Allahabad Law Ageney, Allahabad, 14th Ed. 2015)

Ritu Gupta, Law of Contract inchudes The Specific Relief Act, 1963, (LexisNexis, New Delhi, Ist Ed. 2015)

# **B.B.A.L.L.B- 5 YEARS**

## **2<sup>nd</sup> SEMESTER**

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Cost Accounting**

**Subject Code : BBALLB 102**  
**Class : B.B.A.L.L.B. I YEAR**  
**Semester : II**  
**Credit : 4**

**Objectives:** The primary objective of the course is to familiarize the students with the basic cost concepts, allocation and control of various costs and methods of costing.

### **Course Contents**

#### **Unit I**

**Hours: 12**

**Meaning and Scope of Cost Accounting:** Basic Cost Objectives and scope of cost accounting, Cost centres and cost units, Difference between financial, cost and management accounting. Basic Cost concepts - Cost classification and elements of cost.

**Materials Control:** Meaning, Steps Involved, Materials and Inventory, Techniques of Material/Inventory Control (EOQ, FSND, ABC, Stock Levels, JIT, VED), Valuation of Inventory (FIFO, LIFO, Weighted average); Practical's of EOQ, stock levels, FIFO, LIFO

#### **Unit II**

**Hours: 12**

**Labour Cost:** Attendance and payroll procedures, overtime, idle time and incentives, direct and indirect labour, remuneration systems and incentive schemes (Halsey, Rowan, Taylor, Merrick, Bedaux, Emerson plans practical).

**Overheads: Functional analysis** – factory, administration, selling, distribution, research and development, fixed, variable, semi variable and step cost; Factory overheads, Administration overheads and Selling and distribution overheads (in brief about types of overheads). (Overhead rate, Machine rate, under & over absorption practical).

#### **Unit III**

**Hours: 10**

**Cost Sheet** – Preparation of Cost Sheet (simple problems).

**Process Costing** - Meaning and computation of normal profits, abnormal effectives and abnormal loss.

#### **Unit IV**

**Hours: 10**

**Contract Costing:** Progress payments, retention money, escalation clause, contract accounts, accounting for material, accounting for plant used in a contract, contract profit and balance sheet entries.

Operating Costing (basic problems related to transport only).

#### **Text Books**

1. Maheshwari, S. N. and Mittal, S. N. (2015), Cost Accounting – Theory and Problems, ShriMahavir Book Depot.
2. Arora, M.N., (2012), Cost Accounting, Vikas Publishing House.

#### **Reference Books**

1. Lal, Jawahar and Srivastava, Seema, (2013), Cost Accounting, McGraw Hill Education.
2. Pandey, I.M., (2014), Management Accounting, Vikas Publishing House, Delhi.
3. R.Palaniappn&Hariharan;(2012),Cost Accounting Theory&Practices,I.K. International Publishing House,Delhi.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** :E-Commerce  
**Subject Code** : BBALLB 104  
**Class** : B.B.A.L.L.B. I YEAR  
**Semester** : II  
**Credit** : 4

**Objectives:** The course imparts understanding of the concepts and various application issues of e-business like Internet infrastructure, security over internet, payment systems and various online strategies for e-business.

## **Course Contents**

### **UnitI Hours: -12**

**Introduction to E-Commerce:** Electronic Business, Electronic Commerce, Types of Electronic Commerce, Benefits, Limitations and Barriers of E-commerce, Electronic Commerce Models, Value Chains in Electronic Commerce, E-Commerce in India., Web Based Tools for Electronic Commerce, e-Marketing, Intranet, Composition of Intranet, Business Applications on Intranet, Extranets. Electronic Data Interchange, Components of Electronic Data Interchange, Electronic Data Interchange Communication Process.

### **UnitII Hours: -12**

**Security Issues in e-business:** Basic E-Commerce Security issues, Electronic Commerce Threats, E-Commerce Security Strategy, Encryption, Digital Signatures, Digital Certificates, Securing E-commerce Networks: Firewalls, Personal Firewalls, IDS, VPNs, Public Key Infrastructure (PKI) for Security.

### **UnitIII Hours: -10**

#### **Electronic Payment System:**

Concept of e-Money, Internet Banking, Electronic Payment System, Types of Electronic Payment Systems, Smart Cards, Infrastructure Issues in EPS, Electronic Fund Transfer.

### **UnitIV Hours: -10**

**e-Business Applications & Strategies:** Business Models & Revenue Models over Internet, Emerging Trends in e-Business, Digital Commerce, Mobile Commerce, Basics of Internet Enabled SCM-e Supply Chain, Strategies for E-Commerce, Internet based Business Models; Legal, Ethical and Societal Impacts of E-Commerce.

#### **Text Books**

1. Efraim Turban, David King, Dennis Viehland, Jae Lee, (2012): Electronic Commerce – A Managerial Perspective, Pearson Education.
2. Bharat Bhaskar (2013). Electronic Commerce- Framework, Technologies and Applications, Tata McGraw Hill.

#### **Reference Books**

1. Elias M. Awad (2010). Electronic Commerce-From Vision to Fulfillment, PHI Learning.
2. Dave Chaffey (2013). E-Business and E-Commerce Management- Strategy, Implementation and Practice, Pearson Education.
3. Joseph, P.T. and S.J. (2012). E-Commerce – An Indian Perspective, PHI.
4. Schneider Gary, (2014). Electronic Commerce, Cengage Learning.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : English -II  
**Subject Code** : BBALLB 106  
**Class** : B.B.A.L.L.B. I YEAR  
**Semester** : II  
**Credit** : 1

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : E-Commerce Lab  
**Subject Code** : Cs-1256  
**Class** : B.B.A.L.L.B. I YEAR  
**Semester** : II  
**Credit** : 1

Lab would be based on the Paper 106. The objective of this lab is to understand the various application of e-business like Internet infrastructure, security over internet, payment systems, online transactions and online strategies for e-business.



**LINGAYA'S UNIVERSITY**  
**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**SUBJECT** : Law of Torts-II  
**SUBJECT CODE** : LLB104  
**CLASS** :B.B.A LL.B. I YEAR  
**SEMESTER** : II  
**CREDIT** : 4

**OBJECTIVE:** The Law of Torts-II is primarily concerned with Specific Torts. In a society where men live together, conflicts of interests are bound to occur and they may from time to time cause damage to one or the other. In addition, with the rapid industrialization, tortious liability has come to be used against manufacturers and industrial units. As the Law of Torts is basically judge made law, students are required to study it in the light of judicial pronouncements. They are required to equip themselves with the latest developments extending to the entire course.

**Unit I: Negligence, Torts against Persons:**

1. Negligence:
  - a. Theories of Negligence
  - b. Standards of care, duty of care, carelessness, inadvertence
  - c. Doctrine of Contributory Negligence
  - d. Res ipsa loquitur
2. Torts Against Persons: Assault Battery, Mayhem False Imprisonment, Malicious Prosecution
3. Nervous Shock

**Unit II: Torts against Property:**

1. Torts against Property: Trespass to Land, Trespass ab initio, Dispossession, Trespass Movable Property, Trespass to Goods, Conversion
2. Nuisance: Definition, Elements constituting Nuisance, Categories Acts of Nuisance

### **Unit III: Principles of Liability in Torts:**

1. Categories of Liability
2. Fault Liability
3. Vicarious Liability
4. Vicarious Liability of State
5. Strict Liability - Ryland v Fletcher
6. Absolute Liability: Liability without Fault M.C. Mehta v. Union of India (Sriram Food & Fertilizers Co-Oleum Gas Leakage) case - Liability for harm caused by inherently dangerous industries - Ultrahazardous activities.

### **Unit IV: Remedies and Damages:**

1. Personal Capacity
2. Who can sue
3. Who can not be sued
4. General Remedies in torts
5. Damage and its Kinds
6. Remoteness of Damages (In Re Problem And Wagon Mound Case)
7. Judicial & Extra Judicial Remedies
8. Joint Tortfeasors

### **Unit V: Defamation:**

1. Definition
2. Kinds of Defamation
3. Libel & Slander
4. Innuendo
5. Defences in Defamation

### **REFERRED CASE LAWS:**

1. Donoghue v. Stevenson (1932) All ER Rep. 1
2. Municipal Corporation of Delhi V, Subhagwanti, AIR 1966 SC 1750
3. Malay Kumar Ganguly v. Sukumar Mukherjee & Ors., AIR 2010 SC 1162
4. Rylands v. Fletcher (1868) LR 3 HL 330.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**SUBJECT** : LAW OF CONTRACT-II  
**SUBJECT CODE** : LLB 102  
**CLASS** : B.B.A LL.B. I YEAR  
**SEMESTER** : II  
**CREDIT** : 4

**Objective:-** This paper will impart comprehensive information on indemnity, guarantee, agency, partnerships, sale of Goods Act and Negotiable instrument.

#### **UNIT-I**

##### **(c) Contract of Indemnity**

7. Meaning of Contract of Indemnity
8. Right to Indemnity holder.
9. Nature and extent of liability of the indemnifier.
10. Commencement of liability of the indemnifier.
11. Time of commencement of Indemnifier's Liability
12. Are Insurance Contract the Contracts of Indemnity?

##### **(d) Contract of Guarantee**

7. Meaning & Features of Contract of Guarantee.
8. Difference between Contracts of Indemnity & Contract of Guarantee.
9. Nature & Extent of Surety's Liability.
10. Meaning & Revocation of Continuing Guarantee.
11. Rights of Surety against Principal Debtor, Creditor & Co-Surety.
12. Extent and Discharge of Surety's Liability.

#### **UNIT-II**

##### **(d) Contract of Bailment**

6. Definition & Essentials of Contract of Bailment.
7. Duties of Bailor.
8. Duties of Bailee's
9. Right of the Bailee & General & Particular Lien.
10. Duties & Rights of Finder of Goods.

##### **(e) Contract of Pledge**

6. Definition of pledge under the Indian contract act.
7. Distinction between Bailment & pledge.

8. Rights of the pawqner and pawnee.
9. Pawnee's right of sale as compared to that of an ordinary bailee.
10. Pledge by certain specified persons mentioned in the Indian Contract Act.

**(f) Contract of Agency**

8. Meaning of Essentials of Contract of agency
9. Different kinds of agent- Auctioneers, Brokers & Del Credere Agents .
10. Distinction between agent and servant
11. Duties and rights of agent.
12. Extent of Agent's Authority- Actual , Apparent, Authority in Emergency.
13. Liability of the agent towards the principal.
14. Methods of termination of agency contract.

**UNIT-III**

**Specific Relief Act, 1963**

8. Recovering Possession of property (section 5-8)
9. Specific performance of Contracts (section 9-24)
10. Rectification of Instruments (section 26)
11. Rescission of Contract (section 27-30)
12. Cancellation of Instruments (section 31- 33)
13. Declaratory Decrees( section 34-35)
14. Preventive Relief or Injunctions( section 36-44)

**UNIT-IV**

**The Sale of Goods act, 1930**

5. Definition, Distinction between Sale and Agreement to Sale .
6. Conditions and warranties.
7. Passing of property.
8. Rights of Unpaid Seller and Remedies for Breach of Contract.

**Book Recommendation:**

- AvtarSingh. Law of Contract and Specific Relief, Eastern Book company, 2013 (11<sup>th</sup>Edn)
- Pollock & Mulla, Indian Contract and Specific Relief Act, Lexis nexis, @013 (14<sup>th</sup>Edn)
- S.K. Kapoor , Contract- II, Central Law Agency, 2015
- B.M. Prasad and Manish Mohan ,Khergamvala on the Negotiable Instrument Act, 2013, Lexis Nexis, 2013 (21<sup>st</sup>Edn)
- P. Mulla, The Sale of Goods and Indian Partnership Act, Lexis, Nexis, 2013 (10 Edn)
- Bhashyam and Adiga, The Negotiable Instruments Act (19956), Bharath, Allahbad.
- M.S. Parthasarathy (ed.),J.S.Khergamvala, The Negotiable Instrument act.
- J.P. Verma (ed.), Singh and Gupta, The Law of partnership in India (1999), Orien Law House, New Delhi.

# **B.B.A.L.L.B 5 YEARS**

## **IIIrd SEMESTER**

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

<b>SUBJECT</b>	<b>: MarketingManagement</b>
<b>SUBJECT CODE</b>	<b>: BBALLB 212</b>
<b>CLASS</b>	<b>: B.B.A LL.B. II YEAR</b>
<b>SEMESTER</b>	<b>: III</b>
<b>CREDIT</b>	<b>: 4</b>

**Objectives:** The objective of this paper is to identify the foundation terms and concepts that are commonly used in marketing. This course will give complete relationship between marketing and other management functions.

### **Course Contents**

#### **Unit I**

**Hours: -10**

**Introduction to Marketing:** Nature, Scope and Importance of Marketing, Basic concepts, Marketing Environment, Consumer Behavior, Market Segmentation, Targeting and Positioning.

#### **Unit II**

**Hours: -10**

**Product:** Product Levels, Product Mix, Product Strategy, Product Development, Product Lifecycle and Product Mix.

**Pricing Decisions:** Designing Pricing Strategies and Programmes, Pricing Techniques.

#### **Unit III**

**Hours: -12**

**Place:** Meaning & importance, Types of Channels, Channels Strategies, Designing and Managing Marketing Channel, Retailing, Physical Distribution, Marketing Logistics and Supply Chain Management.

#### **Unit IV**

**Hours: -12**

**Promotion:** Promotion Mix, Push vs. Pull Strategy; Promotional Objectives, Advertising- Meaning and Importance, Types, Media Decisions, Promotion Mix, Personal Selling-Nature, Importance and Process, Sales Promotion – Purpose and Types; Publicity and Public Relations- Definition, Importance and Methods.

**Emerging Issues in Marketing:** Integrated Marketing, Online Marketing, Online Payments, Rural Marketing, Social Marketing, Green Marketing (Introductory aspects only).

#### **Text Books**

1. Kotler, Armstrong, Agnihotri and Haque, (2012), Principles of Marketing- A South Asian Perspective, Pearson Education.
2. Ramaswamy and Namkumar,S.,(2013), Marketing Management Global Perspective: Indian Context, McMillan, Delhi.

#### **References**

1. Saxena, Rajan, (2012), Marketing Management, McGraw Hill Education.
2. Lamb, Charles W, (2012), MKTG: a South Asian Perspective, Cengage Learning.
3. Russel, Winer, (2012), Marketing Management, Pearson Education.
4. Kotler, KoshiJha, (2014), Marketing Management, Pearson Education.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**SUBJECT** : HumanResourceManagement  
**SUBJECT CODE** : BBA LLB 214  
**CLASS** : B.B.A LL.B. II YEAR  
**SEMESTER** : III  
**CREDIT** : 4

**Objectives:** The objective of this course is to make students familiarize with basic concepts of human resource management and people related issues.

#### **Course Content:**

##### **Unit I:**

**Hours: -10**

**Human Resource Management:** Concept and Functions, Role, Models, Status of HR , HR Policies, Evolution of HRM. Emerging Challenges of Human Resource Management; workforce diversity, empowerment, Downsizing; VRS; HumanCapital; HRIS.

## **Unit II**

**Hours: -12**

**Human Resource Planning:** Human Resource Planning- Quantitative and Qualitative dimensions; **Recruitment** – Concept and sources; (E-recruitment, recruitment process outsourcing etc.); **Selection** – Concept and process; test and interview; placement induction. Job analysis – job description and job specification; job design; Job Enlargement; Job Enrichment and flexi-time; Career Planning; Succession Planning.

## **Unit III**

**Hours: -12**

**Training and Development:** Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role Specific and Competency Based Training; Evaluating Training Effectiveness; Management Development; Career Development ;

**Performance appraisal:** Nature and objectives; Techniques of performance appraisal; potential appraisal and employee counseling; Internal mobility – promotions, demotion, transfers and separation. Compensation: concept and policies; job evaluation.

## **Unit IV**

**Hours: -10**

**Maintenance:** Employee health and safety; employee welfare; social security; Industrial relations- an overview. Grievance handling and redressal Industrial Disputes causes and settlement machinery.

**Strategic HRM:** HRD audit, managing globalization; technology and HRM.

### **Text Books**

1. Gary Dessler. (2013) A Framework for *Human Resource Management*. Pearson.
2. David A. Decenzo, Stephen P. Robbins, Susan L. Verhulst, *Human Resource Management*, (2015), Wiley India Private Limited.

### **Reference Books**

1. Bohlendar and Snell, *Principles of Human Resource Management*, (2013) Cengage Learning.
2. K. Aswathappa, *Human Resource Management* (2013), McGraw Hill Education (India) Private Limited.
3. Chhabra, T.N. *Essentials of Human Resource Management*. (2014) Sun India Publication New Delhi.
4. Robert L. Mathis and John Jackson, *Human Resource Management* (2011), South-Western Publisher.



## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**SUBJECT** : Environment Science  
**SUBJECT CODE** : BCE 201  
**CLASS** : B.B.A LL.B. II YEAR  
**SEMESTER** : III  
**CREDIT** : 4

**Objectives:** The basic objective of this paper is to understand the basic fundamental to environmental science, the complexity of ecosystems, major environmental problems including their causes and consequences. This course endeavors to provide a background to current and controversial environmental issues and possible solutions to environmental problems.

#### **Course Contents**

##### **UNIT I**

**Ecosystems and how they work:** Types of Eco-Systems, Geosphere–Biosphere and Hydrosphere introduction. Major issues of Biodiversity, Conservation of Bio-Diversity.

**Concept of sustainability and international efforts for environmental protection:** Concept of Sustainable Development, Emergence of Environmental Issues. International Protocols, WTO, Kyoto Protocol, International Agreement on Environmental Management.

## **UNIT II**

**Water Pollution:** Water Resources of India, Hydrological Cycle, Methods of Water Conservation and Management, Rain Water Harvesting and their legal aspects, River Action Plan, Ground and Surface Water Pollution; Waste Water Management.

**Air Pollution:** Air Pollution and Air Pollutants, Sources of Air Pollution and its Effect on Human Health and Vegetations. Green House Effect, Global Warming and Climate Change.

## **UNIT III**

**Solid Waste:** Management – and Various Methods Used, Composting, Land Fill Sites etc. Hazardous Waste Management, Biomedical Waste Management.

Environmental Impact Assessment and Environmental Management System - Introduction and its Impact.

## **UNIT IV**

**Introduction to Indian Environmental laws:** Legal framework, The Indian Penal Code, Role of Judiciary in Environmental Protection, Water (Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution) Act, 1981,

## **Text Books**

1. Miller Tyler, G. Jr., (2011), Environmental Science: Working with the Earth, Cengage Learning India Pvt. Ltd.
2. Mishra, S.P., and Panday, S.N., (2014), Essential Environment Studies, Ane Books Pvt. Ltd.

## **Reference Books**

1. Chhatwal, Rajni Johar (2012), Environmental Science, UDH Publishers & Distributors (P) Ltd.
2. Ghosh Roy, M.K. (2014), Sustainable Development, Ane Books Pvt. Ltd.
3. Asthana, D.K. and Meera. (2014), Textbook on Environmental Studies. S.Chand.
4. Arumugam.N, & Kumaresan.V, (2014) Environmental Science & Engineering, Saras Publication.

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Family Law-I  
**Subject Code** : BBALLB 201  
**Class** : B.B.A LL.B. II YEAR  
**Semester** : III  
**Credit** : 4

**Objective:** -Hindu law refers to the code of laws applied to Hindus, Buddhists, Janis and Sikhs. It also refers to the legal theory, jurisprudence and philosophical reflections on the nature of law discovered in ancient and medieval era. It gives us the base of the society i.e. family. It deals with different families' positions, traditions, rights and duties, family problems and legal solutions to them which directly relate to the society. The main objective of the subject is to resolve the socio-legal disputes arising in the society regarding marriage, divorce, property rights, partition, succession, maintenance, guardianship, adoption etc. It also sensitizes the students about Hindu society for their legal rights and duties.

**UNIT-I**

8. Application of Hindu Law,
9. Sources of Hindu Law,
10. Schools of Hindu Law,
11. Hindu Joint Family, Joint Families, Coparcenary, Classification of Property,
12. Karta of Joint Family, Position, Liabilities and Powers of Karta.,
13. Coparcener's Power of Alienation, Coparcener's Right to Challenge Improper Alienation,
14. Alienee's Rights and Remedies.

**UNIT-II**

8. The nature and concept of Hindu Marriage,
9. Essential Conditions for Valid Hindu Marriage, and Ceremonies of Marriage,
10. Registration of Hindu Marriages,
11. Remedy of Restitution of Conjugal Rights,
12. Void and Voidable Marriages,
13. Judicial Separation and Divorce,
14. Various Types of Grounds for Divorce and Judicial Separation,

**UNIT-III**

5. Nature and Scope of The Hindu Succession Act, 1956,
6. Effects of the Hindu (Succession) Amendment, 2005,

7. Rules of succession to the Property of Hindu Male, Succession to the Property of Hindu Female, Succession to the Mitakshara Coparcener's Interest,
8. General Rules of Succession, Partition, Subject matter of Partition, Persons who have a Right to Partition Right to Share.

#### **UNIT-IV**

8. Nature and Scope of The Hindu Minority and Guardianship Act, 1956,
9. Concept of Minority and Guardianship.  
Types of Guardians-
10. Natural Guardians and their Powers,
11. Testamentary Guardian: Appointment and Powers,
12. Certified Guardian,
13. Defecto Guardian
14. Guardian By Affinity,

#### **UNIT-V**

10. The Hindu Adoption & Maintenance Act, 1956,
11. Nature of Adoption,
12. Essential Conditions for Valid Adoption,
13. Effects of Adoption,
14. Registration of Adoption,
15. Personal Obligation,
16. Maintenance of Dependents,
17. Quantum of Maintenance,
18. Maintenance As a Charge on Property

#### **Leading Case**

#### **BOOKS RECOMMENDED**

RanganathMisra, Mayne's Treatise on Hindu Law & Usage (16th ed., 2008)  
 Satyajeet A. Desai, Mulla Principles of Hindu Law, (Vol. I & II 21st ed., 2010)  
 ParasDiwan and PeeyushiDiwan, Modern Hindu Law (Allahabad Law Agency, Reprint 2018)  
 Duncan M. Derrett, A Critique of Modern Hindu Law (1970)  
 Basant K. Sharma. Hindu Law.(Central Law Publication Sth Ed. 2017)

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Constitutional law-I**  
**Subject Code : BBA LLB 203**  
**Class : B.B.A LL.B. II YEAR**  
**Semester : III**  
**Credit : 4**

**Objective:** - Constitution of India is the pillar on which the governance of our country rests. The course aims to examine the political, social and economic value structure of the Constitution of India. The balancing of positive responsibility of the state to establish a economy of growth, social justice and political aspiration of all sections of the Indian society through Constitutional Governance. The objective of this course is to make students understand the basic concepts of Indian constitution.

**UNIT-I**

4. Nature ,Silent features and Preamble of the Constitution of India
5. Union and its Territory
6. Citizenship

**UNIT-II**

5. Article-12 and 13.
6. Right to Equality(Art. 14),
7. Special Provision for Weaker Sections of the Society,
8. Reservation Policy.

**UNIT-III**

6. Fundamental Freedoms under Art.19,
7. Freedom of Press.
8. Protection in respect of conviction of offence (Art-20),
9. Right to Life and Personal Liberty Article 21).
10. Protection against Arrest and Detention (Art 22),

**UNIT-IV**

4. Right against Exploitation (Art-23 & 24),
5. Right to Religion (Art 25-28).
6. Cultural & Educational Rights of Minorities (Art.29 & 30),

**UNIT-V**

5. Right to Constitutional Remedies(Art, 32), 226
6. Judicial Review ,WritJurisdictionand PIL
7. Directive Principles of State Policy,
8. Fundamental Duties.

**Leading Case**

**BOOKS RECOMMENDED**

1. Kagzi, M.C. Jain. The Constitutional of India, Vol. 1 & 2, New Delhi, India Law House, 2001)
- 2.Pylee, MV.Constitutional Amendments in India (Delhi, Universal Law, 2003)
- 3.Hasan, Zoya& E. Sridharan. India's Living Constitution: Ideas, Practices, Controversies (Delhi,Permanent Black, 2002 ed.)
4. Basu, Durga Das. Commentary on the Constitution of India, (Calcutta, DebidasBasu, 1989 Ed.)
5. Seervi, H.M. Constitutional Law of India (Vol. I & II, III, Bombay N.M. Tripathi, 1991)
- 6.Chaube, Shibnikinkar.Constituent Assembly of India (New Delhi, Wadhwa and Com.Pvt. Ltd. 2002 ed.)
7. Bakshi, P.M. The Constitution of India (Delhi Universal Law Publishing, 2002)

8. Jain Subhash C. The Constitution of India; Select Issues & Perceptions (New Delhi Taxmann Publications, 2000)

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Jurisprudence (Legal methods, Indian Legal systems and Basic Theory of Laws)  
**Subject Code** : BBA LLB 109  
**Class** : B.B.A LL.B. II YEAR  
**Semester** : III  
**Credit** : 4

**Objectives:** -It includes sources of Law, Administration of Justice, Law and Morality, Schools of Jurisprudence, Legal Rights and Duties, Ownership and Possessions, Legal Personality,

Obligation and Liability etc. The subject is very important for Law Students as it helps in understanding the evolution and nature of Law and the fundamental functions of Law from different perspectives. Moreover, the students are also exposed to the information relating to functioning of various legal systems. This helps in making laws and tackling socio-legal problems prevalent in our country by studying the remedial measures in India.

#### **Unit I:**

4. 1 Definition, nature and province/scope of Jurisprudence
5. Theory of Natural Law and jurisprudence,
6. Analytical school-  
Austin's theory of Law  
Kelson's pure theory of Law  
Bentham's theory of Law

#### **Unit II:**

4. Historical school
5. Sociological School
6. Realist school

#### **Unit III:**

3. Administration of Justice
4. Socio-Economic Approach and Philosophy  
Law and Social Change  
Legal Aid  
Public Interest Litigation

#### **Unit IV:**

Sources of law —

4. Custom,
5. Precedent
6. Legislation

#### **Unit V:**

4. Rights and Duties
5. Possession and Ownership
6. Persons

#### **BOOKS RECOMMENDED-**

10. B.S: Mani Tripathi, The Legal Theory, (Allahabad Law Agency, Allahabad, 18th Ed. 2012)
11. N.V. Paranjapai, Studies in Jurisprudence and Legal Theory, (Central Law Agency, Allahabad 7thEd.2013)

12. Nomita Aggarwal, Jurisprudence, (Central Law Agency, Allahabad, 10th Ed. (rep) 2016)
13. S.P. Dwivedi, Jurisprudence & Legal Theory, (Central Law Agency, Allahabad 7th Ed. 2017)
14. Salmond, John William, Sir, Jurisprudence or the theory of the law, (Hard Press Publishing (2013)
15. R.W.M. Dias, Jurisprudence, (Jain Law Book Agency, Delhi, 12th Edition, 2014)
16. Edgar Bodenheimer, Jurisprudence, (Harvard University Press, 1974 (Revised Ed.)
17. Amartya Sen, The Idea of Justice, (Cambridge, Mass.: Belknap Press/Harvard University Press, Ed. 2009)
18. Granville Austin, Indian Constitution, (The Cornerstone of a Nation, New Delhi, Oxford University Press, Ed. 2007)

# **B.B.A.L.L.B 5 YEARS**

## **IVTH SEMESTER**



**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Financial Management**  
**Subject Code : BBALLB 221**  
**Class : B.B.A LL.B. II YEAR**  
**Semester : IV**  
**Credit : 4**

**Objectives: Efficient Management of a business enterprise is closely linked with the efficient management of its finances. Accordingly, the objective of the course is to acquaint the students with the overall framework of financial decision- making in a business unit.**

Course Contents

UNIT I

**Financial Management: Meaning, Scope, Objectives of Financial Management, Profit Vs. Wealth Maximization. Financial Management and other Areas of Management, Methods of Financial Management, Organization of Finance Function.**

**Sources of Financing: Classification of Sources of Finance.**

UNIT II

**Capital Structure: Meaning and Theories of Capital Structure: Net Income, Net Operating**

**Income and MM Approach and Traditional Approach, Factors Determining Capital Structure.**

**Cost of Capital: Concept, Importance, Classification and Determination of Cost of Capital (Cost of Equity, Preference, debt and WACC), Leverage: Financial, operating & composite leverage**

#### **UNIT III**

**Capital Budgeting: Concept, Importance and Appraisal Methods: Pay Back Period, Accounting Rate of Return, Net Present Value Method (NPV), Profitability Index, and IRR. Capital Rationing.**

**Dividend Policy: Theories for Relevance and Irrelevance Concepts of Dividend.**

#### **UNIT IV**

**Working Capital Management: Operating cycle, Working Capital Estimation, Concept, Management of cash: Preparation of Cash Budget.**

#### **Text Books**

- 1. Khan M.Y, Jain P.K., (2014), Financial Management, McGraw Hill Education.**
- 2. Pandey I. M., (2015), Financial Management, Vikas Publishing House.**
- 3. Brigham and Houston (2013) Financial Management, CENGAGE Learning**

#### **Reference Books**

- 1. Kapil, Sheeba, (2012), Financial Management, Pearson Education.**
- 2. Chandra Prasanna (2011), Financial Management: Theory and Practice, McGraw Hill.**
- 3. Maheshwari, S.N. (2013), Financial Management: Principles and Practice, Sultan Chand.**
- 4. Tulsian, P.C. (2010), Financial Management: A self study textbook, S. Chand.**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Strategic Management  
**Subject Code** : BBA LLB 222  
**Class** : B.B.A LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**Objectives:** The course aims to acquaint the students with the nature, scope and dimensions of Business Policy and Strategy Management Process.

**Course Contents**

**UNIT I**

**Introduction:** Nature, Scope and Importance of Business Policy; Evolution; Forecasting, Long-Range Planning, Strategic Planning and Strategic Management.

**Strategic Management Process:** Formulation Phase— Vision, Mission, Environmental Scanning, Objectives and Strategy; Implementation phase— Strategic Activities, Evaluation and Control.

**UNIT II**

**Environmental Analysis:** Need, Characteristics and Categorization of Environmental Factors; Approaches to the Environmental Scanning Process – Structural Analysis of Competitive Environment; ETOPa Diagnosis Tool.

**Analysis of Internal Resources:** Strengths and Weakness; Resource Audit; Strategic Advantage Analysis; Value-

Chain Approach to Internal Analysis; Methods of Analysis and Diagnosing Corporate Capabilities – Functional  
Area Profile and Resource Deployment Matrix, Strategic Advantage Profile; SWOT Analysis.  
McKinsey's 7s Framework.

### **UNIT III**

**Formulation of Corporate Strategies:** Approaches to Strategy formation; Major Strategy options – Stability, Growth and Expansion: Concentration, Integration, Diversification, Internationalization, Cooperation and Digitalization, Retrenchment, Combination Strategies.

### **UNIT IV**

**Choice of Business Strategies:** BCG Model; Stop-Light Strategy Model; Directional Policy Matrix (DPM) Model; Product/Market Evolution – Matrix and Profit Impact of Market Strategy (PIMS) Model.

**Major Issues involved in the Implementation of strategy:** Organizational Cultural and Behaviour factors, Organization Structure; Role of Leadership, Resource Allocation.

### **Text Books**

1. Kazmi, Azhar, (2014), Strategic Management and Business Policy, McGraw Hill Education.
2. Ghosh, P.K., (2012), Strategic Planning and Management, Sultan Chand & Sons, New Delhi.

### **Reference Books**

1. Hill, Charles W.L. and Jones Gareth R. (2011), An Integrated Approach to Strategic Management, Cengage Learning.
2. Walker, Gordon, (2012), Modern Competitive Strategy, McGraw Hill Education.
3. Weelen, (2012), Concepts in Strategic Management and Business Policy, Pearson Education.
4. Fred, David, (2011), Strategic Management: Concepts and Cases, Prentice Hall of India

**Note: Latest edition of text books may be used**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Management Information System  
**Subject Code** : BCS 201  
**Class** : B.B.A LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**Objectives:** The objective of the course is to acquaint the students about the concept of information system in business organizations, and also the management control systems.

**Course Contents**

**UNIT I**

**Introduction:** Definition, Purpose, Objectives, and Role of MIS in Business Organization, pre-requisites for effective MIS, MIS Applications in Business.

**Information in Decision Making:** Meaning and importance, Sources and Types of Information, information requirements with particular reference to Management Levels, Relevance of Information in Decision Making, Strategic Business objectives of information system.

**UNIT II**

**Cost Benefit Analysis:** Quantitative and Qualitative Aspects, Assessing Information needs of the Organization.

**System Development:** Concept of System, Types of Systems – Open, Closed, Deterministic, Probabilistic, etc., System Approaches - System Development Life Cycle (SDLC), Prototyping, End User Development, Waterfall and Spiral method, System Analysis, Design and Implementation.

**UNIT III**

**Types of information system:** Transaction Processing System, Expert System, Decision Support System, Executive Information system and Knowledge Management System.

**Information Technology:** Recent Developments in the Field of Information Technology, Impact of IT on Organization, Multimedia Approach to Information Processing, Centralized and Distributed Processing.

#### **UNIT IV**

**Emerging Concepts and Issues in Information Systems:** ERP - An overview, Characteristics, and Role of ERP in Business Organization, Customer Relationship Management, Business Intelligence, Introduction to Database, Data Warehousing, Data Mining and its Applications, MIS and Information Security Challenges (Introductory aspects only).

#### **Text Books**

1. Laudon and Laudon, Management Information Systems, Pearson Education, 2014.
2. Javadekar, W.S., "Management Information Systems", Tata McGraw Hill Publication, 2014.

#### **Reference Books**

1. O'Brien, James A., "Management Information System", Tata McGraw Hill, 2014.
2. Davis, B. Gordon, "Management Information System", Tata McGraw Hill Publication, 2012.
3. Goyal D.P., "Management Information Systems", Macmillan Publication, 2014.
4. M Azam, "Management Information System", Tata McGraw Hill, 2012.

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Business Statistics and Quantitative Analysis**  
**Subject Code : YTG**  
**Class : B.B.A LL.B. II YEAR**  
**Semester : IV**  
**Credit : 4**

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Family Law -II  
**Subject Code** : BBA LLB 202  
**Class** : B.B.A LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**Objective:** -To familiarize students with the concept and intricacies of different aspects of Family Law, majorly relating to the Hindus and Muslims. On Completion of this course content the students should have acquired the reasonable level of knowledge/competence relating to area of Inheritance, Partition, Succession, Wills, Charitable Trusts, etc.

#### **Unit I: Joint Hindu Family**

4. Concept of joint Hindu Family and coparcenary under Mitakshara and Dayabhaga law and their incidence.
5. Property in Hindu Law: Separate and Comparcency Property
6. Karta of Joint Hindu Family :
  6. Who can be the Karta?
  7. Position of the Karta.
  8. Powers, Duties and Liabilities of the Karta.
  9. Alienation of Joint Family Property by the Karta
  10. Pious obligation of the son to repay the debts incurred by the Karta

#### **Unit II: Partition**

8. Meaning of 'Partition' Bringing the joint family status to an end
9. Subject matter of partition
10. Person entitled to demand Partitions and to a share on Partition
11. Partition, how effected
12. Rules relating to division of property on partition
13. Reopening of Partition & reunion
14. Difference between Mitakshara & Dayabhaga Laws regarding Partition

#### **Unit III: Principles of Inheritance**

##### **C. Hindu Law: The Hindu succession Act, 1956:**

5. General rules of Succession to a Hindu male dying intestate
6. General rules of Succession to a Hindu female dying intestate
7. Stridhan and Women's Estate
8. General principles of inheritance and disqualification of Heirs.



#### **D. Muslim Law**

3. Principles of Inheritance under Muslim Law (Sunni Law): Primary Heirs.
4. Brief Introduction to Hiba (Gift). Will(Wasiyat), and MarzulMaut (Death Bed Transaction)

#### **Unit IV: Religious and Charitable Endowments**

##### **C. Hindu law**

3. Endowments:
  - (f) Meaning, Kinds and Essentials
  - (g) Public and private temples – Powers and Obligations of Mahant and Shebait
  - (h) Idol as a Litigant: Removal and Replacements of Idol
  - (i) Hindu religious and charitable endowments laws and important case law thereunder
  - (j) Law relating to charitable endowments

##### **D. Muslim Law**

4. Waqf:
  - (e) Meaning, Kinds, Rights, Obligations and Characteristics
  - (f) Objects and purpose of Waqf- Advantages and disadvantages
  - (g) Mosque: objects, kinds and requisites
  - (h) The Wakf Acts 1923,1954, and 1995 and important case law thereunder

#### **Unit V: Pre Emption under Customary Law**

- (f) Origin, Meaning; Classification:
- (g) Subject Matter
- (h) Requisite formalities
- (i) Constitutional validity.
- (j) Legal force of Pre-Emption as an argument questioning title

#### **Referred Case Laws:**

22. Munilala v. Bishwanath. AIR 1968 SC 450
23. Najm-Un-Nissav.AjaibAli.(1900)
24. Radhakrishnan v. Sridhar. AIR 1960 SC 1368.
25. Pasha Begum v. Syed ShabberHasan, AIR 1956 Hyd L.
26. Mohd. Ismail v. Abdul Rashid AIR 1956 AirT.
27. Ahmad Arifvs Wealth TaxCommission AIR 1971,SC
28. ShaharBanovs Aga Mohammad 1907
29. BibiSadique Fatima vsMahmoodHasan AIR 1978.
30. Md. Ismail vs Thakur Sabir Ali AIR 1962.
31. KhaliluddinvsShri Ram 1934.
32. M KazimvsAAshghar Ali AIR 1932.
33. M.P. Gopalakrishnan Nair and Anr. V. State of Kerala andfOrs. [2005] INSC 265 (20 April 2005)
34. K. MukundarayaShenoy v. The State of Mysore AIR 1960 Kar 18.
35. T. Krishnan v. G.D.M. Committee AIR1978 Ker 68.
36. Ratilal v. State of Bombay AIR V1953 Bom 242.

37. A.V.K.V. Temple v. State of Uttar Pradesh 1997(4) SC 124.
38. Hunooman Prasad Pandey v. Mussumat Babooee Mumraj Koonweree, (1856) 6 MIA 393
39. Balmukund v. Kamlawati. AIR 1964 SC 1385
40. R. Kuppayee v. Raja Gounder (2004) ISCC 295.
41. M/s Nopany Investment (P) Ltd. v. Santokh Singh (HC) 2007 (13) JT 448
42. A. Raghaavamma V.A. Chenechamma AIR 1964 SC 136

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Constitutional law-II  
**Subject Code** : BBA LLB 204  
**Class** : B.B.A LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**Objective:** - Constitution of India is the pillar on which the governance of our country rests. The course aims to examine the political. Social and economic value structure of the Constitution of India. The

balancing of positive responsibility of the state to establish an economy of growth, social justice and political aspiration of all section of the India Society through constitutional governance.

The objective of the paper is to aspire the students with the laws relating to system of Governance at the Union and State Level.

### **Unit I: The Union Executive**

8. Forms of Government –Presidential and parliamentary
9. The nature and extent and executive power – the position, Powers and function of the president
10. Procedure for the election and impeachment of president.
11. Constitutional position of the President.
12. Vice President – Power, Function, Election and removal.
13. Council of Ministers.
14. Attorney General of India.

### **State Executive**

5. Constitutional position of Governor.
6. The position, Powers and function of the president
7. Advocate general for the state.
8. Comparison between Presidential Power and Power of Governor.

### **Unit II: Union Legislature & State Legislature**

5. Powers of Chairman- Deputy Chairman, Speaker and Deputy Speaker- their removal from office – salaries and privileges of parliament and its member.
6. Legislative procedure various stages in the enactment of a statute – sittings of house- procedure relating to ordinary bills, money bills and other financial bills.
7. Composition and duration of the house – the Legislative procedure and privileges by the house.
8. The Doctrine of Pleasure.

### **Unit III: Judiciary**

#### **Union Judiciary**

4. Establishments and constitution of the Supreme Court.
5. Qualification, Appointment & removal of Judges.
6. Original, Appellate and Advisory jurisdiction of Supreme Court.

#### **State Judiciary**

6. High Court judges appointment, qualification, condition of services.
7. Removal and Transfer of Judges.
8. Powers and jurisdiction of High Court.
9. Subordinate Courts- appointments of district judges- control over subordinate courts.
10. Doctrine of Stare Decisis.

#### **Unit IV: Legislative relations**

3. Distribution and Legislative Powers between the Union and State
4. Freedom of Trade, Commerce and Intercourse

#### **Unit V: Miscellaneous Provisions**

6. Civil Service under Constitution.
7. Government Liability in contract and torts.
8. Election Commission: Constitution, Powers of election commission.
9. Emergency Provision
10. Constitutional Amendments

#### **Referred Case Laws:**

27. In Re Presidential reference case, Constitutional of India AIR 1951 S.C.332
28. Ram JawayaKapur v. State of Punjab AIR 1955 S.C. 549
29. Indira Gandhi v. Raj Narain AIR 1975 S.C. 2299
30. S.R. Bommai v. Union of India. 1994(3) S.C.C 1
31. A.D.M. Jabalpur v. Shin Shank Shukla, 1976 Suppl. S.C.R. 172
32. A.P. Sampoorana Madhya NishedSamithi&Ors. v. State of A.P. AIR 1997 A.P. 312
33. U.N. Rao v. Indira Gandhi AIR 1971 S.C. 1002
34. KeshavanadBharau v. State of Kerala. 1976(2) S.C.R. 347,523.
35. National Human Rights Commission v. State of Arunachal Pradesh-AIR 1996 S.C. 1234
36. Minerla Mills v. Union of India AIR 1980 S.C. 1804
37. Prafulla Kumar v. Pramfil of Commerce AIR 1947 P.C. 60
38. Union of India v. V.H.S. Dhillon AIR 1972 SC 1061
39. K. Nagraj v. State of A.P. 1985 (1) SCC 527
40. P.V. NarsimhaRao v. State 1998 (94) SCC 626
41. TejKiran v. Sanjiva Reddy AIR 1970 S.C. 1573
42. Roop Ashok Hurrah v. Ashok Hurrah 2002 (3) SCC 406
43. TirupathiBalaji Developers (P) Ltd. v. State of Bihar AIR 2004 SC 2351
44. A.K. Roy V. U01 1982 (2) SCR 272
45. State of Maharashtra v. A. 1 LakshmiruttyAIR 1987 SC 331
46. KihotoHollohah v. Zachillu 1992 suppl.(2) SCC 651
47. G. Vishwanathan. v. Speaker T.N. Assembly 1996 (2) SCC 353
48. M. KashinathJalmi v. Speaker Legislative Assembly Goa 1993(2) SCC 703
49. D.C. Wadhwa v. State of Bihar 1987 (1) SCC 379
50. Krishan Kumar v. State of Bihar 1998(5) SCC 643
51. Makhan Singh v. State of Punjab AIR 1964 SC. 381
- 52.

#### **Books Recommended:**

Text Books:

3. J.N. Pandey- Constitutional Law of India. Central Law Agency

4. M.P. Jain- Constitutional Law, Wadhwa and Company, Nagpur

Reference Books:

6. V.N. Shukla- Constitution of India. Eastern Book Company.
7. D.D.Basu - Introduction to the Constitution of India, Lexis Nexis India
8. H.M. Seervai - Constitutional Law of India, Universal Law Publishing Company Ltd
9. K.C. Wheare - Modern Constitution, Thomas and Hudson 1990
10. P.M. Bakshi - The Constitution of India Universal Law Publication.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Public International Law  
**Subject Code** : BBA LLB 206  
**Class** : B.B.A LL.B. II YEAR  
**Semester** : IV  
**Credit** : 4

**OBJECTIVE:** To apprise the students about the similarities and difference between Municipal law and International Law, various sources, explanation of the term. State including types of states, recognition of state, extradition, asylum, diplomatic agents, Amicable and Coercive modes of settlement of dispute, War, Blockade, evolution of Human Rights and its National and International perspective.

#### **UNIT-I**

1. Definition, Nature and Sanctions of International Law,
2. Relationship between International Law and Municipal Law,
3. Sources and subjects of International Law including position of individual

#### **UNIT-II**

1. State Territory,
2. State Jurisdiction,
3. Recognition of States and Governments,
4. Acquisition and loss of State Territory,

### **UNIT-III**

1. State Succession,
2. Extradition,
3. Asylum,
4. Settlement of Disputes

### **UNIT-IV**

1. Nature, Definition and Effects of War,
2. Belligerent Occupation,
3. War Crimes,
4. Contraband,
5. Blockade,
6. Prize Counts,
7. Enemy Character, Rules of Warfare

### **UNIT-V**

1. Human Rights: Concept of Human Rights,
2. Provisions of U.N. Charter relating to Human Rights,
3. Universal Declaration of Human Rights, 1948 and its Legal Significance,
4. Covenant on Civil and Political Rights, 1966
5. Covenant on Economic, Social and Cultural Rights,
6. National Commission on Human Rights

### **BOOKS RECOMMENDED**

1. Starke's International Law (Oxford University Press Butterworth & Co. publisher Ltd. 11th Ed. 2013)
2. V.K. Ahuja. Public International Law (Lexis Nexis, 1st Ed. 2016)
3. V.C. Govindaraj. Conflict of Laws-Cases and Materials (Lexis Nexis, 1st Ed. 2017)
4. Aggarwal, H.O. Public International Law and Human Rights (Central Law Publications Ed. 2012)
5. Kappor, S.K. International Law (Central Law Publications 2013)
6. Harris, D.J. Cases and Material on International Law (Sweet & Maxwell Ed. 2013)
7. Greig, DW. International Law (Butterworths and Co. (Publishers) Ed. 2007)

**B.B.A.L.L.B 5 YEARS**  
**VTH SEMESTER**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Operation Management**  
**Subject Code : BMA 403**  
**Class : B.B.A LL.B. III YEAR**  
**Semester : V**  
**Credit : 4**



## SCHOOL OF LAW

### B.B.A.L.L.B. 5 YEARS PROGRAMME

**Subject** : Service Marketing  
**Subject Code** : BBALLB 311  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : V  
**Credit** : 4

**Objective:** This course aims at enabling students to apply marketing concepts and principles to the unique challenges and opportunities of services marketing to create customer value.

#### Course Contents:

##### UNIT - I

**Introduction to Services Marketing:** Meaning and Nature of Services Growing Importance of Services Sector; Classification of Services and Marketing Implications; Services Marketing Management Process.

##### UNIT - II

**Understanding Consumer Behavior in Services;** Customer Expectations and Perceptions; Defining and Measuring Service Quality and Customer Satisfaction, Servqual, House of Quality, Return on Quality; GAPs Model; Service Recovery.

##### UNIT - III

**Services Marketing Mix:** Service Positioning, Services Design and Development; Service Blueprinting; Service Process; Pricing of services; Services Distribution Management; Managing the Integrated Services Communication Mix; Physical Evidence and Servicescape; Managing Service Personnel; Employee and Customer Role in Service Delivery.

##### UNIT - IV

**Marketing Applications in Select Service Industries:** IT, Hospitality Services, Airlines, Tourism Services, Health Care and Wellness; Banking and Insurance Services.

#### Text Books

1. Zeithaml V. A., Bitner M. J. and Pandit, A. (2013), Services Marketing, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Lovelock C. H., Wirtz, J. and Chatterjee, J. (2012). Service Marketing: People, Technology, Strategy, Pearson Education, New Delhi.

#### Reference Books

1. Hoffman, K. D. & Bateson, J. E.G. (2012), Marketing of Services, Cengage Learning.
2. Kurtz D. L. and Clow K. E. (2013). Services Marketing. Biztantra, New Delhi.
3. Nargundkar, Rajendra, (2012), Services Marketing Text and Cases, Tata McGraw Hill Publishing Co. Ltd.
4. Fitzsimmons, JA, and Fitzsimmons, M.J (2012) Service Management: Operations, Strategy, and Information Technology, Irwin/McGraw-Hill

**Note: Latest edition of text books may be used**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Law of Crime -I: Indian Penal Code  
**Subject Code** : BBALLB 301  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : V  
**Credit** : 4

**Objectives:** - This paper will deal with the basic principles of criminal law determining Criminal liability and punishment as well as Marital offences.

**Unit I: Introduction to Substantive Criminal Law**

- a. Extent and operation of the Indian Penal Code
- b. Definition of Crime
- c. Constituents Elements of Crime: Actus Reus and Mensrea
- d. Stages in commission of a Crime- Intention, Preparation, and Attempt etc.

**Unit II: General Exceptions (Sections 76-106)**

- l. Definitions
- m. Mistake
- n. Judicial and Executive acts
- o. Accident
- p. Necessity
- q. Infancy
- r. Insanity
- s. Intoxication
- t. Consent
- u. Good Faith
- v. . Private Defence against Body and Property

**Unit-III: Inchoate Forms of Crime**

- a. Joint and Constructive Liability
- b. Criminal Conspiracy
- c. Attempt
- d. Abetment

**Unit-IV: Punishment**

- a. Offence against the State
- b. Offence against Public Tranquillity
- c. Theories of Punishment with special reference to Capital Punishment

**Unit V: Marital Offence**

- c. Offences relating to marriage (Chapter-XX)-Bigamy, Adultery etc.
- d. Offence of cruelty by the Husband or relatives of Husband(Chapter-XXA/Section 498A)

**Text Book References:-**

- 5. RatanlalDhirajLal, The Indian Penal Code, Lexis Nexis, ButterworthsWadhwa, Nagpur, 2012
- 6. K.D. Gaur, TextBook on Indian Panel Code, Universal Law Publishing Co., New Delhi, 2012
- 7. P S A Pillai, Criminal Law, Lexis Nexis, 14<sup>th</sup> Edition,2019
- 8. Bare Act of Indian Penal Code, 1860

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Corporate Law  
**Subject Code** : BBALLB 303  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : V  
**Credit** : 4

**Objectives:** - The fundamental assumptions of corporate law are a well-recognized subject in the legal curriculum and the title of a voluminous literature, its exact scope is not obvious since the word company has no strict legal meaning. This paper revolves around all the basics. Core issues, eminent doctrines/ principles that enhance the faith of the stakeholders towards the corporation thereby helping to understand the corporate culture within the country. Therefore the emphasis in this course is on the fundamental principles, concepts, and doctrines revolving around the subject matter of corporate law covering from pre incorporating to the establishment, management and to winding up of companies' act 2013 and its implications on the corporate sector.

**Unit I: Company Form and Structure**

- (g) Corporate Personality, personification- Concept & Jurisprudential aspects
- (h) Company- Definition, Nature, characteristics
- (i) Classification of companies
- (j) Doctrine of piercing the corporate veil- Statutory exceptions and Judicial interpretations
- (k) Promotion of companies- legal position of promoters, Duties and Liabilities
- (l) Pre-incorporation Contracts

## **Unit II: Company –Registration and Incorporation**

- (g)** Memorandum of Association- Importance and Contents
- (h)** Articles of Association- Significance and interrelationship.
- (i)** Doctrine of Ultra Vires- Applicability, consequences
- (j)** Doctrine of Constructive Notice- Rule of presumption
- (k)** Doctrine of Indoor Management- concept & Exceptions
- (l)** Prospectus (meaning, issue and kinds)

## **Unit III: Corporate Fund Raising**

- (f)** Share/equity Capital- Meaning and nature of shares, Kinds of Shares.
- (g)** Right issue, Bonus Issue- Rationale, mechanism
- (h)** Allotment- principles & procedure
- (i)** Debenture/ Debt Capital- Concept, Meaning and kinds.
- (j)** Debenture vis-à-vis Debenture holder.

## **Unit IV: Corporate management**

- (f)** Directors- Meaning, Types, Qualifications, Disqualifications.
- (g)** Legal position of Directors.
- (h)** Shadow, De-facto and de- jury Director.
- (i)** Powers and duties of directors
- (j)** Meeting- Kinds and Requisites of valid meeting.

## **UNIT V: Corporate Abuse and Remedies**

- (f)** shareholders democracy
- (g)** Majority Powers and Minority Rights.
- (h)** Principle of Non- Interference (Rule established in Foss v Harbottle)
- (i)** Protection against Oppression
- (j)** Protection against Mismanagement.

## **UNIT VI: Corporate Collapse**

- (h)** Winding Up- Meaning and Types
- (i)** Modes of Winding Up and Types
- (j)** Modes of Winding Up and Procedure
- (k)** Winding Up by the Tribunal
- (l)** Voluntary Winding Up
- (m)** Merger and Acquisition of company (e.g. Like Arcelor Mittal and Air India Case)
- (n)** Reconstruction and Amalgamation

### **Text Books:**

- 14. Ramaiyaya, Guide to Companies act, 2013
- 15. Charlesworth& Morse, Company Law
- 16. Gower & Davies, Principles of Modern company law& Practice Taxman
- 17. Sekhar K, SEBI Capital Issues, Debentures and Listing, wadhwa and Company, Nagpur
- 18. C.R. Dutta on the Company law , ^thEdn . 2008 by Kamal Gupta.
- 19. Pennington, company Law.
- 20. K. Majumdar, Dr. G.K. Kapoor Company Law &Practice , taxman
- 21. Nicholas Bourne, Principles of Company law
- 22. Agrawal& Baby on SEBI Act, Taxman Publications.
- 23. Palmer, Company Law
- 24. Nicholas Bourne, Principles of Company Law.

25. H.L.J. Ford and A.p Austen, Ford's Principles of Corporations law, ( 1999) Butterworths
26. Jonathan Charkham, fair share: The Future of shareholders Power and Responsibility.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Labour & Industrial Law-I**  
**Subject Code : BBALLB 305**  
**Class : B.B.A LL.B. III YEAR**  
**Semester : V**  
**Credit : 4**

**Objectives:** -To apprise the students with application of various laws for the raising of living standards of labourers and peaceful of resolution of Industrial DISPUTES. In this regards the functions of Labour Court, strike, Lockout, Role of Trade Unions and the factories act etc. are explained in detail.

#### **Unit-I: THE INDUSTRIAL DISPUTE ACT 1947**

9. Object and main features of the Act.
10. Definitions: Appropriate Government, Employer. Industry, Industrial Dispute, Workmen, Public Utility Service, Industrial Establishment or Undertaking,
11. Authorities under the Act (Section3-9 and 11-15)
12. Notice of change (Section9-A)
13. Reference of Disputes to Boards, Court and Tribunal (Section 10-A)
14. Voluntary Reference of Disputes to Arbitration (Section 10-A)
15. Power of labour Court and Tribunal to give relief in case of Discharge or Dismissal of Workmen( Section 11-A)
16. Awards and Settlement (Section, 16-21)

#### **UNIT-II THE INDUSTRIAL DISPUTES ACT 1947**

7. Definition of Strike and Lockout (section-2), other Statuary Provision of ID Act, 1947 relating to strikes and Lockouts(section- 22-28)
8. Layoff and Retrenchment (section 2, 25A-26E and 25 F- 25H)
9. Compensation to Workmen in case of Transfer of Undertakings (section 25 FF),
10. 60 Days' Notice to be given Intention to Close Down the Undertaking (section 25 FFA)
11. Compensation to workmen in case of closing down of undertaking (section25 FFF), special provision relating to lay off, retrenchment and closure in certain establishments (section 25K- 25 S)
12. Unfair labour practice (section25 I-25 U), scope of section 33 and 36 of ID Act, 1947.

#### **UNIT –III THE TRADE UNIONS ACT, 1926**

6. Development of Trade Unions Law in India,
7. Definition: Executive, Registrar, Trade Union,
8. Registration of Trade Union (section 3-9), Cancellation of Registration (section-10)
9. Appeals (section-II),

10. Incorporation of Registered Trade Union (Section 13),

#### **UNIT –IV: THE TRADE UNIONS ACT, 1926**

8. Right and Liabilities of Registered Trade Union (Section 15-18)
9. Right to inspect Books of trade Union (section 20)
10. Right of Minor to be Membership of trade Union (Section 21)
11. Disqualification of Office Bearers of Trade Unions (Section -21a)
12. Proportion of Office Bearers to be connected with an Industry (section 22)
13. Change of Name and Amalgamation of Trade Union (section 23 to 26)
14. Dissolution and Returns (Section 27 & 28)

#### **UNIT –V: THE FACTORIES ACT, 1948**

10. Definition : Adult, Adolescent, Child Hazardous Process, Manufacturing Process, Worker, factory,
11. Approval of Licensing and Registration of Factories (Section 6)
12. Notice by Occupier and Duties of Occupier (Section 7)
13. Inspector and Certifying Surgeons (section 8 to 10)
14. Statutory Provisions relating to Health and Safety (section 11 to 41)
15. Welfare (section 42 to 50)
16. Working Hours of adult (51-66)
17. Employment of Young Persons (section 67-77)
18. Annual Leave with wages (section 78-84)

#### **Books Recommended**

12. C.B. Memoria and SatishMemoria. Dynamics of industrial relations. (Himalaya publishing House- Mumbai 2007 part II and III. Latest ED.)
13. Dr. V. G. Goswami. Labour and industrial law, (Central Law Agency Allahabad, 2005, part VI. Latest )
14. Nirmalsingh and S. K. Bhatia. Industrial relations and Collective bargaining, (Deep and deep publications Pvt. Ltd.- Delhi Ed. 2000.)
15. Srivastava K. Industrial Peace and labour in india, (Kitabmahal Allahabad, Ed. 2003)
16. Indian law Institute. Labour Law labour Relations, (Ed. 2002)
17. Km Pillai. Labour problems and remedies, (Universal Book Traders, Delhi Ed. 2006)
18. SN Mishra. Labour and Industrial Law, (Central law agency , Faridabad , Haryana Ed)
19. HL Kumar. Labour problems and remedies, ( Universal Book Traders, delhi, Ed. 2006)
20. Giri VV, Labour Problems in India Industry, (Asian Publishing House, Bombay, ed. 1965)
21. C.B. Memoria and SatishMemoria. Dynamics of industrial relations,(Himalay Publishing House- Mumbai Ed. 2007 Part VIII)
22. Dr. V. G. Goswami. Labour and Industrial law ( Central law agency Allahabad, Ed. 2005 part II, III, IV)

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject Code : BBA LLB 307**  
**Class : B.B.A LL.B. III YEAR**  
**Semester : V**  
**Credit : 4**

**OBJECTIVE:** To explain the students about the importance of ethics in Legal profession, various qualities of advocates, various skills to maintain Bench Bar relation, role of BCI and State Bar Council and various types of contempt of Court as well as leading cases on professional misconduct.

### **UNIT-I**

1. Meaning of Legal Profession
2. Background to Legal Profession in India
3. Meaning and Necessity of Professional Ethics
4. Standards of Professional Conduct and Etiquette

### **UNIT-II**

1. Status and Virtues of an Advocate
2. Qualifications and Disqualification for Enrolment
3. Qualities of an Advocate
4. Right and Various Duties of Advocate
5. Bench-Bar Relation

### **UNIT-III**

1. Establishment of Bar Council of India
2. Functions and Powers of Bar Council
3. Establishment of State Bar Councils
4. Functions and Powers of State Bar Councils

### **UNIT IV**

1. Meaning and Scope of Professional and other Misconducts
2. Background to Law of Contempt
3. Categories of Contempt of Courts
4. Contempt by Lawyers and Judges

### **UNIT V**

1. Powers of State Bar Council to Punish for Professional and other Misconduct
2. Powers of High Court to Punish Contempt of Subordinate Courts

### **BOOKS RECOMMENDED:**

1. S.P. Gupta. Professional Ethics, Accountancy for Lawyers & Bench Bar Relations, (latest Ed.2012)
2. Kailash Rai, Professional Ethics, Accountancy for Lawyers & Bench Bar Relations (Latest Ed 2014)
3. Dr. Sirohi, Professional Ethics, Accountancy for Lawyers & Bench Bar Relations (Latest Ed.2010)



**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Professional Ethics, Lawyer's Accountability & Bar-Bench Relation (Practical)  
**Subject Code** : BBA LLB 351\*  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : V  
**Credit** : 1

**Objective:** This course will be taught in association with the practicing Lawyers / retired Judges/ retired Law Teachers. The students will be given Assignment by the subject teacher. Students will record answer to all the Assignment by preparing a Project File. The Project File

will be evaluated by the Board of Examiners at the time of Practical/ Viva-voce examination.  
The course shall comprise of the following:

### **UNIT: I**

- (1) Historical Perspective and Regulation of Legal Profession.
- (2) Admission, Enrolment and Rights of Advocate, Bar Councils.
- (3) Nature and Characteristics of:
  - (a) Ethics of Legal Profession,
  - (b) Legal Profession

### **UNIT: II**

- (1) Contempt of Court:
  - (a) Civil Contempt
  - (b) Criminal Contempt
  - (c) Punishment for Contempt
  - (d) Defences Against Contempt.
  - (e) Constitutional Validity of Contempt Law.
  - (f) Contempt by Lawyers, Judges, State, and Corporate Bodies

### **UNIT: III**

Strike by the Lawyers

### **UNIT: IV**

Extent of Professionalization of Legal Profession

- (c) Code of Ethics for Lawyers
- (d) Professional Misconduct and its Control

### **UNIT: V**

4. Bar-Bench Relations
5. Accountability of Lawyers towards Court, Clients and Society
6. Role of Law and Legal Profession in Social Transformation

### **BOOKS RECOMMENDED**

4. Gupta S.P., Professional Ethics, Accountancy for Lawyers & Bench Bar Relations.
5. Rai Kailash, Professional Ethics, Accountancy for Lawyers & Bench Bar Relations.
6. Sirohi (Dr.), Professional Ethics, Accountancy for Lawyers & Bench Bar Relations.

**B.B.A.L.L.B 5 YEARS  
VITH SEMESTER**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Entrepreneurship Development  
**Subject Code** : BBALLB 223  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objectives:** It provides exposure to the students to the entrepreneurial cultural and industrial growth so as to prepare them to set up and manage their own small units.

**Course Contents**

**Unit I Hours: -10**

**Introduction:** The Entrepreneur: Definition, Emergence of Entrepreneurial Class; Theories of Entrepreneurship.

**Unit II Hours: -10**

**Promotion of a Venture:** Opportunity Analysis; External Environmental Analysis Economic, Social and Technological; Competitive factors; Legal requirements of establishment of a new unit and Raising of Funds; Venture Capital Sources and Documentation Required, Forms of Ownership.

**Unit III Hours: -12**

**Entrepreneurial Development Programmes (EDP):** EDP, Their Role, Relevance and Achievements; Role of Government in Organizing EDP's Critical Evaluation.

**Role of Entrepreneur:** Role of an Entrepreneur in Economic Growth as an Innovator, Generation of Employment Opportunities, Complimenting and Supplementing Economic Growth, Bringing about Social Stability and Balanced Regional Development of Industries: Role in Export Promotion and Import Substitution, Forex Earnings.

1. Hisrich, Robert and Peters, Michael, (2012), Entrepreneurship, McGraw Hill Education.
2. Charantimani, (2014), Entrepreneurship Development and Small Business Enterprise, Pearson Education.

1. Balaraju, Theduri, (2012), Entrepreneurship Development: An Analytical Study, Akansha Publishing House.
2. David, Otes, (2014), A Guide to Entrepreneurship, Jaico Books Publishing House, Delhi.
3. Kaulgud, Aruna, (2012), Entrepreneurship Management, Vikas Publishing House, Delhi.
4. Chhabra, T.N. (2014), Entrepreneurship Development, Sun India.

**Note: Latest edition of text books may be used.**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Sales and Distribution Management  
**Subject Code** : BBALLB 225  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objective:** The course aims to impart the knowledge and skills needed to manage the sales force and distribution functions in a business organization so as to help gain a competitive advantage.

**Course Contents:**

**UnitI Hours: -10**

**Introduction to Sales Management:** Scope and Importance; The Evolving Face of Personal Selling; Personal Selling Process and Approaches; Sales Organization Structure; Sales Strategies, Sales Forecasting; Sales Territory Design.

**UnitII Hours: -12**

**Sales Force Management:** Sales Force Job Description; Recruitment and Selection; Training Sales Personnel; Sales Force Motivation; Compensation; Sales Quotas: Evaluating Sales Performance; Information Technology in Sales Management;

**Unit III Hours: -12**

**Distribution Planning and Control:** Functions of Intermediaries; Types and Role of Channel Intermediaries in India for Consumer and Industrial products: Wholesale and Retail Structure, Channel Strategy and Design; Selection, Motivation and Evaluation of Intermediaries; Managing Channel Dynamics, Relationships and Channel Conflict; Ethical and Legal Issues in Sales and Distribution Management in Indian context.

**UnitIV Hours: -10**

**Distribution System and Logistics:** Physical Distribution System –Objectives and Decision Areas; Customer Service Goals; Logistics Planning; An overview of Transportation, Warehousing and Inventory Decisions; Efficient Supply Chain Management (SCM); Integration of Sales and Distribution Strategy.

**Text Books**

1. Still. K.R., Cundiff. E.W & Govoni. N.A.P (2014). Sales Management. Pearson Education, New Delhi.
2. Rosenbloom, Bert (2014) Marketing Channels: A Management View, Cengage Learning, New Delhi.

**Reference Books**

1. Jobber , David and Lancaster, Geoffery (2012), Selling and Sales Management, Pearson Education, New Delhi
2. Tanner Jr., J.F., Honeycutt Jr., E.D. and Erffmeyer, R.C. (2014), Sales Management:, Pearson Education, New Delhi
3. Panda, T.K. and Sahadev, S (2012) Sales and Distribution Management, Oxford University Press, New Delhi.
4. Havaladar, K K. and Cavale, VM. (2012), Sales and Distribution Management: Text and Cases, Tata McGraw Hill, New Delhi.

# SCHOOL OF LAW

## B.B.A.L.L.B. 5 YEARS PROGRAMME

**Subject** : Law of Crime-II: Criminal Procedure Code  
**Subject Code** : BBALLB 302  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objectives:** - Of all the branches of law, criminal law is the most important branch of law, because it closely touches and concerns man in his day-today affairs. The Criminal Procedure is an inseparable part of the penal law. Without the Criminal Procedure code, the substantive criminal law will become Worthless and meaningless. Our law of criminal procedure is mainly contained in the Code of Criminal Procedure 1973. It provides the machinery for the detection of crime, apprehension of suspected criminals, collection of evidence, determination of the guilt or innocence of the suspected person and the imposition of suitable punishment on the guilty person. With this perspective this subject is designed to make the student understand how the Criminal Procedure Code controls and regulates the working of the machinery set up for the investigation and trial of offence.

### **Unit I:**

10. Constitution of Criminal Courts and Offices (Section 6-25),
11. Power of Courts (Section 26-35),
12. Power of Superior Officers of Police (Section-36),
13. Arrest of Persons (Section 41-60),
14. Difference between Summons and Warrant,
15. Difference between cognizable and non-cognizable offences,
16. Rules regarding Proclamation and attachment( Section 82-86),
17. Difference between Bailable and non-bailable offence,
18. Difference between compoundable and non-compoundable offences

### **Unit II:**

6. Provisions as to Bail and Bonds (Section 436-450),
7. Order for maintenance of wives, children and parents (Section 125-128),
8. Information to the Police and their powers to Investigate (Section 154-176),
9. Jurisdiction of Criminal courts in Inquiries and Trials (Section 177-189),
10. Complaints to Magistrate and commencement of Proceeding Before Magistrate (Section 200-210)

### **Unit III:**

7. The Charge (Section 211-224),
8. Trial before a Court of Session (Section 225-237)
9. Trial of Warrant cases by Magistrates(Section 238-250)
10. Trial of Summons Cases by Magistrate (Section 251-259),
11. Summary Trials (Section 260-265), Plea Bargaining (Section 265-A, 265-L)
- 12. Pleas of Autrefois Acquit and Autrefois Convict (Section 300),**

### **Unit IV:**

The Juvenile Justice (Care and Protection of Children) Act 2015 Section (1-55)

### **Unit V:**

8. The Judgement (Section 353-365),
9. Submission of Death Sentence for confirmation Section (366- 371),
10. Appeals (Section 372-394),
11. Reference and Revision (Section 395-405),
12. Transfer of Criminal Cases (Section 406-412),
13. Limitation for taking cognizance of Certain Offences (Section 467-473),



14. The Probation of Offender Act 1958, Section (1-5 and 12-14)

**BOOKS RECOMMENDED:**

8. C.K. Thakker 'Takwani' & MC. Thakker, Criminal Procedure (Lexis Nexis, New Delhi, 4th Ed.2014)
9. K.N. Chandrasekhar Pillai, Criminal Procedure (Eastern Book Company, Lucknow, 16<sup>th</sup> Ed.2016)
10. RatanLal&Dhirajlal, The Code of Criminal Procedure, (Lexis Nexis, New Delhi, 22<sup>nd</sup> Ed, 2017)
11. NV. Paranjape, the Code of Criminal Procedure, (Central Law Agency, Allahabad, 6<sup>th</sup> Ed.2017)  
Law Commission Reports
12. Forty first Report of the Law commission of India on the Code of Criminal Procedure, 1898
13. Thirty seventh Report of the Law commission of India on the Code of Criminal Procedure, 1898
14. Fourteenth Report of the Law commission of India on the Reform of Judicial Administration

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Law relating to Right to Information  
**Subject Code** : BBALLB 304  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objectives:** The course aims to give knowledge about provisions of the Act- How Right to Information Law is bringing, Transparency and accountability in the working of the government and to study the role of judiciary on RTI and also about Media & Law.

## **UNIT-I: INTRODUCTION**

1. Meaning and Scope of Right to Information
2. Media Access to Official Information
3. Right to Information and Human Rights Violations .
4. Difference between Right to Information and Right to Obtain Information
5. Right to Information Law- Basic Elements
- 6 Factors Restricting Free Flow of Information

## **UNIT-I: THE RIGHT TO INFORMATION ACT, 2005**

1. Preliminary(Section 1 to 2)
2. The Central Information Commission (Section 12 to 14)
- 3.Right to information and Obligations of Public Authorities(Section 3 to 11)
4. The State Information Commission(Section 15 to 17)
5. Powers & Function of the Information Commission, appeals & penalties (Section 18 to20)
6. Miscellaneous (Section 21 to 31)

## **UNIT-III: JUDICIAL ON RIGHT TO INFORMATION**

1. Free flow of Information for Public Record
2. Right to information: Fundamental Right
3. Disclosure of Information
4. Right to Know
- 5.Right to Acquire & Disseminate Information
6. Direction on Voter's Right to Information
7. Third Party Information
8. Public Authority under art, 12 of the Indian Constitution

## **UNIT-IV: MEDIA &LAW.**

1. Media & Criminal Law (Defamation/obscenity/Sedition)
2. Media & Tort Law (Defamation and Negligence)
3. Media and Legislature-Privileges of the Legislature
4. Media and Executive-Official Secrets Act, 1923
5. Media & Judiciary-contempt of Court

## **UNIT-V: MEDIA IN CONSTITUTIONAL FRAMEWORK**

- 1.Freedom of Expression in Indian Constitution
2. Interpretation of Media Freedom
3. Issues of Privacy
4. Pre-Trial by Media and Free Expression
5. Media and Human Rights

## **RECOMMENDED BOOKS**

1. J.N. Barowalia, Commentary on the Right to Information Act (University Law Publication, Delhi,Ed. 2016)
2. P.K. Das, Hand Book on the Right to Information Act (Universal Law Publication, Delhi, Ed 2016)
3. Dheera Khandelwal and KK. Khandelwal, A Commentary and Digest on the Right to

Information Act 2005.(Vol-2, The Bright Law House, Delhi, Ed. 2014)

4. A.S. Yaday, Right to Information Act 2005: An Analysis (Central Law Publication, Allahabad,Ed. 2016)

5. N.V. Paranjape, Right to Information Law in India (Lexis Nexis, Ed. 2014).

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** :Labour& Industrial Law-II  
**Subject Code** : BBALLB 306  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : VI  
**Credit** : 4

**Objectives:** - To apprise the students with application of various laws for the raising of living Standards of labourers. In this regard we teach students about applications of The Workmen's Compensation Act, 1923, the Minimum Wages Act, Law of Gratuity and the Equal Remuneration Act, 1976 in detail.

#### **Unit I: The Employee's Compensation Act, 1923**

8. Main Features of the Act,
9. Definitions Compensation, Dependent, Employer, Workman, Partial Disablement, TotalDisablement,
10. Employer's Liability for Compensation(section-8),
11. Notice and claims of the Accident (section-10),
12. Commissioner (Section 19 to 29),
13. Appeals (section 30),

#### 14. Medical Examination (Section 11)

### **Unit II: The Minimum Wages Act, 1948**

7. Objects and Constitutional Validity of the Act,
8. Salient Features of the Act
9. Definitions: Employer, Cost of Living Index, Scheduled Employment, Wages,
10. Minimum Wages, Fair Wage and Living Wage,
11. Fixation and Revision of Minimum Rates of Wages, Working Hours,
12. Determination of Wages and Claims (section 3, 20 and 21),

### **Unit III: Payment of Wages Act, 1936**

6. Definition, Employer, industrial and other Establishment, Wages,
7. Payment and Deduction from Wages (Section 3-13),
8. Inspector (section 14), :
9. Authority to Hear claims(section 15)
10. Appeal (section-17)

### **Unit IV: The Industrial Employment (Standing Orders) Act, 1946,**

7. Procedure for Certification & Adoption of Standing Orders.
8. Certifying Officer,
9. The Employees' State Insurance Act, 1948
10. Employees' State Insurance Corporation,
11. Standing Committee, Medical Benefit Council,
12. Contributions, Benefits, Employees Insurance Court

### **Unit V: The Equal Remuneration Act, 1976-**

5. Definition Clause
6. Payment of Remuneration at Equal Rates(section 4 to7)
7. Inspector,
8. Penalties and Cognizance of Offences under the Act ,

### **The Payment of Bonus Act, 1965-**

6. Eligibility, Disqualification for Bonus (section 8,9)
7. Minimum & Maximum Bonus (5,10,11);
8. Proportionate Reduction (5, 13)
9. Recovery of Bonus Due (5, 21)
10. Customary Bonus, Productivity Bonus.

### **The Payment of Gratuity Act, 1972.**

3. Definitions, Eligibility, Payment, Determination,
4. Recovery and Protection of Gratuity, Sec. 2-A, 4, 7, 8, and 13

### **BOOKS RECOMMENDED:**

9. C.B. Memoria and Satish Memoria, Dynamics of industrial Relations, (Himalaya Publishing House-Mumbai Part II and III. Ed. 2007
10. Dr. V.G. Go swami. Labour and Industrial law, (Central Law Agency Allahabad,, Part VI. Ed.2005)
11. Nirmal Singh and S.K. Bhatia, Industrial Relations and Collective Bargaining, (Deep and Deep Publications Pvt, Ltd. - Delhi, Ed. 2000.)
12. Srivastava K. Industrial Peace and Labour in India, (Kitab Mahal Allahabad, Ed. 2003)

13. Indian Law Institute. Labour Law and Labour Relations, (Ed. 2002)
14. KM Pillai, Labour and Industrial Law, (Allahabad Law Agency, Faridabad Haryana, Part I. Ed. 2005)
15. S.N. Mishra, Labour and Industrial Law, (Central Law Publications, Allahabad, Part I. Ed. 2004)
16. HL Kumar, Labour problems and remedies, (Universal Book Traders, Delhi, Ed. 2006)

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

<b>Subject</b>	<b>: Arbitration, Conciliation &amp; Alternative Dispute Resolution Systems(Theory)</b>
<b>Subject Code</b>	<b>: BBALLB 308</b>
<b>Class</b>	<b>: B.B.A LL.B. III YEAR</b>
<b>Semester</b>	<b>: VI</b>
<b>Credit</b>	<b>: 4</b>

**Objectives:** -To find out the various Dispute Resolution Techniques used at International and National level. To trace out the differences between most prominent dispute resolution methods including traditional litigation, arbitration (in many forms including International Commercial Arbitration mediation and conciliation etc. The system of ADR is less time consuming as well as informal. Therefore, cost of litigation is also subsequently reduced. With the help of this paper, the students learn new techniques of resolution of disputes in certain cases.

#### **Unit I:**

6. Evolution of ADR, ADR in India,
7. Advantages & disadvantages of ADR,
8. ADR Processes Pretial Mediation,
9. Mediation, Negotiation, Conciliation,
10. ADR in family disputes, Conciliation under CPC

#### **Unit II:**

6. Concept, Meaning & Growth of LokAdalats,
7. LokAdalats under Legal Services Authorities Act, 1987,
8. NyayaPanchayats-Historical Perspectives,
9. Advantages of NyayaPanchayats,
10. Composition & Jurisdiction of NyayaPanchayats

#### **Unit III:**

8. Arbitration & Conciliation Act (Section 1-43),

9. Definition of Arbitration,
10. International Commercial Arbitration,
11. Objectives of the Act,
12. Arbitration Agreement
13. Composition and jurisdiction of Arbitral Tribunal,
14. Conduct of Arbitral Proceedings,

**Unit IV:**

7. Making of Arbitral Awards and Termination of Proceedings,
8. Recourse Against Arbitral Award,
9. Finality and Endorsement of Arbitral Award.
10. Appealable orders,
11. Lien on Arbitral Awards and Deposits as to costs,
12. Effect on Arbitration Agreement of Death and of parties insolvency

**Unit V:**

10. Arbitration & Conciliation Act (Section 44-60),
11. Foreign Awards-Definition,
12. Enforcement of Certain Foreign Awards,
13. New York Convention Awards,
14. Geneva Convention Awards,
15. Convention on Recognition and Enforcement of Foreign Arbitral Awards (Schedule 1), Protocol on Arbitration Clauses (Schedule 11),
16. Convention on Execution of Foreign Arbitral Awards (Schedule III),
17. Conciliation under Arbitration and Conciliation Act, 1996 (Sections 61-81),
18. Role of Conciliator, Confidentiality in conciliation.

**BOOKS RECOMMENDED:**

6. Anupam Kurlwal, An Introduction to Alternative Dispute System (ADR), (Central Law Publication, Allahabad, Ed. 2014).
7. S.C. Tripathi, Arbitration and Conciliation Act, 1996 with Alternative means of settlement of dispute, (Central Law Publication, Allahabad, Ed. 2015).
8. Avtar Singh, Law of Arbitration and conciliation, (Eastern Book Company, Lucknow, Ed. 2013).
9. Ashwinie Kumar Bansal, International Commercial Arbitration Practice and Procedure, (Universal Law Publishing Co., New Delhi, Ed. 2012)
10. G.K. Kwatra, Arbitration and conciliation Law of India, (Universal Law Publication Co. New Delhi, Ed. 2014).

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Arbitration, Conciliation & Alternative Dispute Resolution Systems (Practical)  
**Subject Code** : BBALLB 352\*  
**Class** : B.B.A LL.B. III YEAR  
**Semester** : VI  
**Credit** : 1

**Objectives:** - The Course will be taught partly through class room lectures including simulating exercise and partly through extension programme like Lok-Adalat, etc. The Course will be taught in association with practicing lawyers / retired Judges / retired Law Teachers. The Class room instructions shall include lessons on the concepts and practice of Arbitration, Conciliation and Alternate Dispute Resolution. Students shall be required to maintain the Diary of the Sessional Work for this paper in which they shall record the written exercises assigned to them by the subject teacher during the session and their observations about the field work / training work of LokAdalat etc. organized by the Law Department of the College / University and attended by them. The course shall comprise the followings:

**Unit I:**

3. Existing Justice Delivery System in India - Effectiveness and Menaces.
4. Reforms in the Legal System for Achieving Effective and Speedy Resolution of Disputes Public Interest Litigation

**Unit II:**

3. Alternate Dispute Resolution System - Objectives, Meaning and Advantages.
4. Types of ADR System - Mini Trial, Mediation — Arbitration, Neutral Fact Finding Expert, Early Neutral Evaluation, Court-annexed Arbitration, Mediation and Hybrid Process, Judicial Settlement Conferences etc., Multi-Door Court House.

**Unit III:**

3. Other Amicable Settlement Process-n LOK ADALAT
4. Arbitration Agreement, International Commercial Arbitration, Composition and Jurisdiction of Arbitral Tribunals.

**Unit IV:**

3. Conduct of Arbitral Proceedings and its Termination and Making of Arbitral Award
4. Finality and Enforcement of Arbitral Award - Recourse Against Arbitral Award, enforcement of Foreign awards (New York Convention Awards and Geneva Convention Awards).

**Unit V:**

1. Conciliation - Commencement of Proceedings, Appointment and Role of Conciliators, Submission of Statement to Conciliators, Settlement Agreement, Termination, Cost and Deposits of Proceedings, Protection for Conciliation Proceedings.
2. Mediation - Meaning, Advantages, Techniques, Common Errors of Mediation Advocacy.

**BOOKS RECOMMENDED**

- (j) Rao P.C., Alternative Dispute Resolution,
- (k) Basu N.D., Law of Arbitration and Conciliation.
- (l) Kwatra G.K., The Arbitration and Conciliation Law of India.
- (m) Bansal A.K., Law of International Commercial Arbitration,
- (n) Saraf B.P. & Jhunjhnuwala M., Arbitration and Conciliation.

- (o) Mathotra O.P., The Law and Practice of Arbitration and Conciliation
- (p) Shaffer Thomas L., Legal Interviewing and Counselling in Nutshell.
- (q) Binder David A. & Bergman Paul et al, Lawyers as Counsellors
- (r) Law Commission of India Report :Law Commission of India Report on GramaNyayalayas Law  
Commission of India Report on Urban Litigation- Mediation



# **B.B.A.L.L.B 5 YEARS VIITH SEMESTER**

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** :Project Management  
**Subject Code** : BBALLB 313  
**Class** : B.B.A LL.B. IVYEAR  
**Semester** : VII  
**Credit** : 4

### **Objectives:**

The basic objective of this course is to familiarize the students with the various aspects of Projects and key guidelines relevant to project planning, analysis, financing, selection, implementation and review.

### **Course Contents**

#### **UNIT - I**

**Introduction:** Projects, Project Management, Objectives and Importance of Project Management, Tools and Techniques for Project Management, Project Team, Roles and Responsibilities of Project Manager, Determinants of Project Success.

**Project Life Cycle:** Phases of Project Life Cycle, Classification of Projects.

**Project Management Process and Project Selection:** Process of Project Management, Project Selection Methods, Project Selection Criteria.

**Generation and Screening of Project Ideas:** Generation of Ideas, SWOT Analysis, Monitoring the Environment, Corporate Appraisal, Profit Potential of Industries (Porter Model, analysis for Project Ideas, Preliminary Screening, Project Rating Analysis, Entry barriers Analysis, Review of Project Planning.**Project Organizational Structure:** Forms of Organizational Structure- Functional Organization, Project Organization, Matrix Organization.

#### **UNIT-II**

**Technical Analysis:** Factors Considered in Technical Analysis, Factors Affecting Selection of Locations, Need for Considering Alternatives, Technology Selection, Sources of Technology, Appropriate Technology.

**Market Analysis:** Conduct of Market Survey, Characterization of Market, Market Planning (Introductory aspects only).

**Network Techniques:**Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (Simple problems only).

#### **UNIT-III**

**Financial Estimates and Projections:** Feasibility Study, Types of Feasibility Study, Steps of Feasibility Study, Importance and Steps of Financial Feasibility, Components of Cost of Project and Its Estimation (Introductory aspects only).

**Financing of Projects:** Capital Structure, Sources of Long-term Finance, Debt Financing, Characteristics of Debt, Types of Debts, Equity Financing, Preferential Shares, Equity Shares, Retained Earnings, Short-term Sources for Working Capital, Newer Sources of Finance, Venture Capital.

#### **UNIT-IV**

**Project Evaluation and Control:**Project Monitoring and Controlling,Project Evaluation, Post Project Evaluation (Post Audit), Abandonment Analysis.

**Social Cost Benefit Analysis:**Social Cost, Social Benefit.

**Risk Analysis:** Process of Risk Management, Sources of Risk in Project Management, Managing Risk.

**International Project Management:** Introduction, Types of International Projects, Process of International Project Management, Financing International Projects, Risks Associated with International Projects.

**Emerging Concepts and Issues in Project Management:** Role of Information Technology in Project Management, Future of Project Management. ***Text Book.***

1. Chandra, Prasanna, "Projects: Planning, Analysis, Financing, Implementation and Review", Tata McGraw Hill Publishing Company Limited, 2014.
2. Nagarajan, K., "Project Management", New Age International (P) limited, Publishers, 2015.

#### **Reference Books**

1. R. Panneerselvam. R, Senthilkumar. P., "Project Management", PHI Learning, (P) limited, Publishers, 2013.
2. Maheshwari, S.N., "Financial and Management Accounting", Sultan Chand & Sons, 2012.
3. Jeffrey K. Pinto, "Project Management: Achieving Competitive Advantage", Pearson Education, 2012.
4. Desai, Vasant, "Project Management", Himalaya Publishing House, 2013.

**Note: Latest edition of text books may be used.**

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

<b>Subject</b>	<b>:Property Law</b>
<b>Subject Code</b>	<b>: BBALLB 401</b>
<b>Class</b>	<b>: B.B.A LL.B. IVYEAR</b>
<b>Semester</b>	<b>: VII</b>
<b>Credit</b>	<b>: 4</b>

**Objectives:** - Property Law is one of the basic fundamental laws. It mainly deals with transfer of Immovable Property among the Living persons, the students are made aware regarding the basic

Principles of Transfer of Property as well as specific transfer like Election, Part Performance, Sale, Mortgage, Lease, Charge and Gift. This paper is very useful in practice for advocates since most of the Common disputes are directly and indirectly associate with the Right to Property.

**Unit I:**

7. Object and Scope of the Transfer of Property, 1882,
8. Interpretation Clause(Section-3), Definition of Transfer of Property,
9. Subject Matter of Transfer,
10. Persons competent to Transfer, Oral Transfer,
11. Condition restraining alienation ,restriction repugnant to interest created
12. Transfer for the benefit of Unborn Person

**Unit II:**

7. Rule Against Perpetuity,
8. Vested and Contingent Interests,
9. Conditional Transfer
10. Doctrine of Election
11. Apportionment,
12. Transfer of Property by Ostensible Owner(Section-41)

**Unit III:**

6. Transfer by unauthorized Person who subsequently acquires Interest in Property Transferred,
7. Transfer by One Co-owner,
8. Joint Transfer for Consideration,
9. Priority of Rights created by Transfer,
10. Fraudulent Transfer,
6. Doctrine of LIS-Pendent,
7. Doctrine of Part-Performance

**Unit IV:**

8. Definition of Sale,
9. Rights and Liabilities of Buyer and Seller
10. Marshaling by Subsequent Purchaser,
11. Definition of Mortgage and kinds of Mortgage (Section58-59)
12. Rights and Liabilities of Mortgagor (Section 60 to 66),
13. Rights and Liabilities of Mortgage (Section 67 to 77),
14. Priority (Section 78 to 80).

**Unit V:**

6. Charge (Section 100)
7. Definition of Lease,
8. Rights and Liabilities of Lessor and Lessee (Section105 to 108),
9. Different Modes of Determination of Lease (Section 111),
10. Gift (Section 122 to 129)

**BOOKS RECOMMENDED:**

6. D.F. Mulla. Transfer of Property Act (Lexis Nexislth Ed. 2013)
7. Shukla S.N. Transfer of Property, reprint (Allahabad Law Agency, Ed, 2017)
8. Sinha R.K. The Transfer of Property Act (Central Law Agency Ed. 2016)
9. Tripathi G.P. The Transfer of Property Act (Central Law Publication 19th Ed. 2016)

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Law of Evidence  
**Subject Code** : BBALLB 403  
**Class** : B.B.A LL.B. IV YEAR  
**Semester** : VII  
**Credit** : 4

**Objectives:** - The law of evidence is one of the most important branches of adjective law. Evidence is the pivot on which the whole edifice of administration of justice rests. It involves several questions, such as what is evidence, typology of evidence, how it is produced before a Judicial Authority and what is the role of the evidence in the administration of justice. The study of the law of evidence is most important in the field of legal education

- To acquaint the students with basic principles of the law of evidence;
- To enable them to understand the importance of evidence in the system of administration of justice.
- To enable them to analyse critically the rules of evidence and its application to a given fact situation.

**Unit I:**

7. History of Law of Evidence
8. Meaning Nature, Scope and Object of Evidence,
9. Types of Evidence,
10. Fundamental Rules of Law of Evidence,
11. Fact in issue and relevant facts, Fact Proved, not proved, disproved (S. 3),
12. Presumption(S-4), Relevancy of Facts (S-5-16),

**Unit II:**

8. Res Gestate (Section - 6), Occasion, cause & effect of fact in Issue (Section 7),
9. Motive, Preparation & Conduct (S-8),
10. Identification (S-9),
11. Conspiracy (S-10),

12. Facts not otherwise Relevant (S-11),
13. Relevancy of State of Mind & State of Body & Bodily feeling (Section-14),
14. Evidence of similar occurrences (Section-15)

**Unit III:**

7. Meaning of Admission & Confession (17-31),
8. Difference between Admission & Confession,
9. Circumstances under which confession is admissible and not admissible,
10. Evidentiary value of admission & confession,
11. Dying Declaration, Expert Opinion,

**Unit IV:**

7. Evidence of Character in Civil & Criminal Cases
8. Principles relating to direct evidence (S-60),
9. Law relating to admissibility of documentary evidence (S. 61-66),
10. Proof as to genuineness of document i.e. execution & attestation (S 63-67),
11. Public Document and Private documents (S 74-78),
12. Exclusion of oral by documentary evidence (S-91-99),

**Unit V:**

6. Meaning of Proof & Presumption,
7. On whom burden of proof lies, Standard of Proof in Civil & Criminal Cases
8. Estoppel: Meaning & Scope (115-117), Principles Governing Doctrine of Estoppel,
9. Witness: Meaning, Types (126-127), Who may be a Witness,
10. Privileges of certain witnesses & Communication (135-136),
12. Examination of Witness (137-166)

**BOOKS RECOMMENDED:**

7. S. Sarkar Ahmed Ejaz, Law of Evidence, (Ashoka Law House, Delhi, 6th Ed. 2002)
8. Vepa P Sarathi, Law of Evidence, (Eastern Book Company, 6th Ed. 2006)
9. Ranchhoddas Ratanlal Thakore and Dhiraj Lal, The Law of Evidence, (Wadhwa & Wadhwa, Nagpur, 22nd Ed. 2006)
10. MC. Sarkar, 8.C. Sarkar, Law of Evidence in India, Pakistan, Bangladesh, Burma and Ceylon, (Wadhwa & Wadhwa, Nagpur, 15th Ed. 2000)
11. Wigmore John Henry, Wigmore on Evidence, (Aspen Law & Business Publications 4<sup>th</sup> Ed. 1983)
12. Adrian Zuckerman, The Principles of Criminal Evidence, (Oxford University Press, London, 1989)

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** :Principles of Taxation  
**Subject Code** : BBALLB405  
**Class** : B.B.A LL.B. IVYEAR  
**Semester** : VII  
**Credit** : 4

**Objectives:** - Taxation is a general law made by governments to collect revenue from people and organizations. A tax formula contains at least three elements: the definition of the base, the rate, structure, and the identification of the legal taxpayer. The base multiplied by the appropriate rate gives a product, called the tax liability, which is the legal obligation that the taxpayer must meet at specified dates. A tax is identified by the characteristics of its base, such as income in the case of an income tax. The paper is helpful to the students in understanding the theoretical as well as practical aspects of Taxation Policy of the Government.

#### **Unit I:**

5. Definition: Income-Meaning, Concept, Application and Diversion of. Income, Agricultural Income, Assesse, Assessment year and Previous Year, ResidentialStatus and Tax Liability of Assesse.
6. Distinction between Capital Receipt and Revenue Receipt.
7. Capital Expenditure and revenue.
8. Types of Taxes, Distinction between Direct and Indirect Tax.

#### **Unit II:**

4. Heads of Income
  - Salary
  - Income from house property
  - Capital gains
5. Income of other persons included in Assessee's Total Income
6. Set out and Carry Forward of Losses

#### **Unit III:**

5. Assessment Procedure
6. Rectification of Mistakes
7. Deduction under Section 80 C, 80 CCE, 80 G, 80 U
8. Deductions under Section 80 C, 80 D, 80 CCE, 80 G, 80 U

**Unit IV:**

1. Appeal, Reference and Revision
2. Penalties (Section 271 to 275)
3. Income Tax Authorities
4. Liability in Special Cases (Sec 159-181)

**Unit V:**

5. Rebate of Income Tax (Sec 87-88)
6. Relief from Income Tax (Sec 89)
7. Double Taxation Relief (Sec 90-91)
8. Collection, Recovery and Refund (Sec 190 to 234 and Sec 237-245)

**BOOKS RECOMMENDED:**

5. KailashRai, Taxation Law, (Allahabad Law Agency 16th Ed. 2017)
6. V.K. Singhania. Students Guide to Income Tax (Taxman Publication Pvt. Ltd. Ed. 2015)
7. Kanga &Palkiwala. The Law and Practice of Income Tax (N.M. Tripathi Pvt. Ltd. LatestEd.)
8. Sampathlyengar. Law of Income Tax (Bharat Law House Pvt. Ltd. New Delhi, Ed.2014)gt.

**SCHOOL OF LAW****B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** :Land Laws including Ceiling and other Local Laws  
**Subject Code** : BBALLB 407  
**Class** : B.B.A LL.B. IVYEAR  
**Semester** : VII



**Credit : 4**

**Objectives:** - To create awareness about the concept of Intellectual property, various conventions, Provision of copy Act, 1957, The Trade Mark Act 1999 and The Patents Act 1970. The students can understand the Process of Registration of Copyright work, trade mark and patents with the help of this paper.

**Unit I:**

**PUNJAB LAND REVENUE ACT 1887**

5. Definition of Key Words,
6. Revenue Officers: Their Power and Functions, Preparation of Revenue
7. Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, SijraNasab(Pedigree Table) Sirjra Axe(Map of the Village),
8. Arbitration (Sections 127-135), Concepts & Procedure of Partitions

**Unit II:**

**C. THE PUNJAB TENANCY ACT -1887**

5. Definition of Key Words under the Act,
6. Class of Tenants, Law relating to Rent, Law relating to
7. Occupancy of Tenant,
8. Law of Ejectment of Tenants

**D. HARYANA CEILING OF LAND HOLDING ACT - 1972**

6. Definition of Key Words(Section-3),
7. Concept of Permissible Area and Surplus Area (Ss-4 to 6),
8. Ceiling on Land, Acquisition and Disposal of Surplus Area(SS 7 to 15),,
9. Appeal by the
10. Aggrieved Party (Section-18)

**Unit III:**

**HARYANA RENT CONTROL ACT, 1973**

5. Definitions (SS 1-4),
6. Rights & Duties of Tenants,
7. Rights and Duties of Landlords,
8. Grounds of Ejectment of Tenants.

**Unit IV:**

**HARYANA PANCYAYATI RAJ ACT 1994 (SS 1 to 54) (Chapter 1 to 6)**

7. Definition of Key Words,
8. Constitution of Gram Sabha and Gram Panchayat,
9. Gram Panchayat's Duties,
10. Functions and Powers, Finance and Taxation,

11. Control of Gram Panchayat,
12. Sources of Income and Expenditure of Gram Panchayat.

**Unit V:**

**HARYANA PANCHAYATI RAJ ACT 1994, PANCHAYATI SAMITI  
(CHAPTER 7 TO 11) AND SECTION 55 TO 116)**

6. Definition of Key Words,
7. Conduct of Business of PanchayatSamities,
8. Servant of PanchayatSamities,
9. Duties and Powers of PanachayatSamiti, Finance and Taxation,
10. Sources of Income of PanchayatSamiti, Control of PanchayatSamiti

**BOOKS RECOMMENDED:**

- HarshaliChowdhary, Punjab & Haryana Land Laws, (Central Law Publications, Allahabad, Ist Ed, 2016)
- Badruddin, Commentary on Revenue Laws, Panchayat Laws and Rent Laws, (The LayHouse, Rohtak, 4th Ed, 2015) ;
- NeetyKaul, Land Laws in Punjab and Haryana (Chawla Publications (P) Ltd.,Chandigarh, 6th Ed. 2014),
- P. Narula, Punjab and Haryana Land Laws, (Allahabad Law Agency, Ed. 2012)

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Drafting, Pleading and Conveyance (Theory)  
**Subject Code** : BBALLB 409  
**Class** : B.B.A LL.B. IV YEAR  
**Semester** : VII  
**Credit** : 4

**Objectives:** - The Object is to present the substantive Law in the context of Pleading, Drafting, and Conveyance and show how those transactions are influenced by Legal considerations. A well drafted document instantly attracts the attention of the Court. It develops the skill of drafting of documents among students. It helps the students in making a good lawyer and Judge.

**Unit I:**

7. General Principles of Drafting
8. Fundamental Rules of Pleadings (Civil),
9. Complaint
10. Written Statement
11. Interlocutory Application
12. Amendment of Pleadings

**Unit II:**

7. Affidavit
8. Execution Petition
9. Memorandum of Appeal (Civil)
10. Revision (Civil) .
11. Writ Petition
12. Review

**Unit III:**

7. Petition under Hindu Marriage Act, 1955
8. Complaint (Criminal)
9. Claim petition under Motor Vehicle Act, 1988
10. Bail Application
11. Anticipatory Bail Application
12. Revision (Criminal)  
(138 NIAC + 125 W.P.C)

**Unit IV:**

9. Sale Deed

10. Mortgage Deed
11. Lease Deed
12. Gift Deed
13. Promissory Note
14. Power of Attornecy(GPA & SPA)
15. Will

**Unit V:**

7. Notice
8. Adoption Deed
9. Partnership Deed
10. Exchange Deed
11. Agreement Sale
12. Leave and License

**BOOKS RECOMMENDED:**

- Mulla, D-F.: The Code of Civil Procedure, 1908, (Lexis Nexis, New Delhi 11th Edition 2016)
- Sarkar, The Law of Civil Procedure, (Eastern Book Co., Lucknow 5<sup>th</sup> Ed. 2016)
- Chaturvedi, A.N., Pleading, Conveyancy & Drafting & Legal Professional, (11th Ed. 2016)
- Chaturvedi, R.N. Pleading, Drafting & Conveyancing, (Central Law Agency, Allahbad 4<sup>th</sup> Ed. 2016)
- Dr. A.B. Kafaltiya, Pleading Drafting & Conveyancing, (Universal Lexis Nexis, New Delhi 11th Ed. 2014)

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Drafting, Pleading and Conveyance (Practical)  
**Subject Code** : BBALLB 451  
**Class** : B.B.A LL.B. IVYEAR  
**Semester** : VII  
**Credit** : 1

**Objectives:** - This course aims at acquainting the students about the various fundamentals of drafting to develop the skills of pleading and conveyance. It provides an insight into the functions and objectives of pleadings and suggests tools to help approach the task of drafting Pleadings. The course contents of this study material have been so designed as to provide Practical orientation and develop necessary acumen ship in drafting legal documents. The object is to present substantive laws in the context of pleadings and conveyance and to show how those transactions are influenced by the legal considerations. A well drafted document instantly attracts the attention of the court. Any failure however little in bringing out the material issues would be fatal to the matter under consideration

**Unit I:**

- General Principles of Drafting and relevant substantive rules
- Pleading and its essentials
- Importance in civil and criminal matter

**Unit II:**

- Complaint
- Written Statement
- Interlocutory Application
- Original Petition

**Unit III:**

- Affidavit
- Execution Petition
- Memorandum of Appeal and Revision in civil matters
- Petition under Article 226 and Article 32 of the Constitution of India

**Unit IV:**

- Complaints
- Criminal and Miscellaneous Petition
- Bail Application
- Memorandum of Appeals and Revision in criminal matters

#### **Unit V:**

- Sale Deed
- Mortgage Deed
- Lease Deed
- Gift Deed
- Promissory note
- Power of Attorney (General and Special)
- Will

#### **BOOKS RECOMMENDED:**

- Mulla, D.F.: The Code of Civil Procedure, 1908, (Lexis Nexis, New Delhi 11th Edition 2016)
- Sarkar, The Law of Civil Procedure, (Eastern Book Co., Lucknow 5<sup>th</sup> Ed, 2016)
- Chaturvedi, A.N., Pleading, Conveyancing Drafting & Legal Professional, (11th Bd. 2016)
- Chaturvedi, RN. Pleading, Drafting & Conveyancing, (Central Law Agency, Allahbad 4<sup>th</sup> Ed. 2016)
- Dr. AB. Kafaliya, Pleading Drafting & Conveyancing, (Universal Lexis Nexis, New Delhi Ed. 2014)

**Objectives:** - This course aims at acquainting the students about the various fundamentals of drafting to develop the skills of pleading and conveyancing. It provides an insight into the functions and objectives of pleadings and suggests tools to help approach the task of drafting Pleadings. The course contents of this study material have been so designed as to provide Practical orientation and develop necessary acumen ship in drafting legal documents. The object is to present substantive laws in the context of pleadings and conveyancing and to show how those transactions are influenced by the legal considerations. A well drafted document instantly attracts the attention of the court. Any failure however little in bringing out the material issues would be fatal to the matter under consideration

#### **Unit I:**

- General Principles of Drafting and relevant substantive rules
- Pleading and its essentials
- Importance in civil and criminal matter

#### **Unit II:**

- Complaint
- Written Statement
- Interlocutory Application
- Original Petition

### **Unit III:**

- Affidavit
- Execution Petition
- Memorandum of Appeal and Revision in civil matters
- Petition under Article 226 and Article 32 of the Constitution of India

### **Unit IV:**

- Complaints
- Criminal and Miscellaneous Petition
- Bail Application
- Memorandum of Appeals and Revision in criminal matters

### **Unit V:**

- Sale Deed
- Mortgage Deed
- Lease Deed
- Gift Deed
- Promissory note
- Power of Attorney (General and Special)
- Will

### **BOOKS RECOMMENDED:**

- Mulla, D.F.: The Code of Civil Procedure, 1908, (Lexis Nexis, New Delhi 11th Edition 2016)
- Sarkar, The Law of Civil Procedure, (Eastern Book Co., Lucknow 5<sup>th</sup> Ed, 2016)
- Chaturvedi, A.N., Pleading, Conveyancing Drafting & Legal Professional, (11th Bd. 2016)
- Chaturvedi, R.N. Pleading, Drafting & Conveyancing, (Central Law Agency, Allahbad 4<sup>th</sup> Ed. 2016)
- Dr. A.B. Kafaltiya, Pleading Drafting & Conveyancing, (Universal Lexis Nexis, New Delhi Ed. 2014)





# **B.B.A.L.L.B 5 YEARS**

## **VIIITH SEMESTER**

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Goods and Services tax (GST)  
**Subject Code** : BBALLB315  
**Class** : B.B.A LL.B. IVYEAR  
**Semester** : VIII  
**Credit** : 4

**Objective:** The Objective of the course is to acquaint the student about the introduction of GST in India and the replacement of all Indirect Taxes with GST to make India Level playing field with outside world.

### **Unit-I**

**Indirect Taxes** – Meaning and Types of Indirect Taxes, Central Excise Duty - features, nature, scope, salient features of central excise Duty Act; Procedure for excise registration and documents needed; CENVAT MODVAT provisions; Exemptions to small scale industries; Introduction to custom duties; its types, calculation and related issues.

**Hours: 14**

### **Unit-II**

**VAT** – Introduction, meaning, features, merits and demerits, tax calculation, difference from sales tax, value addition with example; Different forms for VAT; VAT refund; Importance of CST Act 1956 Various Provisions; Different categories; CST Calculations; Introduction to Services Tax Act 2007; Types of Services covered; relevant provisions; Rates of Service Tax and its calculation.

**Hours: 14**

### **Unit-III**

**Goods and Service Tax (GST)** - Constitutional Amendment, Features of GST, Importance and benefits; Difference between GST and other Taxes; Migration to GST; Registration of dealers under GST, Exempted List; Rate Structure under GST; Procedure for obtaining registration certificate, concept of IGST; CGST; SGST and its calculation with working examples.

**Hours: 14**

### **Unit-IV**

**Implementation of GST:** GST Council, its members; composition; its role; GST Infrastructure; Impact of GST on Business; Salient features of GST Model. How to file refund under GST, Transfer of Input Tax credit and its related issues; Penalties and appeals under GST; Future of GST in India.

**Hours: 14**

### **Text Books**

1. Mehrotra H.C., Agrawal V. P., (2016), Indirect Taxes, SahityaBhawan Publication.
2. B. Viswanathan, (2016), Goods and Services Tax in India, New Century Publications.

### **Reference Books**

1. Singhaia Vinod K. & Singhania Monica, (2016), Students Guide to Indirect Tax Laws, Taxman Publications.
2. Datey V S. (2017), All about GST – A Complete guide to model GST Law, 5/e, Taxman Publications.
3. Gupta K Atul, (2016), GST- Concept and Roadmap, 1/e, LexisNexis Publisher.
4. [Ahuja Girish](#) & [Gupta Ravi](#), (2016), Practical Approach to Direct & Indirect Taxes, (Income Tax, Excise, Customs, CST, VAT, Service Tax, & Wealth Tax 34/e, CCH India

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Civil Procedure Code. 1908 (Including Limitation act 1963 & specific Relief act 1963)  
**Subject Code** : BBALLB 402  
**Class** : B.B.A LL.B. IV YEAR  
**Semester** : VIII  
**Credit** : 4

**Objectives:** - The paper will focus on the civil procedures followed in instituting a suit. The students will be familiarized with certain important concepts and practical skill development activity will provide insights into the actual working of the court procedures.

**Unit I: Introduction**

- f. Definitions : Decree, Decree Holder, Foreign Court, Foreign Judgment, Judgment, Judgment Debtor, Legal Representative, Mesne Profits, Order (Sec.2)
- g. Jurisdiction of Civil Courts, Nature of Suits (Sec.9)
- h. Stay of Suits, Res-judicata, Foreign Judgment (Sec.10, Section 11 and Section 13-14)
- i. Place of Suing, Transfer of Suits (Sections. 15-25)
- j. Joinder of Parties, Representative Suits, Splitting of Claims and Relief. Joinder of Cause of Action (Order I & II)

**Unit II: Initial steps in a suit and Execution of a decree**

**C. Initial steps involved in a suit**

- d. Rules of pleadings, Plaint and Written Statement(Order VI,VII and VIII)
- e. Summons to defendants and witnesses ( Sections. 27-32 & Order V &XVI)
- f. Appearance and non-appearance of parties and Inspection (Order IX and X)

#### **D. Execution**

- f. Power and Jurisdiction of Executing Court ( Secs.36- 47, 49-50)
- g. Procedure in Execution (Secs.51-54 & Order XXI Rules 1& 2, Rules 10- 25),- Stayof Execution ( Rules26-29)
- h. Mode of Execution ( Rules 30-36), Arrest and detention (Secs.55-59& Order XXI Rules 37-40)
- i. Attachment of Property and Adjudication of Claims and Objections ( Secs.60- 64&Order XXI Rules41-59)
- j. Sale, Procedure in Sale and Distribution of Assets ( Sectios.65-73 & Order XXI Rules64-96)

### **Unit III: Appeal, Reference, Receive and Revision**

- g. Appeals from Original Decrees, Procedure in Appeals and Powers of Appellate Court (Sections 96- 99A, 107-108 &Order XLI)
- h. Appeals from Appellate Decrees (Secs. 100-103 &OrderXLII)
- i. Appeals to the Supreme Court(Sec.109)
- j. Reference to High Court (Sec. 113,OrderXLVI)
- k. Review (Sec.114 & Order XLVI)
- l. Revision (Sec.115)

### **Unit IV: Suits in Particular Cases**

#### **C. Suits in Particular Cases**

- c. Suit against Government (Sees.79-82)
- d. b. Suit in case of Minors and Indigent Persons(Order XXXII and XXXL)

#### **D. Interim Orders**

- f. Commissions (Sec. 75- 78, Order XXV1),
- g. Arrest before Judgment
- h. Interpleader Suits (Sec.88 &Order XXXV),
- i. Attachment before Judgment
- j. Temporary Injunctions

### **Unit V: Indian Limitation Act**

- e. Salient features of the Limitation Act, Limitation of Suits, Appeals and Application(Secs.3-11)
- f. Exclusion of Time(Sec.12-15)
- g. Effect of Death, Fraud, Acknowledgement, Payments etc. on Limitation (Secs.16-22)

- h. Acquisition of Ownership by Possession ( Sec. 25-27)

**Text Book Reference:**

- d. C.K. Takwani, Code of Civil Procedure, Eastern Book Company, 2010
- e. M.R. Malik, Ganguly's Civil Court, Practice and Procedure, Eastern Law House, 2012.
- f. Mulla, Code of Civil Procedure.

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject : Intellectual Property Law**  
**Subject Code : BBALLB 404**  
**Class : B.B.A LL.B. IVYEAR**  
**Semester : VIII**  
**Credit : 4**

**Objective:-** To create awareness about the concept of Intellectual Properties, various conventions, provisions of Copy Right Act, 1957, The Trade Mark Act 1999 and the Patents Act 1970. The students can understand the process of Registration of Copyright work, trade mark and patents with the help of this paper.

**UNIT- I**

- 7. Concept of Property vis-à-vis Intellectual Property
- 8. Basic concepts of Intellectual Property Law.
- 9. Nature of Intellectual Property Law
- 10. Origin and Development of Intellectual property- Copy Right, Trade Mark & Patent
- 11. Commercial Exploitation of Intellectual Property
- 12. Enforcement of Rights and Remedies Against Infringement.

**Unit-II**

- 5. International Character of Intellectual Property
- 6. Intellectual Property and Economic Development
- 7. International Protection of Intellectual Property- overview of International Conventions
- 8. Berne Convention- WIPO Treaties 1996; Paris Conventions, TRIPS Agreements etc. India's Position vis-à-vis International Conventions and Agreements.

**UNIT-III**

- 8. Object of Patent Law
- 9. Inventions- Patentable and Non-Patentable
- 10. Process Patent and Product patent.
- 11. Procedure for obtaining a patent
- 12. Rights and Obligations of a Patentee
- 13. Revocation and Surrender of Patents.
- 14. –Infringement of Patent.

**UNIT-IV**

- 9. What is a Trade Mark
- 10. Functions of a trade Mark.
- 11. Trade Mark Registry and Register of Trade Mark.
- 12. Registration of Trade Marks.
- 13. Effects Of Registration.
- 14. Assignment and Transmission of Trade Marks.
- 15. Rectification and Correction of Register.
- 16. Passing off and Infringement action.

**UNIT-V**

8. Meaning and Basis of Copyright.
9. Copyright Office and Copyright Board.
10. Subject Matter of Copyright.
11. Ownership, assignment and Infringement of Copyright.
12. Remedies for Infringement
13. Abridgement of the work and Term of Copyright
14. Right of Broadcasting Authorities.

**BOOK RECOMMENDED:**

- David A. Einhorn Intellectual property Law in Cyberspace (3<sup>rd</sup> Ed. 2017)
- Xuan-Thao N. Nguyen, Robert W. Gomulkiewicz, and Danielle M. Conway. Intellectual property, Software, and Information Licensing: Law and Practice (Cumulative supplement Ist Ed. 2017)
- Jerrey A. Maine and Xuan- Thao N. Nguyen. Intellectual Property Taxation: Transaction and Litigation Issues ( Cumulative Supplement 2<sup>nd</sup> Ed. 2017)
- Aline C. Flower. Intellectual Property Technology Transfer ( Supplement 2<sup>nd</sup> Ed. 2016)
- Alexander I Poltroak: Parul J. Lerner. Essentials of Intellectual Property: Law Conomics, and Strategy (Wiley 2<sup>nd</sup> Ed. 2011)
- M.K.Bhandari. Intellectual Property Rights. (Central Law Publication, Ed. 2013)

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject :Information Technology and Cyber Laws**  
**Subject Code : BBALLB 406**  
**Class : B.B.A LL.B. IVYEAR**  
**Semester : VIII**  
**Credit : 4**

**Objective:-**Both the personal and professional worlds are extremely dependent today on the Cyber World. The world is increasingly dependent on network information and communication technologies (ICT). However, with growing dependency, new threats to network and information security have emerged and there is ever-growing rapidly and where ICT are of crucial importance for its economy. Thus, an effort to spread awareness of Cyber Security is the need of the hour and particularly among the law fraternity as these are the persons who must handle the cases of cybercrime. Lawyers, Police, Govt. Officers, Law students and the NGO's must know about the details of the Information technology and the regulatory frame work for the control of Cyber-crimes as they are in contact with the public at large and provide remedial measures for the public problems.

#### **UNIT-I**

##### **3. Basis Concept of Technology and Law**

- Understanding the technology
- Scope of Cyber Laws.
- Cyber Jurisprudence

##### **4. Understanding Electronic Contracts**

- The Indian law of Contract
- Types of Electronic Contracts.
- Constitution of Electronic Contracts

#### **UNIT – II**

##### **1. Copyright in Information Technology**

- Copyright in internet
- Software piracy
- Multimedia and copyright issues

##### **2. Patents**

- Indian position on computer related patents
- International context of patents.

##### **3. Trademarks**

- Trade mark Law in India
- Infringement and passing off.

#### **UNIT-III**

##### **Information Technology Act 2000**

- Digital Signature
- E- Governance
- Regulation of Certifying Authorities
- Duties of Subscribers
- Penalties and Adjudication
- Offences under the act
- Making of Rules and Regulation

#### **UNIT- IV**

##### **3. Understanding Cyber Crimes**

- Crime in context of Internet
- Types of Crime in Internet,

##### **4. Indian penal Law & Cyber Crimes** (Fraud, hacking, Mischief, Trespass, Defamation, Stalking, Spam)

#### **UNIT- V**

##### **2. Issues of Internet Governance**

- i. Issues of Internet Governance, ii. Freedom of Expression in Internet, iii. Issues of Censorship, iv. Hate Speech, v. Sedition, vi. Libel, vii. Subversion, viii. Privacy Issues, ix. International position on Free speech in Internet.

**Book Recommended:**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** :Administrative Laws  
**Subject Code** : BBALLB 408  
**Class** : B.B.A LL.B. IVYEAR  
**Semester** : VIII  
**Credit** : 4

**Objective-**

- 6) The objective of studying of administrative law is to understand the nature of administration and the rule of law.
- 7) To make students understand the nature, scope, concept, necessity and growth of Administrative law.
- 8) To familiarize the students with the conceptual and operational parameters of the general principles of the Administrative Law.
- 9) To make the students understand the difference between Constitutional law and administrative law.



10) To make the students aware of the working of Administration.

### **Course Outcome**

On completion of this course, the students will be able to:

- CO1. Define the objectives of Administrative law and the rule of Law
- CO2. Explain the nature, scope, necessity and development of Administrative Law and action.
- CO3. Identify the basic rules and principles followed to render administrative justice;
- CO4. Identify distinction between the Constitutional Law and Administrative Law
- CO5. Examine the functioning of the special bodies constituted as alternative means for administering justice viz., Administrative Tribunals, Ombudsman, Lokayukta, Lokpal;

This course has 5 units:

### **Unit-1: Introduction**

- 1. Meaning, Definition & Scope of Administrative Law
- 2. Sources & Development of Administrative Law
- 3. Relationship between Constitutional Law and Administrative Law
- 4. Separation of powers & Constitutional law
- 5. Rule of law & Constitutional law
- 6. Distinction between judicial, quasi-judicial and Administrative functions
- 7. Relationship between Constitutional law and Administrative Law

### **Unit-II: Delegated Legislation**

- 1. Delegated Legislation - Definition & Form
- 2. Necessity of Delegated Legislation
- 3. Reasons for the growth of Delegated Legislation
- 4. Types of Delegated Legislation
- 5. General Limitations upon Delegation of Powers - Principles:
  - i. Subsidiarity
  - ii. delegatus non potest delegare
- 6. Droit Administratif

### **Unit-III: Principle of Natural Justice and Rule of Law**

- 1. Natural Justice & Legal Justice
- 2. Basic principles of natural law:
  - i. No man can be judge of his own cause (Dr. Bonham's Case)
  - ii. Audi alteram partem (right to fair hearing)
- 3. Exceptions to the rule of Natural Justice
- 4. Effects of non-compliance with principles of Natural Justice
- 5. Rule against Bias: Principle against arbitrariness: Wednesbury Rule

### **Unit-IV: Adjudication & Judicial Review Power under the Administrative law**

1. Need for Administrative Adjudication
2. Modes of Administrative Decision making
3. Administrative Tribunals
4. Judicial Review of Administrative Actions: Constitutional Framework
5. Doctrine of ultra vires
6. Power to review own Decisions
7. Grounds for review:
  - i. Failure to exercise discretion
  - ii. Excess of discretionary authority
  - iii. Arbitrary exercise of discretion
8. Doctrine of proportionality
9. Doctrine of Legitimate Expectations

## **Unit-V: Administrative Discretion & Mechanism for Control of Administrative Actions**

### **A. Meaning of Discretionary Power & its rationale**

1. Scope of discretion & Grounds for challenging the exercise of Administrative Discretion
2. Abuse of discretion - Study of case-law:
  - a. Non-application of mind
  - b. Improper purpose
  - c. Irrelevant considerations
  - d. Fettering of discretion acting under dictation
3. Sovereign immunity in Administrative Law

### **B. Institutional controls on Administrative Actions**

- a. Public audit
- b. Commissions of Enquiry
- c. Ombudsman in India (Lokpal&Lokayuktha)
- d. The Right to Information Act

### **C. Methods of judicial review**

- a. Statutory appeals
- b. Writs
- c. Declaratory judgments and injunctions
- d. Civil Suits for Compensation

## **TEXTBOOKS:**

1. K. Takwani, Lectures on Administrative Law, Eastern Books Co, Lucknow
2. P. Mittal, Natural Justice Judicial Review & Administrative Law
3. HWR Wade & CF Forsyth, Administrative Law, OUP, 2009.
4. MP Jain, Cases & Materials On Indian Administrative Law, LexisNexis, New Delhi, 1 stedn. 1994
5. TusharKantiSoha, Administrative Law, Kanishka, 2001

## **ARTICLES:**

- 1.Ajoy P.B., Administrative Action and the Doctrine of Proportionality in India, <http://www.iosrjournals.org/iosr-jhss/papers/Vol1-issue6/D0161623.pdf>
- 2.JusticeMarkandeyKatju., Administrative law and judicial review of administrative action, [http://www.ebcindia.com/lawyer/articles/2005\\_8\\_25.htm](http://www.ebcindia.com/lawyer/articles/2005_8_25.htm)

3. Anupa V. Thapliyal, Central Administrative Tribunals and Their Power to Issue Directions, Orders or Writs Under Articles 226 and 227 of the Constitution, <http://www.ebc-india.com/lawyer/articles/92v4a4.htm>

4. Shubham Manoj Khare, Administrative Discretion & Limitation on Administrative Discretion By Article 14 & 16 of the Indian Constitution, [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1465519](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1465519)

5. D.Y. Chandrachud, Constitutional and Administrative Law in India, <http://scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=1142&context=ijli>

6. Prof. S.S. Vishweshwaraiah, Emerging Trends In Administrative Law, <http://elearning.vtu.ac.in/P3/CIP71/5.pdf>

7. A. T. Markose, 'Judicial Control of Administrative Action in India. A Study in Methods.' <http://www.jstor.org/stable/pdfplus/1337434.pdf?acceptTC=true>

8. Y. Pardhasaradhi, Ravinder Kaur, Administrative Reforms for Good Governance, <http://socialsciences.in/article/administrative-reforms-good-governance>

9. 162nd Report of the Law Commission on Central Administrative Tribunal, <http://lawcommissionofindia.nic.in/101-169/report162.pdf>

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

<b>Subject</b>	<b>:Moot Court, Pre-Trial preparation an Participation in Trial Proceeding (including Interviewing Techniques)</b>
<b>Subject Code</b>	<b>: BBALLB 452*</b>
<b>Class</b>	<b>: B.B.A LL.B. IVYEAR</b>
<b>Semester</b>	<b>: VIII</b>
<b>Credit</b>	<b>: 1</b>

# **B.B.A.L.L.B 5 YEARS IXTH SEMESTER**

**SCHOOL OF LAW**

**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Banking & insurance Laws  
**Subject Code** : BBALLB 501  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : IX  
**Credit** : 4

**Objectives:** - The main aim of the course is to apprise the students about the functioning of banks as the same is covered as general utility service. The students are imparted instruction so as to enable them to understand the multi-dimensional functional issues relating to banking system in India. The subject covered customer-banker relationship, as well as issue relating to Money Laundering etc. Further, the importance and relevance of Ombudsman in Banking is specially highlighted in the instruction imparted to the students. The objectives and structural aspects of RBI, Monopoly of Note Issue, Credit Control, and Determination of Bank Rate Policy are also discussed with the students. Moreover, a comprehensive knowledge regarding the Law of Negotiable Instruments is also given to the students.

#### **Unit I:**

- Banking Definition and Meaning
- Bank, Banker, Banking Company
- Commercial Banks and Essential Functions
- Agency Services, General Utility Services, Information Service
- Emergence of Multi- Functional Dimensions
- System of Banking-Unit Banking, Branch Banking, Group Banking and Chain Banking
- Banking Companies in India

#### **Unit II:**

- Customer: Meaning, Legal Character of Banker-Customer Relationship
- Right and Obligation of Banks
- Right to Set Off, Bankers Lien
- Duty of Confidentiality and Exception to the Duty
- Current Accounts, Deposits Accounts, Joint Accounts and Trust Accounts
- Special Types of Customers: Lunatics, Minors, Agents
- Administrators and Executors, Partnership Firms and Companies

#### **Unit III:**

- Control by Government and its Agencies
- Need for Elimination of Systematic Risk
- Avoidance of Money Laundering
- Control by Ombudsman

#### **Unit IV:**

- R.B.I. as Central Bank of India and its

- Characteristics and Functions of Central Banks
- Central Bank as Banker and Advisor of the State
- Central Bank as Bankers Bank
- Objectives and Organizational Structure of R.B.I
- Regulations of the Monetary system, Monopoly of Note Issue, Credit Control, Determination of Bank Rate Policy, Control and Supervision of other Bank

#### **Unit V:**

- Negotiable Instrument and its Kinds
- Holder and Holder in Due Course
- Parties, Payment in Due Course
- Negotiation, Presentment and Discharge from Liability
- Dishonour
- Civil Liability, Procedure for Prosecution, Extent of Penalty
- The Paying Bankers, Duty to Honour Customers Cheques, Exception to the Duty to Honour Cheques, Money Paid by Mistake, Good Faith and Statutory Protection to the Collecting Banker

#### **BOOKS RECOMMENDED:**

- M.L. Tannen. Banking Law and Practice in India (Eastern Book 2<sup>nd</sup> Ed. 2014)
- S.N. Gupta. The Banking Law and Practice in India (Allahabad Law Agency Ed. 2013)
- S.N. Gupta, Banks and the Customer Protection Law (Allahabad Law Agency Ed. 2017 )
- Maurice Megrah & F.R. Ryder, Pagets Law of Banking (Ed. 2014)
- Lord Chorley, Law of banking (Central Law Agency 6<sup>th</sup> Ed. 2011)
- O.P. Faizi. The Negotiable Instruments Act (Butterworth) (Latest Ed.)
- R.K. Bangia. Negotiable Instruments Act (Latest Ed.)
- Avtar Singh, Negotiable Instrument Act (Central Law Agency, 9<sup>th</sup> Ed. 2015)

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Investment Law  
**Subject Code** : BBALLB 503  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : IX  
**Credit** : 4

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Financial Market Regulation  
**Subject Code** : BBALLB 505  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : IX  
**Credit** : 4

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Foreign Trade  
**Subject Code** : BBALLB 507  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : IX  
**Credit** : 4

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Transportation Laws  
**Subject Code** : BBALLB 509  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : IX  
**Credit** : 4



**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Internship (Lawyers / Law firms)  
**Subject Code** : BBALLB 551  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : IX  
**Credit** : 5

**B.B.A.L.L.B 5 YEARS**  
**XTH SEMESTER**

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Bankruptcy & Insolvency  
**Subject Code** : BBALLB 502  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : X  
**Credit** : 4

**Course objective:**

To make students to learn and understand the legal dimensions relating to insolvency and bankruptcy in India and to acquaint the students with legal framework relating with the subjects.

**Course outcomes:**

After the completion of this course students will be able to:

CO1: Discuss the Insolvency and Bankruptcy Regime in India.

CO2: Understand Enforcement Mechanism: CIRP (Corporate Insolvency Resolution Process).

CO3: Explain the Liquidation process, Liquidation Estate and Determination of Claims.

CO4: Define Insolvency Resolution and Bankruptcy for Individuals and Partnership Firm.

## **Unit I: Introduction to Insolvency and Bankruptcy Regime in India & Adjudicating Authorities**

- a) Insolvency and Bankruptcy: Social, Legal, Economic and Financial Perspectives
- b) Need for Insolvency and Bankruptcy Code: Exploring the rationale and objectives
- c) Role of Adjudicating Authorities.
- d) Role of Insolvency and Bankruptcy Board of India (IBBI).
- e) Appellate Authorities and analysis of some important cases.

## **Unit II: Enforcement Mechanism: CIRP (Corporate Insolvency Resolution Process)**

- a) Initiation of Insolvency Resolution Process and Role of Interim Resolution Professional.
- b) Committee of Creditors: Powers, Duties and Processes.
- c) Fast Track Resolution
- d) Cross Border Insolvency: International Perspective

## **Unit III: Liquidation Process**

- a) Role of IP's as a liquidator and
- b) Liquidation process Liquidation Estate: Determination of Claims
- c) Liquidation Estate : Determination of Estate
- d) Voluntary Liquidation

## **Unit IV: Insolvency Resolution and Bankruptcy for Individuals and Partnership Firm**

- a) Fresh start Process
- b) Insolvency Resolution Process
- c) Role of IP in managing claims
- d) Bankruptcy Order
- e) Rights of homebuyers & Insolvency laws

f) Emerging Issues and Development in law and practice of IBC

#### Text and References

- Taxmann's Guide to Insolvency and Bankruptcy Code, 2016.
- Insolvency and Bankruptcy Code 2016 - Bare Act.

## **SCHOOL OF LAW**

### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Corporate Governance  
**Subject Code** : BBALLB 504  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : X  
**Credit** : 4

#### **Objective-**

Corporate governance is the set of processes, customs, policies, laws and institutions affecting the way a corporation is directed or controlled. Emergence of corporate social responsibility affecting all the stakeholders seeks to make the corporations socially responsible. The course aims at providing basic idea about corporate governance and its implications on society and legal system. To make students to learn and understand the various legal dimensions of corporate governance in India and to acquaint the students with legal framework relating with the subjects.

#### **Course Outcome**

On completion of this course, the students will be able to:

1. Understand the concept of corporate governance and the role and importance of its stakeholders.
2. Explain the principles, theories and models of corporate governance.
3. Discuss the students will be familiarized with the legislative framework of corporate governance in India.

4. Explain the concept of corporate social responsibility.
5. Understand corporate frauds, reasons and the ways and means to deal with the same.

It has 4 units which are as follows:

### **Unit I: Corporate Governance**

- a) Importance of Corporate Governance.
- b) Different Systems of Corporate Governance.
- c) Impact of Legal tradition and the Rule of Law on Corporate Governance
- d) Legal reform of Corporate Governance in India.
- e) Reports of various Committees on Corporate Governance.

### **Unit II: Emerging Trends in Corporate Governance**

- a) Emerging Trend in Corporate Governance based on the recommendation of the committees in the Companies Act 2013
- b) Listing Agreement with Special reference to Clause 49.
- c) Women on Corporate Board.
- d) Social Media Governance.
- e) Corporate Governance vis-a- vis Companies Act 2013

### **Unit III: Corporate Social Responsibility**

- a) Introduction to CSR: Meaning & Definition of CSR,
- b) History & evolution of CSR.
- c) Concept of sustainability & Stakeholder Management.
- d) Building a socially responsible business: Challenges & Suggestion.
- e) Statutory provisions & CSR.

### **Unit IV: Corporate Governance and Public Policy**

- a) Transnational Business: Challenges and Opportunities
- b) Corporate Governance and Political Economy
- c) Corporate Governance and Co-operative Governance in India.
- d) Impact of Corporate Governance on Stakeholders: Consumers & Employees.

#### **TEXTBOOKS AND REFERENCES:**

- Saleem Sheikh & William Rees, Corporate Governance & Corporate Control (2002)
- Avtar Singh, Company Law, 2007 Eastern Book Company.
- Companies Act, 1956
- S.K Verma & Suman Gupta, Corporate Governance & Corporate Law Reform in India.(2005)

### **SCHOOL OF LAW**

#### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Mergers and Acquisitions  
**Subject Code** : BBALLB 506  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : X  
**Credit** : 4

### **SCHOOL OF LAW**

#### **B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Equity & Trust  
**Subject Code** : BBALLB 508  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : X  
**Credit** : 4

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Law of project Finance  
**Subject Code** : BBALLB 510  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : X  
**Credit** : 4

**SCHOOL OF LAW**  
**B.B.A.L.L.B. 5 YEARS PROGRAMME**

**Subject** : Dissertation and Viva voce  
**Subject Code** : BBALLB  
**Class** : B.B.A LL.B. VYEAR  
**Semester** : X  
**Credit** : 5

## SCHOOL OF MANAGEMENT SCIENCES

### Scheme for Bachelor of Business Administration (BBA)

BBA			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 101	Management Process & Organizational Behavior	4	0	0	4
2	MA 107/MA-10	Business Mathematics	4	0	0	4
3	BBA 103	Financial Accounting	4	0	0	4
4	BBA 105	Business Economics	4	0	0	4
5	CS-1105	Computer Application	4	0	0	4
6	CS-1155	Computer Application Lab	0	0	4	2
7	PD-191A	Hobby Club	0	1	0	1
Total			20	1	4	23

BBA			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 102	Cost Accounting	4	0	0	4
2	BBA 104	Business Communication	4	0	0	4
3	BBA 106	Managerial Skill Development* (NUES)	2	0	0	2
4	MA 108	Quantitative Techniques	4	0	0	4
5	CS-1206	E-Commerce	4	0	0	4
6	CS-1256	E-Commerce-Lab	0	4	0	4
Total			18	4	0	22



BBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 201	Marketing Management	4	0	0	4
2	BBA 203	Management Accounting	4	0	0	4
3	BBA 205	Business Laws	4	0	0	4
4	BBA 207	Business Ethics and Corporate Social Responsibility	4	0	0	4
5	BBA 209	Indian Economy	4	0	0	4
6	CE-2303	Environmental Science* (NUES)	2	0	0	2
7	PD	<b>PDP</b>	0	1	0	1
		<b>TOTAL</b>	<b>22</b>	<b>1</b>	<b>0</b>	<b>23</b>

BBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 202	Business Environment	4	0	0	4
2	BBA 204	Human Resource Management	4	0	0	4
3	BBA 206	Financial Management	4	0	0	4
4	BBA 208	Research Methodology	4	0	0	4
5	CS-2202	Information System Management	4	0	0	4
6	BBA 252	Research Methodology – Lab	0	0	2	1
7	BBA-001	Minor Project	0	0	2	1
8	PD-	PDP	0	1	0	1
		<b>Total</b>	<b>20</b>	<b>1</b>	<b>4</b>	<b>23</b>

BBA			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 301	Income-tax Law and Practice	4	0	0	4
2	BBA 303	Service Marketing	4	0	0	4
3	BBA 305	Goods & Services Tax (GST)	4	0	0	4
4	BBA 307	Digital Marketing	4	0	0	4
5	BBA 313	Production & Operations Management	4	0	0	4
6	BBA 351	Summer Training Report & Viva Voice	0	0	12	6
7	PD	PDP	0	1	0	1
TOTAL			20	1	12	27

BBA			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 302	Project Management	4	0	0	4
2	BBA 304	Entrepreneurship Development	4	0	0	4
3	BBA 306	Sales & Distribution Management	4	0	0	4
4	BBA 310	International Business Management	4	0	0	4
5	BBA 308	Business Policy & Strategy	4	0	0	4
6	BBA 003	Project Report and Viva-Voce	0	0	12	6
7	PD-	PDP	0	1	0	1
TOTAL			20	1	12	27

## **BBA 101: Management Process & Organizational Behaviour**

**L-4, T-0**

**Credits –4**

**Max Marks: 75**

**Objectives:** The course aims at providing fundamental knowledge and exposure to the concepts, theories and practices in the field of management.

### **Unit I**

**Lectures:- 10**

**Management:** Concept, Nature, Process, Significance; Managerial levels, skills, Functions and Roles; Management vs. Administration; Coordination as Essence of Management.

Development of Management Thought: Classical, Neo-Classical, Behavioral, Systems and Contingency Approaches.

**Planning:** Nature, Scope and Objectives of Planning; Types of plans; Planning Process; Business Forecasting; MBO: Concept, Types, Process and Techniques of Decision-Making; Bounded Rationality. **Organising:** Concept, Principles of an Organization; Span of Control; Departmentation; Types of an Organization; Authority-Responsibility; Delegation and Decentralization;

### **Unit II**

**Lectures: - 12**

**Staffing:** Concept, Nature and Importance of Staffing. Motivating and Leading: Nature and Importance of Motivation; Types of Motivation; Theories of Motivation: Maslow, Herzberg, X, Y and Z; Leadership: Meaning and Importance; Traits of a leader; Leadership Styles – Likert's Systems of Management, Tannenbaum & Schmidt Model and Managerial Grid.

**Controlling:** Nature and Scope of Control; Types of Control; Control Process; Control Techniques – Traditional and Modern; Effective Control System.

### **Unit III**

**Lectures: - 12**

**Organisational Behaviour-1:** Concept and nature of Organizational behavior, O.B. Models, Importance, Challenges and Opportunities,

**Individual & Interpersonal Behaviour:** Personality – Determinants and Traits; Emotions; Learning-Theories, Perception –Process and Errors, Attitudes- Formation, Theories, Relationship between Attitude and Behavior; **Interpersonal Behaviour:** Johari Window; Transactional Analysis – Ego States, Types of Transactions, Life Positions, Applications of T.A

### **Unit IV**

**Lectures: - 10**

**Group Behaviour & Team Development:** Concept of Group and Group Dynamics, Stages of Group Development, Theories of Group Formation; Concept of Team Vs. Group; Types of Teams; Building and Managing Effective Teams.

**Organization Culture and Change Management:** Concept of Organizational Culture, Managing Conflict, Managing Change; Resistance to Change, Managing cross Cultures.

#### **Text Books**

1. Robbins, (2011). Fundamentals of Management: Essentials Concepts and Applications, Pearson Education.
2. Robbins, S.P. and Sanghi, S., (2009), Organizational Behaviour; 13th edition, Pearson Education.
3. Stoner, Freeman and Gilbert Jr. ((2010)) Management, 8th Edition, Pearson Education.

#### **Reference Books**

1. Koontz, H.( 2014), Essentials of Management, McGraw Hill Education.
2. Ghillyer, A, W., (2008) Management- A Real World Approach, McGraw Hill Education.
3. Mukherjee, K, (2009), Principles of Management, 2nd Edition, McGraw Hill Education.
4. Luthans, Fred, (2008), Organizational Behavior, 11th Edition, McGraw Hill Education.

## **MA-107 Business Mathematics**

**L-4, T-0**

**Credits –4**

**Max Marks: 75**

**Objectives:** This course aims at equipping student with a broad based knowledge of mathematics with emphasis on business applications.

### Course Contents

#### **Unit I**

**Hours: - 10**

**Principle of Counting:** Concept of Factorial, Principle of Counting, Mathematical Induction: Principle, Arithmetic Progression & Geometric Progression, Concepts of function.

#### **Unit II**

**Hours: - 14**

**Matrix Algebra:** Definition of a matrix, Types of Matrices, Equality of Matrices, Matrix Operations, Transpose of a matrix, Determinants, System of Linear equations, Cramer's rule, Inverse of a Matrix. Properties of the Inverse Solution to a System of Equations by:

(i) The Ad-joint Matrix Methods.

(ii) The Gaussian Elimination method, Rank of a Matrix, Rank of a System of Equations.

The Echelon Matrix; Application of Matrices to Business Problems Input Output Analysis, Preparation of Depreciation Lapse Schedule, Leontiff I/O Model.

#### **Unit III**

**Hours: - 10**

**Differential Calculus:** Derivative of a Parametric Function, Logarithmic Differentiation Derivative of an Inverse Function, Optimization Using Calculus, Point of Inflexion Absolute and Local-Maxima and Minima, Optimization in case of Multi Variate Function. Lagrangian multipliers, Derivative as a Rate Measure, Applications in Business.

#### **Unit IV**

**Hours: - 10**

**Integral Calculus:** Indefinite Integrals, Techniques of Integration, Definite Integrals, Business application, Consumer's or Producer's surplus, Learning Curve.

#### **Text Books**

1. Trivedi, (2012), Business Mathematics, Pearson Education.
2. Bhardwaj, R.S. (2013). Mathematics and Statistics for Business, Excel Books.

#### **References**

1. Khan, Shadab, (2012) A Text Book of Business Mathematics, Anmol Publications.
2. Raghavachari, M, (2011), Mathematics for Management, McGraw Hill Education.
3. Tuttle, Michael, D., (2012) Practical Business Math: An Applications Approach, Prentice Hall.
4. Hazarika, P. (2010), A textbook of Business Mathematics, S. Chand Publication.

**Note: Latest edition of text books may be used.**

### **MA 109: Business Mathematics**

**L-4 T-0**

**Credit-4**

**Max Marks: 75**

**Objective:** The objective of this course is to familiarize the students with the basic mathematical tools, with an emphasis on applications to business and economic situations.

**Unit-1 Sequence and Series.** Arithmetic Progression (A.P.), Arithmetic Mean (A.M.), Geometric Progression (G.P.), general term of a G.P., sum of n terms of a G.P. Arithmetic and geometric series, infinite G.P. and its sum, geometric mean (G.M.). Relation between A.M. and G.M. Sum to n terms of the special series :  $\sum n$ ,  $\sum n^2$  and  $\sum n^3$ ..

#### **Unit-2:: Matrices**

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). (Here all matrices will have real entries).

**Unit 3:Determinants:**Determinant of a square matrix (up to  $3 \times 3$  matrices), properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

**Unit 4:Differentiation& Integration:**Differentiability, derivative of composite functions, chain rule, derivative of implicit function. Derivatives of exponential, logarithmic functions. functions expressed in parametric forms. Second order derivatives. Integration as inverse process of differentiation. Integration of functions by substitution, by partial fractions and by parts. Definite integrals, Basic properties of definite integrals, Applications in finding the area under simple curves.

#### **Reference Books:**

1. R.D SHARMA FOR ELEMENTARY MATHEMATICS
2. R.S . AGRAWAL FOR FUNDAMENTALS OF MATHEMATICS
3. PRADEEP'S MATHEMATICS LOGICS & FUNDAMENTAL

### **BBA 103: Financial Accounting**

**L-4 T-0**

**Credit-4**

**Max Marks: 75**

**Objectives:** The objective of this subject is to give understanding of the basic accounting principles and techniques of preparing the accounts for users of accounting information.

#### **Course Contents**

##### **Unit I**

**Hours: - 10**

**Meaning and Scope of Accounting:** Objectives and nature of Accounting, Definition and Functions of Accounting, Book Keeping and Accounting, Interrelationship of Accounting with other Disciplines, Branches of Accounting, Limitation of Accounting, Accounting Principles and Standards: Accounting Principles, Accounting Concepts and Conventions, Meaning and relevance of GAAP, Introduction to Accounting Standards Issued by ICAI.

##### **Unit II**

**Hours: - 10**

**Journalizing Transactions:** Journal Entries, compound Journal entries, Opening Entry.

**Ledger Posting and Trial Balance:** Preparation of Ledger, Posting, Cash book, Sales and Purchase book and Trial Balance.

**Company Final Accounts:** Preparation of Final Accounts with adjustments, Trading Account, Profit & Loss Account, Balance Sheet.

##### **Unit III**

**Hours: - 12**

**Depreciation Provisions and Reserves:** Concept of Depreciation, Causes of Depreciation, Basic Features of Depreciation, Meaning of Depreciation Accounting, Objectives of Providing Depreciation, Fixation of Depreciation Amount, Method of Recording Depreciation, Methods of Providing Depreciation, Depreciation Policy, AS-6 (Revised) Provisions and Reserves, Change of method of Depreciation (by both current and retrospective effect).

**Contemporary Issues & Challenges in Accounting:** Human Resource Accounting, Green Accounting, Inflation Accounting, Price level Accounting, Social Responsibility Accounting

#### **Unit IV**

**Hours: - 12**

**Shares and Share Capital:** Introduction to Joint Stock Company, Shares, Share Capital, Accounting Entries, Under Subscription, Oversubscription, Calls in Advance, Calls in Arrears, Issue of Share at Premium, Issue of Share at Discount, Forfeiture of Shares, Surrender of Shares, Right Shares.

**Issue and Listing of Securities:** Stock Exchange of India, Control of SEBI, Regulating business in stock exchange (Elementary Knowledge only).

#### **Text Books**

1. Tulsian, P.C., (2012) Financial Accountancy, Pearson Education.
2. Maheshwari, S.N. and Maheshwari, S. K., (2012) An Introduction to Accountancy, Vikas Publishing House

#### **Reference Books**

1. Bhattacharyya, Asish K., (2010) Essentials of Financial Accounting, Prentice Hall of India.
2. Rajasekran, (2012), Financial Accounting, Pearson Education.
3. Bhattacharya, S.K. and Dearden, J., (2010) Accounting for Manager – Text and Cases. VKP

### **BBA 105: Business Economics**

**L-4, T-0**

**Credit-4**

**Max Marks: 75**

**Objectives:** The objective of this subject is to give understanding of the basic concepts and issues in business economics and their application in business decisions.

#### **Course Contents**

##### **Unit I**

**Hours: - 10**

**Introduction to Business Economics and Fundamental concepts:** Nature, Scope, Definitions of Business Economics, Difference between Business Economics and Economics, Contribution and Application of Business Economics to Business. Micro vs. Macro Economics. Opportunity Costs, Time Value of Money, Marginalism, Incrementalism, Market Forces and Equilibrium, Risk, Return and Profits.

##### **Unit II**

**Hours: - 12**

##### **Consumer Behavior and Demand Analysis:**

Cardinal Utility Approach: Diminishing Marginal Utility, Law of Equi-Marginal Utility. Ordinal Utility Approach: Indifference Curves, Marginal Rate of Substitution, Budget Line and Consumer Equilibrium. Theory of Demand, Law of Demand, Movement along vs. Shift in Demand Curve, Concept of Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Income Elasticity of Demand, Cross Elasticity of Demand, Advertising Elasticity of Demand. Demand Forecasting: Need, Objectives and Methods (Brief)

##### **Unit III**

**Hours: - 12**

**Theory of Production:** Meaning and Concept of Production, Factors of Production and Production function, Fixed and Variable Factors, Law of Variable Proportion (Short Run

Production Analysis), Law of Returns to a Scale (Long Run Production Analysis) through the use of ISO QUANTS.

#### **Unit IV**

**Hours: - 10**

**Cost Analysis & Price Output Decisions:** Concept of Cost, Cost Function, Short Run Cost, Long Run Cost, Economies and Diseconomies of Scale, Explicit Cost and Implicit Cost, Private and Social Cost. Pricing Under Perfect Competition, Pricing Under Monopoly, Control of Monopoly, Price Discrimination, Pricing Under Monopolistic Competition, Pricing Under Oligopoly.

#### **Text Books:**

1. Samuelson, P & Nordhaus, W. (2010) Economics, McGraw Hill Education.
2. Dwivedi, D.N. (2010) Managerial Economics, Vikas Publishing House.

#### **Reference Books:**

1. Salvatore, D. (2014) Managerial Economics in a Global Economy, Oxford University Press.
2. Kreps, D. (2010) Microeconomics for Managers, Viva Books Pvt. Ltd.
3. Mankiw, NG, (2011), Principles of Economics, Cengage Learning.
4. Peterson, L. and Jain (2012), Managerial Economics, Pearson Education.

**Note:** Latest edition of text books may be used.

### **CS-1105 BComputer Application**

**L-4, T -0**

**Credit-4**

**Max Marks: 75**

**Objectives:** This is a basic paper for students to familiarize with computer and it's applications in the relevant fields and exposes them to other related papers of IT.

#### **Course Contents**

##### **Unit I**

**Hours: - 08**

**Basics of Computer:** Characteristics of Computers, Input-output Devices (Hardware, Software, Human ware and Firmware), Function of Different Units of Computer, Classification of Computers. Computer Memory: Primary Memory, Secondary memory.

##### **Unit II**

**Hours: - 10**

**Computer Software:** Types of Software, Introduction to Operating System; Function of OS, Types of Operating Systems, Booting Procedure, Start-up Sequence, Details of Basic System Configuration, Important Terms like Directory, File, Volume, Label, Drive Name, etc; Introduction to GUI using Windows Operating System, Compiler, Interpreter and assembler, Types of languages; word processor and software.

##### **Unit III**

**Hours: - 14**

**Operating System Concept:** Introduction to MS-Word, MS-Excel / Spread Sheets.

**Advanced Excel:** Introduction, features, applications and advanced functions of Excel.

All Directory Manipulations, Operating system commands. Introduction to DBMS, Structure of a DBMS and Advantages of DBMS.

**Protection & Security:** Indian IT Act, Goals of Protection and Security, Concept of Encryption & Decryption, Virus, Worm, Antivirus, Firewall.

**Information Technology and Society:** Application of information Technology in Railways, Airlines, Banking, Online Banking System, Insurance, Inventory Control, Financial systems, Hotel management, Education, entertainment and health, security issues in information technology.

##### **Unit IV**

**Hours: - 12**

**Computer Networks and IT applications:** Data communication concepts, types of communication media, Concepts of Computer Networks, Network topologies, Networking devices, OSI model.

**Concepts of Web Technology:** Internet, Intranet and Extranets; Applications of internet, Basics services over Internet like WWW, FTP, Telnet, Gopher etc., IP addresses, ISPs, URL, Domain Names, Web Browsers, Internet Protocols, Search Engines, e-mail.

**Text Books**

1. Leon and Leon, (2012), Introduction to Information Technology, Vikas Publishing House.
2. Sinha, Pradeep K. Foundations of Computing, (2012), BPB Publisher

**Reference Books**

1. Joseph A.Brady and Ellen F Monk, (2012), Problem Solving Cases in Microsoft and Excel, Thomson Learning.
2. Tanenbaum, A. S., (2011), Computer Networks, Pearson Education.
3. Goyal, Anita, (2012) Computer Fundamentals, Pearson Education.
4. ITL, ESL, (2008) Introduction to Infotech, Pearson Education..

**Note: Latest edition of text books may be used.**

## **CS-1155 Computer Application Lab**

**L-0, T-04**

**Credit-2**

**Max Marks: 60**

**Lab would be based on the following topics:**

**1. All commands specified in unit III using Windows**

**2. Introduction to MS-Word:**

Introduction to Word Processing, it's Features, Formatting Documents, Paragraph Formatting, Indents, Page Formatting, Header and Footer, Bullets and Numbering, Tabs, Tables, Formatting the Tables, Finding and Replacing Text, Mail Merging etc.

**3. Introduction to MS-Excel:**

Introduction to Electronic Spreadsheets, Entering Data, Entering Series, Editing Data, Cell Referencing, ranges, Formulae, Functions, Auto Sum, Copying Formula, Formatting Data, Creating Tables, Graphs and charts, Creating Database, Sorting Data, Filtering etc.  
Advanced Excel: Advanced Functions of MS-Excel.

**4. Introduction to MS PowerPoint:**

PowerPoint, Features of MS PowerPoint Clipping, Slide Animation, Slide Shows, Formatting etc.

**5. Computerized Accounting Software:**

The students must be familiar with preparation of computerized accounts (By using Tally Software or any other popular accounting software): including creation of company, vouchers and recording transactions, preparing reports – cash book and bank book, ledger accounts, trial balance, profit and loss account (income statement) and balance sheets.



**BBA 102: Cost Accounting**  
**Credits: 04**

**L-4, T/P-0,**

**Max Marks: 75**

**Objectives:** The primary objective of the course is to familiarize the students with the basic cost concepts, allocation and control of various costs and methods of costing.

**Course Contents**

**Unit I**

**Hours: 12**

**Meaning and Scope of Cost Accounting:** Basic Cost Objectives and scope of cost accounting, Cost centres and cost units, Difference between financial, cost and management accounting. Basic Cost concepts - Cost classification and elements of cost.

**Materials Control:** Meaning, Steps Involved, Materials and Inventory, Techniques of Material/Inventory Control (EOQ, FSND, ABC, Stock Levels, JIT, VED), Valuation of Inventory (FIFO, LIFO, Weighted average); Practical's of EOQ, stock levels, FIFO, LIFO

**Unit II**

**Hours: 12**

**Labour Cost:** Attendance and payroll procedures, overtime, idle time and incentives, direct and indirect labour, remuneration systems and incentive schemes (Halsey, Rowan, Taylor, Merrick, Bedaux, Emerson plans practical).

**Overheads: Functional analysis** – factory, administration, selling, distribution, research and development, fixed, variable, semi variable and step cost; Factory overheads, Administration overheads and Selling and distribution overheads (in brief about types of overheads). (Overhead rate, Machine rate, under & over absorption practical).

**Unit III**

**Hours: 10**

**Cost Sheet** – Preparation of Cost Sheet (simple problems).

**Process Costing** - Meaning and computation of normal profits, abnormal effectives and abnormal loss.

**Unit IV**

**Hours: 10**

**Contract Costing:** Progress payments, retention money, escalation clause, contract accounts, accounting for material, accounting for plant used in a contract, contract profit and balance sheet entries.

Operating Costing (basic problems related to transport only).

**Text Books**

1. Maheshwari, S. N. and Mittal, S. N. (2015), Cost Accounting – Theory and Problems, Shri Mahavir Book Depot.
2. Arora, M.N., (2012), Cost Accounting, Vikas Publishing House.

**Reference Books**

1. Lal, Jawahar and Srivastava, Seema, (2013), Cost Accounting, McGraw Hill Education.
2. Pandey, I.M., (2014), Management Accounting, Vikas Publishing House, Delhi.
3. R.Palaniappan & Hariharan;(2012),Cost Accounting Theory& Practices,I.K. International Publishing House,Delhi.

## MA 108 – Quantitative Techniques

L-4, T-0

Credits -4

Max Marks: 75

**Objectives:** The objective of this paper is to develop student's familiarity with the basic concept and tools in statistics and operations research. These techniques assist specially in resolving complex problems serve as a valuable guide to the decision makers.

### Course Contents

#### Unit I

Hours: - 10

**Statistics:** Definition, Importance & Limitation, Collection of data and formation of frequency distribution, Graphic presentation of Frequency distribution – Graphics, Bars, Histogram, Diagrammatic.

#### Unit II

Hours: - 10

Measures of Central Tendency – Mean Median and Mode, Partition values – quartiles, deciles and percentiles; Measures of variation – Range, IQR, quartile, deciles and percentiles, quartile deviation and standard deviation and Lorenz Curve.

#### Unit III

Hours: - 10

**Correlation Analysis:** Correlation Coefficient; Assumptions of Correlation Analysis; Coefficients of Determination and Correlation; Measurement of Correlation- Karl Person's Methods; Spearman's Rank correlation; Concurrent Deviation the Correlation Coefficient; Pitfalls and Limitations Associated with Regression and Correlation Analysis.

#### Unit IV

Hours: - 14

**Linear Programming:** Concept and Assumptions Usage in Business Decision Making, Linear Programming Problem: Formulation, Methods of Solving: Graphical and Simplex, problems with mixed constraints: Duality; Concept, Significance.

**Transportation and Assignment problems:** General Structure of Transportation Problem, Different Types Methods for Finding Initial Solution by North-West Corner Rule, Least Cost Method and Vogel Approximation Method and Testing for Optimality. Assignment Problem: Different Methods Operations, Scheduling: Scheduling Problems, Shop Floor Control, Gantt Charts, Principles of Work Center Scheduling, Principles of Job Shop Scheduling, Personnel Scheduling.

#### **Text Books:**

1. Vohra, N.D., (2011) Quantitative Techniques in Management, McGraw Hill Education.
2. Gupta, SP and Gupta, P.K. (2013), Quantative Techniques and Operation Research, Sultan Chand.

#### **Reference Books**

1. Rajagopalan, S. & Sattanathan, R., (2011) Business Statistics & Operations Research, McGraw Hill.
2. Sharma, J.K., (2010) Operations Research: Problems & Solutions, Macmillan India Ltd.
3. Render, Barry, Stair, R.M., Hanna, M.E., Badri, (2012) Quantitative Analysis for Management, Pearson Education.
4. Vishwanathan, P.K., (2010) Business Statistics and Applied Orientation, Pearson Education.

**Note: Latest edition of text books may be used.**

L-4, T-0,

**CS-1206 E-Commerce**  
**Credits: 04**

**Max Marks: 75**

**Objectives:** The course imparts understanding of the concepts and various application issues of e-business like Internet infrastructure, security over internet, payment systems and various online strategies for e-business.

**Course Contents**

**Unit I**

**Hours: - 12**

**Introduction to E-Commerce:** Electronic Business, Electronic Commerce, Types of Electronic Commerce, Benefits, Limitations and Barriers of E-commerce, Electronic Commerce Models, Value Chains in Electronic Commerce, E-Commerce in India., Web Based Tools for Electronic Commerce, e-Marketing, Intranet, Composition of Intranet, Business Applications on Intranet, Extranets. Electronic Data Interchange, Components of Electronic Data Interchange, Electronic Data Interchange Communication Process.

**Unit II**

**Hours: - 12**

**Security Issues in e-business:** Basic E-Commerce Security issues, Electronic Commerce Threats, E-Commerce Security Strategy, Encryption, Digital Signatures, Digital Certificates, Securing E-commerce Networks: Firewalls, Personal Firewalls, IDS, VPNs, Public Key Infrastructure (PKI) for Security.

**Unit III**

**Hours: - 10**

**Electronic Payment System:**

Concept of e-Money, Internet Banking, Electronic Payment System, Types of Electronic Payment Systems, Smart Cards, Infrastructure Issues in EPS, Electronic Fund Transfer.

**Unit IV**

**Hours: - 10**

**e-Business Applications & Strategies:** Business Models & Revenue Models over Internet, Emerging Trends in e-Business, Digital Commerce, Mobile Commerce, Basics of Internet Enabled SCM-e Supply Chain, Strategies for E-Commerce, Internet based Business Models; Legal, Ethical and Societal Impacts of E-Commerce.

**Text Books**

3. Efraim Turban, David King, Dennis Viehland, Jae Lee, (2012): Electronic Commerce – A Managerial Perspective, Pearson Education.
2. Bharat Bhaskar (2013). Electronic Commerce- Framework, Technologies and Applications, Tata McGraw Hill.

**Reference Books**

1. Elias M. Awad (2010). Electronic Commerce-From Vision to Fulfillment, PHI Learning.
4. Dave Chaffey (2013). E-Business and E-Commerce Management- Strategy, Implementation and Practice, Pearson Education.
3. Joseph, P.T. and S.J. (2012). E-Commerce – An Indian Perspective, PHI.
4. Schneider Gary, (2014). Electronic Commerce, Cengage Learning.

**Note: Latest edition of text books may be used.**

## **BBA 104: Business Communication**

**L-4, T-0,**

**Credits: 04**

**Max Marks: 75**

**Objectives:** To train students to enhance their skills in written as well as oral Communication through practical conduct of this course. This course will help students in understanding the principles & techniques of business communication.

### **Course Contents**

#### **Unit I**

**Hours: - 10**

**Fundamental of Communication English and Career Management:** Meaning and significance of communication, Process of Communication, Principles of Effective Business Communication, 7Cs; How To Improve Command Over Spoken and Written English, Self Appraisal, Selection of Job to match your potential, Challenges of 21st Century managing carrier, Art of Effective Listening.

#### **Unit II**

**Hours: - 10**

**Communicating in a Multicultural World:** idea of a global world, Impact of globalization on organizational and multicultural communication, understanding culture for global communication; Etic and Emic approaches to culture, The Cross Cultural Dimensions of Business Communication, Technology and Communication, Ethical & Legal Issues in Business Communication, overcoming cross cultural communication.

#### **UNIT III**

**Hours: - 12**

**Business letter writing and Presentation Tools: Business letters-** Need, Functions and Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters and Complaints; **Employment related letters** Interview Letters, Promotion. Letters, Resignation Letters,

#### **UNIT IV**

**Hours: - 12**

**Departmental Communication:** Barriers of Communication, Meaning, Need and Types, News Letters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, Minutes of the meeting. Project and Report writing, How to Make a Presentation, the Various Presentation Tools, along with Guidelines of Effective Presentation,

#### **Text Books:**

1. Lesikar et al (2014). Business Communication: Making Connections in a Digital World. Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. Boove, C.L., Thill, J.V. & Chaturvedi, M. (2014). Business Communication Today, Pearson.
3. Effective Business Communication. Centre for Education Growth and Research.

#### **Reference Books:**

1. Krizan et al (2014). Effective Business Communication, Cengage Learning.
2. Scot, O. (2012). Contemporary Business Communication, Biztantra, New Delhi.
3. Chaney & Martin (2012). Intercultural Business Communication, Pearson Education

## **BBA 106: Management Skill Development Program**

**L-0, T/P-2**

**Credits: 02**

**Max Marks: 100**

\*NUES: Non University Examination System

**Objectives:** The main aim of the course is to improve the self-confidence and groom the personality. The following topics are indicated as course line and should be explored through application based exercise and workshops to provide fundamental knowledge and exposure to the students.

### **Course Contents**

#### **Unit I**

**Hours: 6**

**Self:** Core Competency, Understanding of Self, Components of Self – Self identity, Self concept, Self confidence and Self image. Skill Analysis and finding the right fit.

#### **Unit II**

**Hours: 6**

**Self Esteem:** Meaning & Importance, Components of self esteem, High and low self esteem, measuring your self esteem and its effectiveness, Personality mapping tests, Appreciative Intelligence.

#### **Unit III**

**Hours: 6**

##### **Building Emotional Competence**

Emotional Intelligence – Meaning, Components, Importance and Relevance, Positive and Negative Emotions.

Healthy and Unhealthy expression of Emotions, The six-phase model of Creative Thinking: ICEDIP model.

#### **Unit IV**

**Hours: 6**

##### **Thinking skills**

The Mind/Brain/Behaviour, Thinking skills, Critical Thinking and Learning, Making Predictions and Reasoning, Memory and Critical Thinking, Emotions and Critical Thinking.

##### **Creativity**

Definition and meaning of creativity, The nature of creative thinking, Convergent and Divergent thinking, Idea generation and evaluation (Brain Storming), Image generation and evaluation.

**Debates, presentations, role plays and group discussions on current topics.**

**Audio and Video Recording of the above exercises to improve the non-verbal communication and professional etiquettes.**

## **CS-1256 E-Commerce Lab**

**L-0, T/P-4**

**Credits: 02**

**Max Marks: 60**

Lab would be based on the Paper 106. The objective of this lab is to understand the various application of e-business like Internet infrastructure, security over internet, payment systems, online transactions and online strategies for e-business.

## **BBA 205: Business Law**

**L-4, T -0**

**Credit-4**

**Max Marks: 75**

**Objective:** The objective of the course is to impart basic knowledge of the important business laws along with relevant case law.

### **Contents**

#### **Unit I:**

**Hours: - 10**

#### **The Indian Contract Act, 1872: General Principle of Law of Contract**

- a) Contract – meaning, characteristics and kinds
- b) Essentials of valid contract - Offer and acceptance, consideration, contractual capacity, free consent, legality of objects.
- c) Contract of Indemnity and Guarantee
- d) Contract of Bailment & Pledge.

#### **Unit II: The Sale of Goods Act, 1930**

**Hours: - 12**

- a) Contract of sale, meaning and difference between sale and agreement to sell.
- b) Conditions and warranties
- c) Transfer of ownership in goods including sale by non-owners
- d) Performance of contract of sale
- e) Unpaid seller – meaning and rights of an unpaid seller against the goods and the buyer.

#### **Unit III:**

**Hours: - 12**

**The Companies Act 1956 with up-to-date Amendments** (Basic elementary knowledge): Essential characteristics of a Company, Types of Companies, Memorandum and Articles of Association, Prospectus, Shares – Kinds, Allotment and Transfer, Debentures, Essential conditions for a valid Meeting, Kinds of Meetings and Resolutions; Directors and Remuneration, Directors, Managing Directors-their Appointment, Qualifications, Powers and Limits on their Remuneration, Prevention of Oppression and Mismanagement.

#### **Unit IV: The Negotiable Instruments Act 1881**

**Hours: - 10**

- a) Meaning and Characteristics of Negotiable Instruments : Promissory Note, Bill of Exchange, Cheque, Crossing of Cheque, Bouncing of Cheques
- b) Holder and Holder in due Course, Privileges of Holder in Due Course.
- c) Negotiation: Types of Endorsements

### **Text Books**

1. Kuchhal, M.C. and Vivek Kuchhal, (2014) *Business Law*, Vikas Publishing House, New Delhi.
2. Maheshwari & Maheshwari, *Principles of Business Law* (2013), Himalaya Pub.House-New Delhi.

### **Reference Books**

1. Ravinder Kumar, *Legal Aspects of Business*, (2013), Cengage Learning
2. Singh, Avtar, *Business Law*, (2014), Eastern Book Company, Lucknow.
3. N.D.Kapoor, (2010) Sultan Chand, New Delhi
4. **Bulchandani K R**, *Business Law for Management*, (2014), Himalaya Pub.House-New Delhi.

## **BBA-201: Marketing Management**

**L-4, T-0**

**Credits -4**

**Max Marks: 75**

**Objectives:** The objective of this paper is to identify the foundation terms and concepts that are commonly used in marketing. This course will give complete relationship between marketing and other management functions.

### **Course Contents**

#### **Unit I**

**Hours: -10**

**Introduction to Marketing:** Nature, Scope and Importance of Marketing, Basic concepts, Marketing Environment, Consumer Behavior, Market Segmentation, Targeting and Positioning.

#### **Unit II**

**Hours: -10**

**Product:** Product Levels, Product Mix, Product Strategy, Product Development, Product Lifecycle and Product Mix.

**Pricing Decisions:** Designing Pricing Strategies and Programmes, Pricing Techniques.

#### **Unit III**

**Hours: -12**

**Place:** Meaning & importance, Types of Channels, Channels Strategies, Designing and Managing Marketing Channel, Retailing, Physical Distribution, Marketing Logistics and Supply Chain Management.

#### **Unit IV**

**Hours: -12**

**Promotion:** Promotion Mix, Push vs. Pull Strategy; Promotional Objectives, Advertising- Meaning and Importance, Types, Media Decisions, Promotion Mix, Personal Selling-Nature, Importance and Process, Sales Promotion – Purpose and Types; Publicity and Public Relations- Definition, Importance and Methods.

**Emerging Issues in Marketing:** Integrated Marketing, Online Marketing, Online Payments, Rural Marketing, Social Marketing, Green Marketing (Introductory aspects only).

#### **Text Books**

3. Kotler, Armstrong, Agnihotri and Haque, (2012), Principles of Marketing- A South Asian Perspective, Pearson Education.
4. Ramaswamy and Namkumar, S., (2013), Marketing Management Global Perspective: Indian Context, McMillan, Delhi.

#### **References**

3. Saxena, Rajan, (2012), Marketing Management, McGraw Hill Education.
4. Lamb, Charles W, (2012), MKTG: a South Asian Perspective, Cengage Learning.
3. Russel, Winer, (2012), Marketing Management, Pearson Education.
4. Kotler, Koshi Jha, (2014), Marketing Management, Pearson Education.

## **BBA 207: Business Ethics and Corporate Social Responsibility**

**L-4, T/P-0,**

**Credits: 04**

**Max Marks: 75**

**Objectives:** The basic objective of this paper is to make the students realize the importance of values and ethics in business. This course endeavors to provide a background to ethics as a prelude to learn the skills of ethical decision-making and, then, to apply those skills to the real and current challenges of the information professions.

### **Course Contents**

#### **Unit-I**

**Hours: -10**

**Introduction:** Concept of Values, Types and Formation of Values, Values and Behaviour, Values of Indian Managers, Ethical Decision Making.

**Ethics:** Management Process and Ethics, Ethical Decision Making, Ethical Issues, Ethos of Vadanta in Management, Relevance of Ethics and Values in Business

#### **Unit-II**

**Hours: -12**

**Knowledge and Wisdom:** Meaning of Knowledge and Wisdom, Difference between Knowledge and Wisdom, Knowledge Worker versus Wisdom Worker, Concept of Knowledge Management and Wisdom management.

**Stress Management:** Meaning, Sources and Consequences of Stress, Stress Management and Detached Involvement.

**Concept of Dharma & Karma Yoga:** Concept of Karama and Kinds of Karam Yoga, Nishkam Karma, and Sakam Karma; Total Quality Management, Quality of life and Quality of Work Life.

#### **Unit-III**

**Hours: -12**

**Understanding Progress, and Success - Results & Managing Transformation:** Progress and Results Definition, Functions of Progress, Transformation, Need for Transformation, Process & Challenges of Transformation.

**Understanding Success:** Definitions of Success, Principles for Competitive Success, Prerequisites to Create Blue Print for Success. Successful Stories of Business Gurus.

#### **Unit-IV**

**Hours: -10**

**Corporate Social Responsibility & Corporate Governance:** Corporate Responsibility of Business: Employees, Consumers and Community, Corporate Governance, Code of Corporate Governance, Consumer Protection Act, Unethical issues in Business

#### **Text Books**

1. Fernando, A.C., (2010), Business Ethics, Pearson education.
2. Hartman, Laura and Chatterjee, Abha, (2010), Perspectives in Business Ethics, McGraw Hill Education.

#### **Reference Books:**

1. Govindarajan.M, Natarajan.S, Senthilkumar, V.S., (2013) Professional Ethics and Human Values, PHI
2. Rao, A.B., (2012), Business Ethics and Professional Values, Excel Book.
3. Manuel G.Velasquez, (2012), Business Ethics Concepts, Printice Hall of India.
4. Sison, Alejo G. Corporate Governance and Ethics, (2010) Edward Elgar Publishing Ltd.



## **BBA 203: Management Accounting**

**L-4 T-0**

**Credits –4**

**Max Marks: 75**

**Objectives:** The objective of the course is to familiarize the students with the basic management accounting concepts and their applications in managerial decision making.

### **Course Contents**

#### **Unit I**

**Lectures:-6**

**Management Accounting:** Nature and Scope, Financial Accounting, Cost Accounting and Management Accounting, Advantages and Limitations of Management Accounting, Role of Management Accountant.

#### **Unit II**

**Lectures:-14**

**Financial Analysis:** Financial Statements and their Limitations, Concepts of Financial Analysis, Tools of Financial Analysis: Comparative Financial Statements, Common Size Financial Statements, Trend Percentages.

**Ratio Analysis:** Nature and Interpretation, Classification of Ratios, Profitability Ratios, Turnover Ratios, Financial Ratios, Utility and Limitations of Ratios.

**Cash Flow Analysis:** Distribution of Cash from Funds, Utility of Cash Flow Statement, Accounting Standard 3 (AS 3: Revised), Construction of Cash Flow Statement.

#### **Unit III**

**Lectures:-10**

**Budgets and Budgetary Control:** Concept of Budgets and Budgetary Control, Advantages and Limitations of Budgetary Control, Establishing a System of Budgetary Control, Preparation of Different Budgets, Fixed and Flexible Budgeting, Performance Budgeting and Zero Base Budgeting, Concept of Responsibility Accounting – Types of Responsibility Centres.

**Standard Costing and Variance Analysis:** Meaning of Standard Cost, Relevance of Standard Cost for Variance Analysis, Significance of Variance Analysis, Computation of Material, Labour Variances.

#### **Unit IV**

**Lectures:-14**

**Marginal Costing and Profit Planning:** Marginal Costing Differentiated from Absorption Costing, Direct Costing, Differential Costing, Key Factor, Break-even Analysis, Margin of Safety, Cost-Volume-Profit Relationship, Advantages, Limitations and Applications of Marginal Costing.

**Decisions Involving Alternative Choices:** Concept of Relevant Costs, Steps in Decision Making, Decisions Regarding Determination of Sales Mix, Exploring new Markets, Discontinuance of a Product Line, Make or Buy, Equipment Replacement, Change Versus Status Quo, Expand or Contract and Shut-Down or Continue.

### **Text Books**

1. Maheshwari, S. N. and Mittal, S. N. (2015), Cost Accounting – Theory and Problems, Shri Mahavir Book Depot.
2. Maheshwari, S.N., (2014), Principles of Management Accounting, Sultan Chand & Sons.

### **Reference Books**

3. Arora, M.N., (2012), Cost Accounting, Vikas Publishing House.
4. Lal, Jawahar and Srivastava, Seema, (2013), Cost Accounting, McGraw Hill Education.
5. Bhattacharya, (2010), Management Accounting, Pearson Education.

## **BBA 209- Indian Economy**

*L-4 T/P-0*

*Credits-4*

**Objectives:** To help the students to understand the basics of Indian economy and to catch up with economic changes occurring at national and international levels.

### **Course Contents**

#### **Unit I**

**Hours: 10**

**Nature of Indian Economy:** The need for Economic Development, causes of under development, determinates of development, National Income of India-estimates, Interregional variations of national income, NITI Aayog (National Institution for Transforming India).

#### **Unit II**

**Hours: 12**

**Human Resources and Economic Development** – Demographic Features of Indian population, size and growth of population and economic development. Problem of over population. Human development Index. New Economy Policy; - Privatization, Liberalization, Globalization. Unemployment problem in India; Problem of Poverty.

#### **Unit III**

**Hours: 12**

**Industrialization-** Growth and problems of major industries-Iron and Steel, Cotton Textiles, Cement, Sugar and Petroleum. Industrial policy. Small scale industries-Problems and policy. Regional imbalances, Parallel Economy. India's foreign trade and balance of payment.

#### **Unit IV**

**Hours: 10**

**Indian Finance System:** Mobilization of resources for development, Fiscal policy. Economic Planning-Importance of planning for Economic development, Salient features of India's five years plans priorities-target achievements, failures, factors affecting successful implementations of plans.

### **Text Books**

1. Datt, and Sundhram, R., (2013), Indian Economy, Sultan Chand & Sons.
2. Dhingra, I C., (2014), Indian Economy, Sultan Chand & Sons.

### **Reference Books**

1. Singh Ramesh (2015), Indian Economy, McGraw Hill Education.
2. Mishra and Puri (2015), Indian economy, Himalaya Publishing House.
3. Banik Nilanjan (2015), The Indian Economy: A Macroeconomic Perspective, Sage India Publisher.
4. Kapila Uma (2015), Indian Economy: Performance and policies, Academic Foundation.
5. Economic survey 2017.

## CE-2303 Environmental Science\*

\*NUES: Non University Examination System

**L-2, T/P-0,**

**Credits: 02**

**Max Marks: 75**

**Objectives:** The basic objective of this paper is to understand the basic fundamental to environmental science, complexity of ecosystems, major environmental problems including their causes and consequences. This course endeavors to provide a background to current and controversial environmental issues and possible solutions to environmental problems.

### **Course Contents**

#### **Unit I**

**Hours: - 06**

**Ecosystems and how they work:** Types of Eco-Systems, Geosphere – Biosphere and Hydrosphere introduction. Major issues of Biodiversity, Conservation of Bio-Diversity.

**Concept of sustainability and international efforts for environmental protection:** Concept of Sustainable Development, Emergence of Environmental Issues. International Protocols, WTO, Kyoto Protocol, International Agreement on Environmental Management.

#### **Unit II**

**Hours: - 06**

**Water Pollution:** Water Resources of India, Hydrological Cycle, Methods of Water Conservation and Management, Rain Water Harvesting and their legal aspects, River Action Plan, Ground and Surface Water Pollution; Waste Water Management.

**Air Pollution:** Air Pollution and Air Pollutants, Sources of Air Pollution and its Effect on Human Health and Vegetations. Green House Effect, Global Warming and Climate Change.

#### **Unit III**

**Hours: -06**

**Solid Waste:** Management – and Various Method Used, Composting, Land Fill Sites etc. Hazardous Waste Management, Biomedical Waste Management.

Environmental Impact Assessment and Environmental Management System - Introduction and its Impact.

#### **UNIT IV**

**Hours: -06**

**Introduction to Indian Environmental laws:** Legal framework, The Indian Penal Code, Role of Judiciary in Environmental Protection, Water (Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution ) Act, 1981,

#### **Text Books**

1. Miller Tyler, G. Jr., (2011), Environmental Science: Working with the Earth, Cengage Learning India Pvt. Ltd.
2. Mishra, S.P., and Panday, S.N., (2014), Essential Environment Studies, Ane Books Pvt. Ltd.

#### **Reference Books**

5. Chhatwal, Rajni Johar (2012), Environmental Science, UDH Publishers & Distributers (P) Ltd.
6. Ghosh Roy, M.K. (2014), Sustainable Development, Ane Books Pvt. Ltd.
7. Asthana, D.K. and Meera. (2014), Textbook on Environmental Studies. S.Chand.
8. Arumugam.N, & Kumaresan.V, (2014) Environmental Science & Engineering, Saras Publication.

## **BBA 202: Business Environment**

**L-4, T-0,**

**Credits: 04**

**Max Marks: 75**

**Objectives:** To familiarize the students with the nature and dimensions of evolving business environment in India to influence managerial decisions and how the Indian Economy is influencing the business environment in India context.

### **Course Contents**

#### **Unit I**

**Hours: - 10**

**An Overview of Business Environment:** Type of Environment-Internal, External, Micro and Macro Environment, Competitive Structure of Industries, Environmental Analysis and Strategic Management, Managing Diversity, Scope of Business, Characteristics of Business, Process and Limitations of Environmental Analysis.

**Structure of Indian Economy:** Concept of Economic Growth and Economic Development, Growth and Development. Basic Characteristics of Indian Economy, Trends in National Income in India.

#### **Unit II**

**Hours: - 10**

**Planning and Economic Development and Problems in Indian Economy:** Industrial Policy-1991, Disinvestments of Public Enterprises; Economic Problems: Poverty, Inequality, Unemployment, Concentration of Economic Power, Low Capital Formation and Industrial Sickness.

#### **Unit III**

**Hours: - 12**

**Concepts of Macro Economics and National Income Determination:** Definitions, Importance, Limitations of Macro-Economics, Macro-Economic Variables, circular flow in 2,3,4 sector and multiplier in 2,3,4 sector.

**National Income:** Concepts, Definition, Methods of Measurement, National Income in India, Problems in Measurement of National Income & Precautions in Estimation of National Income.

**Macro Economic Framework:** Theory of Full Employment and Income: Classical, Modern (Keynesian) Approach, Consumption Function, Relationship between saving and Consumption, Investment function.

#### **Unit IV**

**Hours: - 12**

**Economic Environment:** Nature of Economic Environment, Economic, Nature and Structure of the Economy, Monetary and Fiscal Policies, FEMA, FDI, WTO, GATT.

**Socio-Cultural Environment:** Nature and Impact of Culture on Business, Culture and Globalization, Social Responsibilities of Business.

#### **Text Books**

1. Datt, and Sundhram, R., (2013), Indian Economy, Sultan Chand & Sons.
2. Cherunilam, Francis, (2014), Business Environment - Text and Cases, Himalaya Publishing House.
3. Prabhakaran Paleri (2014), Business Environment, Cengage Learning.

#### **Reference Books**

1. Dhingra, I C., (2014), Indian Economy, Sultan Chand & Sons.
2. Aswathappa, K., (2012), Essentials of Business Environment, Himalaya Publishing House.
3. Gupta C. B., (2012), Business Environment, Sultan Chand.
4. Dwivedi, D. N., (2014) Macro Economics, McGraw Hill Education.

**Note: Latest edition of text books may be used.**

## **BBA 204: Human Resource Management**

**L-4, T-0**

**Credits: 04**

**Max Marks: 75**

**Objectives:** The objective of this course is to make students familiarize with basic concepts of human resource management and people related issues.

### **Course Content:**

#### **Unit I:**

**Hours: -10**

**Human Resource Management:** Concept and Functions, Role, Models, Status of HR , HR Policies, Evolution of HRM. Emerging Challenges of Human Resource Management; workforce diversity, empowerment, Downsizing; VRS; Human Capital; HRIS.

#### **Unit II**

**Hours: -12**

**Human Resource Planning:** Human Resource Planning- Quantitative and Qualitative dimensions; **Recruitment** – Concept and sources; (E-recruitment, recruitment process outsourcing etc.); **Selection** – Concept and process; test and interview; placement induction. Job analysis – job description and job specification; job design; Job Enlargement; Job Enrichment and flexi-time; Career Planning; Succession Planning.

#### **Unit III**

**Hours: -12**

**Training and Development:** Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role Specific and Competency Based Training; Evaluating Training Effectiveness; Management Development; Career Development ;

**Performance appraisal:** Nature and objectives; Techniques of performance appraisal; potential appraisal and employee counseling; Internal mobility – promotions, demotion, transfers and separation. Compensation: concept and policies; job evaluation.

#### **Unit IV**

**Hours: -10**

**Maintenance:** Employee health and safety; employee welfare; social security; Industrial relations- an overview. Grievance handling and redressal Industrial Disputes causes and settlement machinery.

**Strategic HRM:** HRD audit, managing globalization; technology and HRM.

### **Text Books**

1. Gary Dessler. (2013) A Framework for *Human Resource Management*. Pearson.
2. David A. Decenzo, Stephen P. Robbins, Susan L. Verhulst, *Human Resource Management*”, (2015), Wiley India Private Limited.

### **Reference Books**

1. Bohlendar and Snell, Principles of *Human Resource Management*, (2013) Cengage Learning.
2. K. Aswathappa, Human Resource Management (2013), McGraw Hill Education (India) Private Limited.
3. Chhabra, T.N. *Essentials of Human Resource Management*. (2014) Sun India Publication New Delhi.
4. Robert L. Mathis and John Jackson, Human Resource Management (2011), South-Western Publisher.

## **BBA-206: Financial Management**

**L-4, T-0**

**Credit-4**

**Max Marks: 75**

**Objectives:** Efficient Management of a business enterprise is closely linked with the efficient management of its finances. Accordingly, the objective of the course is to acquaint the students with the overall framework of financial decision-making in a business unit.

### **Course Contents**

#### **Unit I**

Hours: -12

**Financial Management: Meaning, Scope, Objectives of Financial Management, Profit Vs. Wealth Maximization. Financial Management and other Areas of Management, Methods of Financial Management, Organization of Finance Function.**

**Sources of Financing: Classification of Sources of Finance.**

#### **Unit II**

Hours: -12

**Capital Structure: Meaning and Theories of Capital Structure: Net Income, Net Operating Income and MM Approach and Traditional Approach, Factors Determining Capital Structure.**

**Cost of Capital: Concept, Importance, Classification and Determination of Cost of Capital (Cost of Equity, Preference, debt and WACC), Leverage: Financial, operating & composite leverage**

#### **Unit III**

Hours: -12

**Capital Budgeting: Concept, Importance and Appraisal Methods: Pay Back Period, Accounting Rate of Return, Net Present Value Method (NPV), Profitability Index, and IRR. Capital Rationing.**

**Dividend Policy: Theories for Relevance and Irrelevance Concepts of Dividend.**

#### **Unit IV**

Hours: -8

**Working Capital Management: Operating cycle, Working Capital Estimation, Concept, Management of cash: Preparation of Cash Budget.**

### **Text Books**

1. Khan M.Y, Jain P.K., (2014), Financial Management, McGraw Hill Education.
2. Pandey I. M., (2015), Financial Management, Vikas Publishing House.
3. Brigham and Houston (2013) Financial Management, CENGAGE Learning

### **Reference Books**

1. Kapil, Sheeba, (2012), Financial Management, Pearson Education.
2. Chandra Prasanna (2011), Financial Management: Theory and Practice, McGraw Hill.
3. Maheshwari, S.N. (2013), Financial Management: Principles and Practice, Sultan Chand.
4. Tulsian, P.C. (2010), Financial Management: A self study textbook, S. Chand.

## **BBA-208 Research Methodology**

**L-4, T-0,**

**Credits: 04**

**Max Marks: 75**

**Objectives:** The objective of this paper is to understand the various aspects of research, identify the various tools available to a researcher. Research Methodology can help the business manager in decision making.

### **Course Contents**

#### **Unit I**

**Hours: -10**

**Introduction:** Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

#### **Unit II**

**Hours: -10**

**Research Process:** An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method, Existing Data Based Research, Longitudinal Studies, Panel Studies, Questionnaire Design.

#### **Unit III**

**Hours: -12**

**Measurement:** Definition; Designing and writing items; Uni-dimensional and Multidimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurston, Likert and Semantic Differential scaling, Paired Comparison, Reliability and Validity Scale.

**Sampling** –Steps, Types, Sample Size Decision; Secondary data sources.

**Hypothesis Testing:** Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests.

#### **Unit IV**

**Hours: -12**

**Report Preparation:** Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification.

**Computerized Data Analysis:** An overview, features, and role of Computerized Data Analysis (Advanced Excel / SPSS or any other analytical software) (Introductory aspects only).

### **Text Books**

1. Malhotra, Naresh, (2010), Marketing Research, Pearson education.
2. Cooper, Donald R. and Schindler, Pamela S. (2014), Business Research Methods, Tata McGraw Hill.
3. Research Methodology for Faculty (2016), Centre for Education Growth and Research Publication.

### **Reference Books**

1. Nargundkar, Rajendra, (2011), Marketing Research: Text and Cases, McGraw Hill Education.
2. Kumar, Ranjit, (2014), Research Methodology: A step by step guide for Beginners. Pearson Education.
3. Levin, Richard and Rubin, DS, (2013), Statistics for Management, Pearson Education.
4. Beri, G.C., (2013), Marketing Research, McGraw Hill Education.
5. Deepak Chawla & Neena Soni, (2016), 2<sup>nd</sup> edition, Vikas Publishing House.



## CS-2202 Information System Management

**L-4 T-0**

**Credit-4**

**Max Marks: 75**

**Objectives:** The objective of the course is to acquaint the students about the concept of information system in business organizations, and also the management control systems.

### Course Contents

#### Unit I

**Hours: -10**

**Introduction:** Definition, Purpose, Objectives, and Role of MIS in Business Organization, pre-requisites for effective MIS, MIS Applications in Business.

**Information in Decision Making:** Meaning and importance, Sources and Types of Information, information requirements with particular reference to Management Levels, Relevance of Information in Decision Making, Strategic Business objectives of information system.

#### Unit II

**Hours: -10**

**Cost Benefit Analysis:** Quantitative and Qualitative Aspects, Assessing Information needs of the Organization.

**System Development:** Concept of System, Types of Systems – Open, Closed, Deterministic, Probabilistic, etc., System Approaches - System Development Life Cycle (SDLC), Prototyping, End User Development, Waterfall and Spiral method, System Analysis, Design and Implementation.

#### Unit III

**Hours: -12**

**Types of information system:** Transaction Processing System, Expert System, Decision Support System, Executive Information system and Knowledge Management System.

**Information Technology:** Recent Developments in the Field of Information Technology, Impact of IT on Organization, Multimedia Approach to Information Processing, Centralized and Distributed Processing.

#### Unit IV

**Hours: -12**

**Emerging Concepts and Issues in Information Systems:** ERP - An overview, Characteristics, and Role of ERP in Business Organization, Customer Relationship Management, Business Intelligence, Introduction to Database, Data Warehousing, Data Mining and its Applications, MIS and Information Security Challenges (Introductory aspects only).

### Text Books

1. Laudon and Laudon, Management Information Systems, Pearson Education, 2014.
2. Javadekar, W.S., "Management Information Systems", Tata McGraw Hill Publication, 2014.

### Reference Books

1. O'Brien, James A., "Management Information System", Tata McGraw Hill, 2014.
2. Davis, B. Gordon, "Management Information System", Tata McGraw Hill Publication, 2012.
3. Goyal D.P., "Management Information Systems", Macmillan Publication, 2014.
4. M Azam, "Management Information System", Tata McGraw Hill, 2012.

## BBA-252 Research Methodology -Lab

**L-0, T/P-2**

**Credit-2**

**Max Marks: 60**



Lab would be based on the Paper 208. The objective of this lab is to understand the various aspects of research, identification and use of various Software tools available to a researcher. Research tools can help the business manager in decision making (By using any popular Software (Advanced Excel / SPSS or any other analytical software)

### **BBA 301: Income Tax Law and Practice**

**L-4, T/P-0,**

**Credits: 04**

**Max Marks: 75**

**Objectives:** The course aims to help students to comprehend the basic principles of the laws governing Direct and Indirect taxes. Students are expected to have only elementary knowledge of the topics specified in the syllabus.

#### **Course Contents**

##### **Unit I**

**Hours: -10**

Introduction to Income Tax Act 1961, Salient Features and Basic Concepts – Previous Year, Assessment Year, Person, Gross Total Income and Agricultural Income, Residential Status and Incidence of Tax, Fully Exempted Incomes

##### **Unit II**

**Hours: -12**

Heads of Income-Salary (perquisites, allowances and retirement benefits), House Property, Business or Profession, Capital Gains, Other Sources

##### **Unit III**

**Hours: -12**

Deductions u/s 80C to 80U, Provisions for Clubbing of Income (simple problems), Meaning and Provisions of Set off and Carry Forward of Losses (simple problems)

##### **Unit IV**

**Hours: -10**

Deduction of Tax at Sources, Payment of Advance Tax, Assessment of Individuals (computation of Total Income and Tax Liability) and Procedure for filing of returns (online filing- ITR).

#### **Text Books**

1. Lal, B.B., (2012), Income Tax and Central Sales tax Law and Practice, Pearson Education.
2. Singhania, V. K and Singhania, Monica, Students Guide to Income Tax, (2015), Taxman Publications.

#### **Reference Books**

1. Ahuja, Girish and Gupta, Ravi, Systematic Approach to Income Tax, (2014), Bharat Law House.
2. Datey, V.S., Indirect Taxes-Law and Practice, (2015), Taxmann Publications.
3. Government of India, Bare Acts (2014), (Income Tax, Service Tax, Excise and Customs).
4. Vashisht, Nitin and Lal, B.B., (2012), Direct Taxes: Income Tax, Wealth Tax and Tax Planning, Pearson Education.

Note: Latest edition of text books may be used.

## **BBA 313: Production & Operations Management**

**L-4, T-0**

**Credit –4**

**Max Marks: 75**

### **Objectives:**

To develop basic understanding of concepts, theories and techniques of production process and operation management.

### **Course Contents**

#### **Unit I**

**Hours: -12**

**Introduction:** Definition, Objectives, Scope and Functions of Production & Operations Management, Types of Production Systems, Transformation Process Model, Systems Perspectives of Operations Management, and Relationship of Operations Management with Other Functional Areas.

**Production Planning and Control:** Objectives, Importance, Levels and Procedures of Production Planning and Control.

**Production Design and Development:** Product Design, Factors determining the Design of a Product, Approaches to Product Design, Product Development Process, and Factors influencing Product Development.

#### **Unit II**

**Hours: -12**

**Plant Location and Layout:** Factors affecting for location, criteria of site selection, Plant Location Methods, Factor Rating, Centre of Gravity Methods, Analytic Delphi Method, Objectives of Plant Layout, Factors affecting for plant layout, Types of layouts-Process, Product and Fixed position layout, Problems in Facility Layout.

**Purchasing and Material Management:** Objectives and Importance of Material Management, Organisation of Material Management, Factors responsible for providing economy in Material Management, Steps in purchasing procedure, and Methods of Purchasing.

#### **Unit III**

**Hours: -10**

**Inventory Management & JIT:** Inventory management and analysis, Inventory Control, Essentials of a good Inventory Control System, Factors affecting Inventory Control Policy, Models / Methods of Inventory Control- EOQ, Re-order Level, ABC analysis, VED analysis, SDE analysis, HML analysis and FSN analysis. Just in Time Implementation Requirements.

**Quality Management Systems and TQM:** TQM, Phases of Quality Control, Specification of Quality, Quality at Source, Zero Defects, Cost of Quality, Continuous Improvement, Benchmarking, Poka-Yokes, ISO (9000&14000 Series), and Six Sigma (Introductory aspects only).

#### **Unit IV**

**Hours: -10**

**Plant Maintenance:** Importance of Maintenance Management, Types of Maintenance- Breakdown, Preventive, Predictive, Routine and Planned Maintenance.

**Emerging Concepts and Issues in Manufacturing Systems:** IT in Modern Production Management, Supply Chain Management, CAD / CAM Systems, ERP in Manufacturing Systems (Introductory aspects only).

### **Text Books**

1. Aswathappa, K. Production and Operation Management, (2011), Himalaya Publishing.
2. Mahadevan, B. Operation Management: theory and practice, (2015), Pearson Education India.

### **Reference Books:**

1. Charry, S., "Production and Operation Management", Tata McGraw-Hill, 2012.
2. Panneerselvam R. "Production and Operation Management", Prentice Hall, 2012.
3. Chase, R.B, et. Al (2011), Operations Management for Competitive Advantage, Tata McGraw Hill, New Delhi.
4. Stevenson W. J (2014). Operations Management, Tata McGraw Hill, New Delhi.

Note: Latest edition of text books may be used.

<b>L-4    T-0</b>	<b>BBA-303 Services Marketing</b> <b>Credits –4</b>	<b>Max Marks: 75</b>
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**Objective:** This course aims at enabling students to apply marketing concepts and principles to the unique challenges and opportunities of services marketing to create customer value.

**Course Contents:**

<b>UNIT - I</b>	<b>Hours: -10</b>
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**Introduction to Services Marketing:** Meaning and Nature of Services Growing Importance of Services Sector; Classification of Services and Marketing Implications; Services Marketing Management Process.

<b>UNIT - II</b>	<b>Hours: -12</b>
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**Understanding Consumer Behavior in Services;** Customer Expectations and Perceptions; Defining and Measuring Service Quality and Customer Satisfaction, Servqual, House of Quality, Return on Quality; GAPs Model; Service Recovery.

<b>UNIT - III</b>	<b>Hours: -12</b>
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**Services Marketing Mix:** Service Positioning, Services Design and Development; Service Blueprinting; Service Process; Pricing of services; Services Distribution Management; Managing the Integrated Services Communication Mix; Physical Evidence and Servicescape; Managing Service Personnel; Employee and Customer Role in Service Delivery.

<b>UNIT - IV</b>	<b>Hours: -10</b>
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**Marketing Applications in Select Service Industries:** IT, Hospitality Services, Airlines, Tourism Services, Health Care and Wellness: Banking and Insurance Services.

**Text Books**

1. Zeithaml V. A., Bitner M. J. and Pandit, A. (2013), Services Marketing, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Lovelock C. H., Wirtz, J. and Chatterjee, J. (2012). Service Marketing: People, Technology, Strategy, Pearson Education, New Delhi.

**Reference Books**

1. Hoffman, K. D. & Bateson, J. E.G. (2012), Marketing of Services, Cengage Learning.
2. Kurtz D. L. and Clow K. E. (2013). Services Marketing. Biztantra, New Delhi.
3. Nargundkar, Rajendra, (2012), Services Marketing Text and Cases, Tata McGraw Hill Publishing Co. Ltd.
4. Fitzsimmons, J.A, and Fitzsimmons, M.J (2012) Service Management: Operations, Strategy, and Information Technology, Irwin/McGraw-Hill

Note: Latest edition of text books may be used.

## **BBA 307: Digital Marketing**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** This course aims at creating an understanding of the concepts and techniques of internet and digital marketing so as to exploit the opportunities of this medium to support the organization's marketing activities

### **Course Contents**

#### **Unit I**

**Hours: -10**

Role of Communications in Marketing, Advertising Vs Digital Advertising, Sales Promotions, Integrated Marketing Communications. Evolution of internet as a medium for communication.

Introduction to Digital Marketing: Digital Marketing meaning scope and importance, Internet versus traditional marketing communication, internet microenvironment; Use of Business to Consumer and Business to Business Internet Marketing; Internet marketing strategy.

#### **Unit II**

**Hours: -12**

Use of Internet in Relationship Marketing ( e-CRM) Approaches to Implementing e-CRM; Product Life Cycle Management with internet, Online buyer behavior and Models; The Marketing Mix (7- Ps) in online context. Managing the Online Customer Experience: Planning website design, Understanding site user requirement, site design and structure, developing and testing content, Integrated Internet Marketing Communications (IIMC); Objectives and Measurement of Interactive marketing communication, Service quality.

#### **Unit III**

**Hours: -12**

Digital Promotion Techniques: Email Marketing, Opt-in-e-mail-Permission Marketing, Social Media Marketing, Online PR, Interactive Advertising, Online Partnerships, Viral Marketing Search Engine Marketing, Mobile Marketing, Blogs. Search Engine Marketing (SEM): Search Engines, Search Engine Optimization, Website Optimization, Content Marketing, Designing content for social media marketing, Campaign management.

#### **Unit IV**

**Hours: -10**

Web Analytics: Creating a performance system, defining the performance metrics framework, Organic and paid search advertising and analytics, Electronic word-of-mouth analytics, Social media analytics Tools and techniques for Measurement, Website Maintenance Process, tools for web analytics, tools for social media analytics.

### **Text Books**

1. Chaffey, D., Ellis-Chadwick, F., Johnston, K. and Mayer, R. (2009) Internet Marketing: Strategy, Implementation and Practice, Third Edition, Pearson Education, New Delhi.
2. Strauss, Judy and Frost, Raymond (2009), E-Marketing, 5th Edition, PHI Learning Pvt. Ltd., New Delhi.

### **Reference Books**

1. Roberts, M.L. (2009) Internet Marketing, 1st Indian Edition, Cengage Learning, New Delhi.
2. Hanson, W. and Kalyanam, (2010), e-Commerce and Web Marketing 1st Edition, Cengage Learning, New Delhi.

## **BBA-305: Goods & Services Tax (GST)**

**L-4 T-0**

**Credits –4**

**Max Marks: 75**

**Objective:** The Objective of the course is to acquaint the student about the introduction of GST in India and the replacement of all Indirect Taxes with GST to make India Level playing field with outside world.

### **Unit-I**

**Indirect Taxes** – Meaning and Types of Indirect Taxes, Central Excise Duty - features, nature, scope, salient features of central excise Duty Act; Procedure for excise registration and documents needed; CENVAT MODVAT provisions; Exemptions to small scale industries; Introduction to custom duties; its types, calculation and related issues.

**Hours: 14**

### **Unit-II**

**VAT** – Introduction, meaning, features, merits and demerits, tax calculation, difference from sales tax, value addition with example; Different forms for VAT; VAT refund; Importance of CST Act 1956 Various Provisions; Different categories; CST Calculations; Introduction to Services Tax Act 2007; Types of Services covered; relevant provisions; Rates of Service Tax and its calculation.

**Hours: 14**

### **Unit-III**

**Goods and Service Tax (GST)** - Constitutional Amendment, Features of GST, Importance and benefits; Difference between GST and other Taxes; Migration to GST; Registration of dealers under GST, Exempted List; Rate Structure under GST; Procedure for obtaining registration certificate, concept of IGST; CGST; SGST and its calculation with working examples.

**Hours: 14**

### **Unit-IV**

**Implementation of GST:** GST Council, its members; composition; its role; GST Infrastructure; Impact of GST on Business; Salient features of GST Model. How to file refund under GST, Transfer of Input Tax credit and its related issues; Penalties and appeals under GST; Future of GST in India.

**Hours: 14**

### **Text Books**

3. Mehrotra H.C., Agrawal V. P., (2016), Indirect Taxes, Sahitya Bhawan Publication.
4. B. Viswanathan, (2016), Goods and Services Tax in India, New Century Publications.

### **Reference Books**

5. Singhaia Vinod K. & Singhania Monica, (2016), Students Guide to Indirect Tax Laws, Taxman Publications.
6. Datey V S. (2017), All about GST – A Complete guide to model GST Law, 5/e, Taxman Publications.
7. Gupta K Atul, (2016), GST- Concept and Roadmap, 1/e, LexisNexis Publisher.
8. Ahuja Girish & Gupta Ravi, (2016), Practical Approach to Direct & Indirect Taxes, (Income Tax, Excise, Customs, CST, VAT, Service Tax, & Wealth Tax 34/e, CCH India

### **BBA 351: Summer Training Report & Viva Voice**

**L-0, T-0**

**Credit-6**

**Max Marks: 100**

Each student shall undergo practical training of eight weeks during the vacations after fourth semester in an approved business / industrial / service organization and submit at least two copies of the Summer Training Report to the Director / Principal of the Institution before the commencement of the end-term Examination. The Summer Training Report shall Carry 100 marks. It shall be evaluated for 50 marks by an External Examiner to be appointed by the University and for the rest of the 50 marks by an Internal Examiner to be appointed by the Director / Principal of the Institution.

## BBA-302 PROJECT MANAGEMENT

L-4, T-0

Credits –4

Max Marks: 75

### **Objectives:**

The basic objective of this course is to familiarize the students with the various aspects of Projects and key guidelines relevant to project planning, analysis, financing, selection, implementation and review.

### **Course Contents**

#### **UNIT - I**

**Hours: -12**

**Introduction:** Projects, Project Management, Objectives and Importance of Project Management, Tools and Techniques for Project Management, Project Team, Roles and Responsibilities of Project Manager, Determinants of Project Success.

**Project Life Cycle:** Phases of Project Life Cycle, Classification of Projects.

**Project Management Process and Project Selection:** Process of Project Management, Project Selection Methods, Project Selection Criteria.

**Generation and Screening of Project Ideas:** Generation of Ideas, SWOT Analysis, Monitoring the Environment, Corporate Appraisal, Profit Potential of Industries (Porter Model, analysis for Project Ideas, Preliminary Screening, Project Rating Analysis, Entry barriers Analysis, Review of Project Planning.

**Project Organizational Structure:** Forms of Organizational Structure - Functional Organization, Project Organization, Matrix Organization.

#### **UNIT-II**

**Hours: -10**

**Technical Analysis:** Factors Considered in Technical Analysis, Factors Affecting Selection of Locations, Need for Considering Alternatives, Technology Selection, Sources of Technology, Appropriate Technology.

**Market Analysis:** Conduct of Market Survey, Characterization of Market, Market Planning (Introductory aspects only).

**Network Techniques:** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (Simple problems only).

#### **UNIT-III**

**Hours: -10**

**Financial Estimates and Projections:** Feasibility Study, Types of Feasibility Study, Steps of Feasibility Study, Importance and Steps of Financial Feasibility, Components of Cost of Project and Its Estimation (Introductory aspects only).

**Financing of Projects:** Capital Structure, Sources of Long-term Finance, Debt Financing, Characteristics of Debt, Types of Debts, Equity Financing, Preferential Shares, Equity Shares, Retained Earnings, Short-term Sources for Working Capital, Newer Sources of Finance, Venture Capital.

#### **UNIT-IV**

**Hours: -12**

**Project Evaluation and Control:** Project Monitoring and Controlling, Project Evaluation, Post Project Evaluation (Post Audit), Abandonment Analysis.

**Social Cost Benefit Analysis:** Social Cost, Social Benefit.

**Risk Analysis:** Process of Risk Management, Sources of Risk in Project Management, Managing Risk.

**International Project Management:** Introduction, Types of International Projects, Process of International Project Management, Financing International Projects, Risks Associated with International Projects.

**Emerging Concepts and Issues in Project Management:** Role of Information Technology in Project Management, Future of Project Management.



### **Text Books**

1. Chandra, Prasanna, "Projects: Planning, Analysis, Financing, Implementation and Review", Tata McGraw Hill Publishing Company Limited, 2014.
2. Nagarajan, K., "Project Management", New Age International (P) limited, Publishers, 2015.

### **Reference Books**

1. R. Panneerselvam. R, Senthilkumar. P., "Project Management", PHI Learning, (P) limited, Publishers, 2013.
2. Maheshwari, S.N., "Financial and Management Accounting", Sultan Chand & Sons, 2012.
3. Jeffrey K. Pinto, "Project Management: Achieving Competitive Advantage", Pearson Education, 2012.
4. Desai, Vasant, "Project Management", Himalaya Publishing House, 2013.

**Note: Latest edition of text books may be used.**

## **BBA-304 Entrepreneurship Development**

**L-4 T-0**

**Credits –4**

**Max Marks: 75**

**Objectives:** It provides exposure to the students to the entrepreneurial cultural and industrial growth so as to prepare them to set up and manage their own small units.

### **Course Contents**

#### **Unit I**

**Hours: -10**

**Introduction:** The Entrepreneur: Definition, Emergence of Entrepreneurial Class; Theories of Entrepreneurship.

#### **Unit II**

**Hours: -10**

**Promotion of a Venture:** Opportunity Analysis; External Environmental Analysis Economic, Social and Technological; Competitive factors; Legal requirements of establishment of a new unit and Raising of Funds; Venture Capital Sources and Documentation Required, Forms of Ownership.

#### **Unit III**

**Hours: -12**

**Entrepreneurial Behaviour:** Innovation and Entrepreneur; Entrepreneurial Behaviour and Psycho- theories, Social responsibility.

**Entrepreneurial Development Programmes (EDP):** EDP, Their Role, Relevance and Achievements; Role of Government in Organizing EDP's Critical Evaluation.

#### **Unit IV**

**Hours: -12**

**Role of Entrepreneur:** Role of an Entrepreneur in Economic Growth as an Innovator, Generation of Employment Opportunities, Complimenting and Supplementing Economic Growth, Bringing about Social Stability and Balanced Regional Development of Industries: Role in Export Promotion and Import Substitution, Forex Earnings.

### **Text Books**

1. Hisrich, Robert and Peters, Michael, (2012), Entrepreneurship, McGraw Hill Education.
2. Charantimani, (2014), Entrepreneurship Development and Small Business Enterprise, Pearson Education.

### **Reference Books**

1. Balaraju, Theduri, (2012), Entrepreneurship Development: An Analytical Study, Akansha Publishing House.
2. David, Otes, (2014), A Guide to Entrepreneurship, Jaico Books Publishing House, Delhi.
3. Kaulgud, Aruna, (2012), Entrepreneurship Management, Vikas Publishing House, Delhi.
4. Chhabra, T.N. (2014), Entrepreneurship Development, Sun India.

**Note: Latest edition of text books may be used.**



## **BBA-306 Sales & Distribution Management**

**L-4, T/P-0,**

**Credits: 04**

**Max Marks: 75**

**Objective:** The course aims to impart the knowledge and skills needed to manage the sales force and distribution functions in a business organization so as to help gain a competitive advantage.

### **Course Contents:**

#### **Unit I**

**Hours: -10**

**Introduction to Sales Management:** Scope and Importance; The Evolving Face of Personal Selling; Personal Selling Process and Approaches; Sales Organization Structure; Sales Strategies, Sales Forecasting; Sales Territory Design.

#### **Unit II**

**Hours: -12**

**Sales Force Management:** Sales Force Job Description; Recruitment and Selection; Training Sales Personnel; Sales Force Motivation; Compensation; Sales Quotas; Evaluating Sales Performance; Information Technology in Sales Management;

#### **Unit III**

**Hours: -12**

**Distribution Planning and Control:** Functions of Intermediaries; Types and Role of Channel Intermediaries in India for Consumer and Industrial products: Wholesale and Retail Structure, Channel Strategy and Design; Selection, Motivation and Evaluation of Intermediaries; Managing Channel Dynamics, Relationships and Channel Conflict; Ethical and Legal Issues in Sales and Distribution Management in Indian context.

#### **Unit IV**

**Hours: -10**

**Distribution System and Logistics:** Physical Distribution System –Objectives and Decision Areas; Customer Service Goals; Logistics Planning; An overview of Transportation, Warehousing and Inventory Decisions; Efficient Supply Chain Management (SCM); Integration of Sales and Distribution Strategy.

### **Text Books**

3. Still. K.R., Cundiff. E.W & Govoni. N.A.P (2014). Sales Management. Pearson Education, New Delhi.
4. Rosenbloom, Bert (2014) Marketing Channels: A Management View, Cengage Learning, New Delhi.

### **Reference Books**

5. Jobber , David and Lancaster, Geoffery (2012), Selling and Sales Management, Pearson Education, New Delhi
6. Tanner Jr., J.F., Honeycutt Jr., E.D. and Erffmeyer, R.C. (2014), Sales Management:, Pearson Education, New Delhi
7. Panda, T.K. and Sahadev, S (2012) Sales and Distribution Management, Oxford University Press, New Delhi.
8. Havaldar, K K. and Cavale, VM. (2012), Sales and Distribution Management: Text and Cases, Tata McGraw Hill, New Delhi.

## **BBA-310 International Business Management**

**L-4, T-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The basis objective of this course is to provide understanding to the students with the global dimensions of management.

### **Course Contents**

#### **UNIT I**

**Hours: -12**

**Overview:** International Business- Introduction, Concept, Definition, Scope, Trends, Challenges and Opportunities; Nature, Meaning and Importance of International Competitive Advantage, Multidimensional view of Competitiveness.

Financial Perspectives: International Monetary Systems and Financial Markets, IMF, World Bank, IBRD, IFC, IDA, Existing International Arrangements; Globalization and Foreign Investment- Introduction FDI, national FDI Policy Framework, FPI.

#### **UNIT II**

**Hours: -10**

**Globalization:** Impact of Globalization, Technology and its Impact, Enhancing Technological Capabilities, Technology Generation, Technology Transfer, Diffusion, Dissemination and Spill Over, Rationale for Globalization, Liberalization and Unification of World Economics, International Business Theories, Trade Barriers- Tariff and Non Tariff Barriers.

#### **UNIT III**

**Hours: -10**

**Strategy making and International Business:** Structure of Global Organizations, Types of Strategies used in Strategic Planning for achieving Global Competitive Advantage, Meaning, Concept and scope of Distinctive Competitive Advantage, Financial Integration, Cross border Merger and Acquisitions.

#### **UNIT IV**

**Hours: -12**

**Socio Cultural Environment-** Managing Diversity within and across Cultures, Country Risk analysis, Macro Environmental Risk Assessment, Need for Risk Evaluation; Corporate governance, Globalization with social responsibility- Introduction, Social responsibility of TNC, Recent development in corporate social responsibility and policy implications.

**Global Human Resource Management-** Selection, Development, Performance Appraisal and compensation, Motivating employees in the global context and managing groups across cultures, Multicultural management.

#### **Text Books**

1. Tamer, Cavusgil, Gary, Knight, (2012), International Business: Strategy, Management and the New Realities,

Pearson Education.

2. K. Aswathappa, (2012), International Business, McGraw Hill Education.

#### **Reference Books**

1. Sinha P.K, (2012), International Business Management, Excel Books.

2. Singh Shamsher, (2013) International Business, Galgotia Publishing Company.

3. Cherunilam Francis (2010), International Business, PHI.

4. Deresky, (2012), International Management: Managing Across Borders and Culture, Pearson Education.

**Note: Latest edition of text books may be used.**

## **BBA 308: Business Policy & Strategy**

**L-4 T-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The course aims to acquaint the students with the nature, scope and dimensions of Business Policy and Strategy Management Process.

### **Course Contents**

#### **Unit I**

**Hours: -10**

**Introduction:** Nature, Scope and Importance of Business Policy; Evolution; Forecasting, Long-Range Planning, Strategic Planning and Strategic Management.

**Strategic Management Process:** Formulation Phase – Vision, Mission, Environmental Scanning, Objectives and Strategy; Implementation phase – Strategic Activities, Evaluation and Control.

#### **Unit II**

**Hours: -12**

**Environmental Analysis:** Need, Characteristics and Categorization of Environmental Factors; Approaches to the Environmental Scanning Process – Structural Analysis of Competitive Environment; ETOP a Diagnosis Tool.

**Analysis of Internal Resources:** Strengths and Weakness; Resource Audit; Strategic Advantage Analysis; Value-Chain Approach to Internal Analysis; Methods of Analysis and Diagnosing Corporate Capabilities – Functional Area Profile and Resource Deployment Matrix, Strategic Advantage Profile; SWOT analysis. McKinsey's 7s Framework.

#### **Unit III**

**Hours: -12**

**Formulation of Corporate Strategies:** Approaches to Strategy formation; Major Strategy options – Stability, Growth and Expansion: Concentration, Integration, Diversification, Internationalization, Cooperation and Digitalization, Retrenchment, Combination Strategies.

#### **Unit IV**

**Hours: -10**

**Choice of Business Strategies:** BCG Model; Stop-Light Strategy Model; Directional Policy Matrix (DPM) Model, Product/Market Evolution – Matrix and Profit Impact of Market Strategy (PIMS) Model.

**Major Issues involved in the Implementation of strategy:** Organizational Cultural and Behaviour factors, Organization Structure; Role of Leadership, Resource Allocation.

### **Text Books**

1. Kazmi, Azhar, (2014), Strategic Management and Business Policy, McGraw Hill Education.
2. Ghosh, P. K., (2012), Strategic Planning and Management, Sultan Chand & Sons, New Delhi.

### **Reference Books**

1. Hill, Charles W.L. and Jones Gareth R. (2011), An Integrated Approach to Strategic Management, Cengage Learning.
2. Walker, Gordon, (2012), Modern Competitive Strategy, McGraw Hill Education.
3. Weelen, (2012), Concepts in Strategic Management and Business Policy, Pearson Education.
4. Fred, David, (2011), Strategic Management: Concepts and Cases, Prentice hall of India

**Note: Latest edition of text books may be used.**

## **BBA-003 PROJECT REPORT AND VIVA VOICE**

**L-0 T-0**

**Credits-6**

**Max Marks : 100**

During the sixth semester each student shall undertake a project to be pursued by him / her under the supervision of an Internal Supervisor to be appointed by the Director / Principal. The project should preferably be based on primary data. Both the subject and the name of the Supervisor will be approved by the Director / Principal of the Institution. The Project Report in duplicate along with one soft copy in a CD/DVD will be submitted at least three weeks prior to the commencement of the End Term Examination of the Sixth Semester. Project Report shall carry 100 marks. It shall be evaluated for 50 marks by an External Examiner to be appointed by the University and for the rest of the 50 marks by an Internal Examiner to be appointed by the Director / Principal of the Institution.

## Scheme for Integrated BBA-MBA (Management and Commerce)

BBA-MBA (Integrated)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 101	Management Process & Organizational Behavior	4	0	0	4
2	MA 107/MA-10	Business Mathematics	4	0	0	4
3	BBA 103	Financial Accounting	4	0	0	4
4	BBA 105	Business Economics	4	0	0	4
5	CS-1105	Computer Application	4	0	0	4
6	CS-1155	Computer Application Lab	0	0	4	2
7	PD-191A	Hobby Club	0	1	0	1
TOTAL			20	1	4	23

BBA-MBA (Integrated)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 102	Cost Accounting	4	0	0	4
2	MA 108	Decision Sciences	4	0	0	4
3	CS-1202	E-Commerce	4	0	0	4
4	BBA 106	Business Communication	4	0	0	4
5	BBA 108	Management Development Program* (NUES)	2	0	0	2
6	BCOM 1108	Business Studies	4	0	0	4
7	CS-1252	E-Commerce-Lab	0	0	4	2
Total			22	0	4	24

BBA-MBA (Integrated)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 201	Business Laws	4	0	0	4
2	BBA 203	Marketing Management	4	0	0	4
3	BBA 205	Business Ethics and Corporate Social Responsibility	4	0	0	4
4	BBA 207	Management Accounting	4	0	0	4
5	BBA 209	Indian Economy	4	0	0	4
6	CE-2303	Environmental Science* (NUES)	2	0	0	2
7	PD	PDP	0	1	0	1
		<b>Total</b>	<b>22</b>	<b>1</b>	<b>0</b>	<b>23</b>

BBA-MBA (Integrated)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 202	Business Environment	4	0	0	4
2	BBA 204	Human Resource Management	4	0	0	4
3	BBA 206	Financial Management	4	0	0	4
4	BBA 208	Research Methodology	4	0	0	4
5	CS-2202	Information System Management	4	0	0	4
6	BBA 252	Research Methodology – Lab	0	0	4	2
7	BBA-001	Minor Project	0	2	0	2
8	PD-	PDP	0	1	0	1
		<b>Total</b>	<b>20</b>	<b>3</b>	<b>4</b>	<b>25</b>

BBA-MBA (Integrated)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 301	Income-tax Law and Practice	4	0	0	4
2	BBA 303	Production & Operations Management	4	0	0	4
3	BBA 305	Sales & Distribution Management	4	0	0	4
4	BBA 307	Digital Marketing	4	0	0	4
5	BBA 309	Entrepreneurship Development	4	0	0	4
6	BBA 351	Summer Training Report & Viva Voice	0	0	12	6
7	PD	PDP	0	1	0	1
		Total	20	1	12	27

BBA-MBA (Integrated)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BBA 302	Project Management	4	0	0	4
2	BBA 304	Services Marketing	4	0	0	4
3	BBA 306	International Business Management	4	0	0	4
4	BBA 308	Business Policy & Strategy	4	0	0	4
5	BBA 352	Project Report and Viva-Voce	0	0	6	3
6	PD	PDP	0	1	0	1
		Total	16	1	6	20

BBA-MBA (Integrated)			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-103A	Accounting for Managers	4	0	0	4
2	BA-134A	Supply Chain Management	4	0	0	4
3	BA-136A	Principles of Insurance	4	0	0	4
4	BA- 313	Goods & Services Tax (GST)	4	0	0	4
5	EN-472A	Advanced Business Communication	4	0	0	4
6	BA-120A	International Business	3	0	0	3
7	PD	PDP	0	1	0	1
		<b>Total</b>	<b>23</b>	<b>1</b>	<b>0</b>	<b>24</b>

BBA-MBA (Integrated)			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA201	Strategic Management & Analysis	3	0	0	3
2	MBA203	Financial Markets	3	0	0	3
3	MBA205	Business Statistics	3	0	0	3
4		Specialization Elective 1 (Major)	3	0	0	3
5		Specialization Elective 2 (Major)	3	0	0	3
6		Specialization Elective 3 (Major)	3	0	0	3
7		Specialization Elective 1 (Major)	3	0	0	3
8		Specialization Elective 2 (Major)	3	0	0	3
9		Specialization Elective 3 (Major)	3	0	0	3
PRACTICAL						
1	MBA003	Summer Internship Project & Viva-Voice	0	0	8	4
		<b>Total</b>	<b>27</b>	<b>0</b>	<b>8</b>	<b>31</b>



BBA-MBA (Integrated)			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-1581A	MAJOR PROJECT	0	0	30	15
		Total	0	0	30	15

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS**  
**HUMAN RESOURCE MANGEMENT**

BBA+MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 207	Performance Management	3	0	0	3
2	MBA 209	Compensation Management	3	0	0	3
3	MBA 211	Organizational Design	3	0	0	3
		Total	9	0	0	9

BBA+MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 208	International Human Resource Management	3	0	0	3
2	MBA 210	Strategic Human Resource Management	3	0	0	3
3	MBA 212	Cross Cultural Management	3	0	0	3
		Total	9	0	0	9

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS**  
**FINANCIAL MANGEMENT**

BBA+MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 213	Financial Services	3	0	0	3
2	MBA 215	Security Analysis and Portfolio Management	3	0	0	3
3	MBA 217	Strategic Cost Management and Control	3	0	0	3
Total			9	0	0	9

BBA+MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 214	International Finance	3	0	0	3
2	MBA 216	Strategic Financial Management	3	0	0	3
3	MBA 218	Financial Derivatives	3	0	0	3
Total			9	0	0	9

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS**  
**INTERNATIONAL BUSINESS**

BBA+MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 219	International Business Environment	3	0	0	3
2	MBA 221	International Logistics & Supply Chain Management	3	0	0	3
3	MBA 223	International Trade (Practices, Procedures & Documentations)	3	0	0	3
		<b>Total</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>

BBA+MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 220	Mergers and Acquisitions	3	0	0	3
2	MBA 222	International Project Management	3	0	0	3
3	MBA 224	FOREX Management & Currency Derivatives	3	0	0	3
		<b>Total</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS**  
**MARKETING MANAGEMENT**

BBA+MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 225	Consumer Behavior	3	0	0	3
2	MBA 227	Integrated Marketing Communication	3	0	0	3
3	MBA 229	Product & Brand Management	3	0	0	3
		<b>Total</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>

BBA+MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MBA 226	International Marketing	3	0	0	3
2	MBA 228	Strategic Marketing	3	0	0	3
3	MBA 230	Services Marketing	3	0	0	3
		<b>Total</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>

## **SYLLABUS FOR BBA + MBA**

### **BBA 101: Management Process & Organizational Behaviour**

L-4, T-0

Credits –4

Max Marks: 75

Objectives: The course aims at providing fundamental knowledge and exposure to the concepts, theories and practices in the field of management.

#### Course Contents

##### Unit I

Lectures:- 10

Management: Concept, Nature, Process, Significance; Managerial levels, skills, Functions and Roles; Management vs. Administration; Coordination as Essence of Management. Development of Management Thought: Classical, Neo-Classical, Behavioral, Systems and Contingency Approaches.

Planning: Nature, Scope and Objectives of Planning; Types of plans; Planning Process; Business Forecasting; MBO: Concept, Types, Process and Techniques of Decision-Making; Bounded Rationality. Organising: Concept, Principles of an Organization; Span of Control; Departmentation; Types of an Organization; Authority-Responsibility; Delegation and Decentralization;

##### Unit II

Lectures: - 12

Staffing: Concept, Nature and Importance of Staffing. Motivating and Leading: Nature and Importance of Motivation; Types of Motivation; Theories of Motivation: Maslow, Herzberg, X, Y and Z; Leadership: Meaning and Importance; Traits of a leader; Leadership Styles – Likert's Systems of Management, Tannenbaum & Schmidt Model and Managerial Grid.

Controlling: Nature and Scope of Control; Types of Control; Control Process; Control Techniques – Traditional and Modern; Effective Control System.

##### Unit III

Lectures: - 12

Organisational Behaviour-1: Concept and nature of Organizational behavior, O.B. Models, Importance, Challenges and Opportunities,

Individual & Interpersonal Behaviour: Personality – Determinants and Traits; Emotions; Learning-Theories, Perception –Process and Errors, Attitudes- Formation, Theories, Relationship between Attitude and Behavior; Interpersonal Behaviour: Johari Window; Transactional Analysis – Ego States, Types of Transactions, Life Positions, Applications of T.A

##### Unit IV

Lectures: - 10

Group Behaviour & Team Development: Concept of Group and Group Dynamics, Stages of Group Development, Theories of Group Formation; Concept of Team Vs. Group; Types of Teams; Building and Managing Effective Teams.

Organization Culture and Change Management: Concept of Organizational Culture, Managing Conflict, Managing Change; Resistance to Change, Managing cross Cultures.

#### Text Books

1. Robbins, (2011). Fundamentals of Management: Essentials Concepts and Applications, Pearson Education.
2. Robbins, S.P. and Sanghi, S., (2009), Organizational Behaviour; 13th edition, Pearson Education.
3. Stoner, Freeman and Gilbert Jr. ((2010)) Management, 8th Edition, Pearson Education.

#### Reference Books

1. Koontz, H.( 2014), Essentials of Management, McGraw Hill Education.
2. Ghillyer, A, W., (2008) Management- A Real World Approach, McGraw Hill Education.
3. Mukherjee, K, (2009), Principles of Management, 2nd Edition, McGraw Hill Education.
4. Luthans, Fred, (2008), Organizational Behavior, 11th Edition, McGraw Hill Education.

LINGAYA'S UNIVERSITY, GREATER FARIDABAD, HARYANA

BBA-MBA(INTEGRATED)

#### Business Mathematics

L-4, T-0

Credits –4

Max Marks: 75

Objectives: This course aims at equipping student with a broad based knowledge of mathematics with emphasis on business applications.

#### Course Contents

##### Unit I

Hours: - 10

Principle of Counting: Concept of Factorial, Principle of Counting, Mathematical Induction: Principle, Arithmetic Progression & Geometric Progression, Concepts of function.

## Unit II

Hours: - 14

Matrix Algebra: Definition of a matrix, Types of Matrices, Equality of Matrices, Matrix Operations, Transpose of a matrix, Determinants, System of Linear equations, Cramer's rule, Inverse of a Matrix. Properties of the Inverse Solution to a System of Equations by:

- (i) The Ad-joint Matrix Methods.
- (ii) The Gaussian Elimination method, Rank of a Matrix, Rank of a System of Equations.

The Echelon Matrix; Application of Matrices to Business Problems Input Output Analysis, Preparation of Depreciation Lapse Schedule, Leontiff I/O Model.

## Unit III

Hours: - 10

Differential Calculus: Derivative of a Parametric Function, Logarithmic Differentiation Derivative of an Inverse Function, Optimization Using Calculus, Point of Inflexion Absolute and Local- Maxima and Minima, Optimization in case of Multi Variate Function. Lagrangian multipliers, Derivative as a Rate Measure, Applications in Business.

## Unit IV

Hours: - 10

Integral Calculus: Indefinite Integrals, Techniques of Integration, Definite Integrals, Business application, Consumer's or Producer's surplus, Learning Curve.

## Text Books

1. Trivedi, (2012), Business Mathematics, Pearson Education.
2. Bhardwaj, R.S. (2013). Mathematics and Statistics for Business, Excel Books.

## References

1. Khan, Shadab, (2012) A Text Book of Business Mathematics, Anmol Publications.
2. Raghavachari, M, (2011), Mathematics for Management, McGraw Hill Education.
3. Tuttle, Michael, D., (2012) Practical Business Math: An Applications Approach, Prentice Hall.
4. Hazarika, P. (2010), A textbook of Business Mathematics, S. Chand Publication.

Note: Latest edition of text books may be used.

## **SYLLABUS BBA-MBA(INTEGRATED)**

### **BBA 105: Financial Accounting**

L-4 T-0

Credit-4

Max Marks: 75

**Objectives:** The objective of this subject is to give understanding of the basic accounting principles and techniques of preparing the accounts for users of accounting information.

#### **Course Contents**

##### **Unit I**

Hours: - 10

Meaning and Scope of Accounting: Objectives and nature of Accounting, Definition and Functions of Accounting, Book Keeping and Accounting, Interrelationship of Accounting with other Disciplines, Branches of Accounting, Limitation of Accounting,

Accounting Principles and Standards: Accounting Principles, Accounting Concepts and Conventions, Meaning and relevance of GAAP, Introduction to Accounting Standards Issued by ICAI.

##### **Unit II**

Hours: - 10

Journalizing Transactions: Journal Entries, compound Journal entries, Opening Entry.

Ledger Posting and Trial Balance: Preparation of Ledger, Posting, Cash book, Sales and Purchase book and Trial Balance.

Company Final Accounts: Preparation of Final Accounts with adjustments, Trading Account, Profit & Loss Account, Balance Sheet.

##### **Unit III**

Hours: - 12

Depreciation Provisions and Reserves: Concept of Depreciation, Causes of Depreciation, Basic Features of Depreciation, Meaning of Depreciation Accounting, Objectives of Providing Depreciation, Fixation of Depreciation Amount, Method of Recording Depreciation, Methods of Providing Depreciation, Depreciation Policy, AS-6 (Revised) Provisions and Reserves, Change of method of Depreciation (by both current and retrospective effect).

Contemporary Issues & Challenges in Accounting: Human Resource Accounting, Green Accounting, Inflation Accounting, Price level Accounting, Social Responsibility Accounting

##### **Unit IV**

Hours: - 12



Shares and Share Capital: Introduction to Joint Stock Company, Shares, Share Capital, Accounting Entries, Under Subscription, Oversubscription, Calls in Advance, Calls in Arrears, Issue of Share at Premium, Issue of Share at Discount, Forfeiture of Shares, Surrender of Shares, Right Shares.

Issue and Listing of Securities: Stock Exchange of India, Control of SEBI, Regulating business in stock exchange (Elementary Knowledge only).

#### Text Books

1. Tulsian, P.C., (2012) Financial Accountancy, Pearson Education.
2. Maheshwari, S.N. and Maheshwari, S. K., (2012) An Introduction to Accountancy, Vikas Publishing House

#### Reference Books

1. Bhattacharyya, Asish K., (2010) Essentials of Financial Accounting, Prentice Hall of India.
2. Rajasekran, (2012), Financial Accounting, Pearson Education.
3. Bhattacharya, S.K. and Dearden, J., (2010) Accounting for Manager – Text and Cases, Vikas Publishing House.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA 107: Business Economics**

L-4, T-0

Credit-4

Max Marks: 75

Objectives: The objective of this subject is to give understanding of the basic concepts and issues in business economics and their application in business decisions.

#### Course Contents

##### Unit I

Hours: - 10

Introduction to Business Economics and Fundamental concepts: Nature, Scope, Definitions of Business Economics, Difference between Business Economics and Economics, Contribution and Application of Business Economics to Business. Micro vs. Macro Economics. Opportunity Costs, Time Value of Money, Marginalism, Incrementalism, Market Forces and Equilibrium, Risk, Return and Profits.

##### Unit II

Hours: - 12

Consumer Behavior and Demand Analysis:

Cardinal Utility Approach: Diminishing Marginal Utility, Law of Equi-Marginal Utility. Ordinal Utility Approach: Indifference Curves, Marginal Rate of Substitution, Budget Line and Consumer Equilibrium.

Theory of Demand, Law of Demand, Movement along vs. Shift in Demand Curve, Concept of Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Income Elasticity of Demand, Cross Elasticity of Demand, Advertising Elasticity of Demand. Demand Forecasting: Need, Objectives and Methods (Brief)

### Unit III

Hours: - 12

Theory of Production: Meaning and Concept of Production, Factors of Production and Production function, Fixed and Variable Factors, Law of Variable Proportion (Short Run Production Analysis), Law of Returns to a Scale (Long Run Production Analysis) through the use of ISO QUANTS.

### Unit IV

Hours: - 10

Cost Analysis & Price Output Decisions: Concept of Cost, Cost Function, Short Run Cost, Long Run Cost, Economies and Diseconomies of Scale, Explicit Cost and Implicit Cost, Private and Social Cost. Pricing Under Perfect Competition, Pricing Under Monopoly, Control of Monopoly, Price Discrimination, Pricing Under Monopolistic Competition, Pricing Under Oligopoly.

### Text Books:

1. Samuelson, P & Nordhaus, W. (2010) Economics, McGraw Hill Education.
2. Dwivedi, D.N.( 2010) Managerial Economics, Vikas Publishing House.

### Reference Books:

1. Salvatore, D. (2014) Managerial Economics in a Global Economy, Oxford University Press.
2. Kreps, D. (2010) Microeconomics for Managers, Viva Books Pvt. Ltd.
3. Mankiw, NG, (2011), Principles of Economics, Cengage Learning.
4. Peterson, L. and Jain (2012), Managerial Economics, Pearson Education.

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **Computer Application**

L-4, T-0

Credit-4

Max Marks: 75

Objectives: This is a basic paper for students to familiarize with computer and it's applications in the relevant fields and exposes them to other related papers of IT.

### Course Contents

### Unit I

Hours: - 08

Basics of Computer: Characteristics of Computers, Input-output Devices (Hardware, Software, Human ware and Firmware), Function of Different Units of Computer, Classification of Computers. Computer Memory: Primary Memory, Secondary memory.

## Unit II

Hours: - 10

Computer Software: Types of Software, Introduction to Operating System; Function of OS, Types of Operating Systems, Booting Procedure, Start-up Sequence, Details of Basic System Configuration, Important Terms like Directory, File, Volume, Label, Drive Name, etc; Introduction to GUI using Windows Operating System, Compiler, Interpreter and assembler, Types of languages; word processor and software.

## Unit III

Hours: - 14

Operating System Concept: Introduction to MS-Word, MS-Excel / Spread Sheets.

Advanced Excel: Introduction, features, applications and advanced functions of Excel.

All Directory Manipulations, Operating system commands. Introduction to DBMS, Structure of a DBMS and Advantages of DBMS.

Protection & Security: Indian IT Act, Goals of Protection and Security, Concept of Encryption & Decryption, Virus, Worm, Antivirus, Firewall.

Information Technology and Society: Application of information Technology in Railways, Airlines, Banking, Online Banking System, Insurance, Inventory Control, Financial systems, Hotel management, Education, entertainment and health, security issues in information technology.

## Unit IV

Hours: - 12

Computer Networks and IT applications: Data communication concepts, types of communication media, Concepts of Computer Networks, Network topologies, Networking devices, OSI model.

Concepts of Web Technology: Internet, Intranet and Extranets; Applications of internet, Basics services over Internet like WWW, FTP, Telnet, Gopher etc., IP addresses, ISPs, URL, Domain Names, Web Browsers, Internet Protocols, Search Engines, e-mail.

## Text Books

1. Leon and Leon, (2012), Introduction to Information Technology, Vikas Publishing House.
2. Sinha, Pradeep K. Foundations of Computing, (2012), BPB Publisher

## Reference Books

1. Joseph A.Brady and Ellen F Monk, (2012), Problem Solving Cases in Microsoft and Excel, Thomson Learning.
2. Tanenbaum, A. S., (2011), Computer Networks, Pearson Education.
3. Goyal, Anita, (2012) Computer Fundamentals, Pearson Education.
4. ITL, ESL, (2008) Introduction to Infotech, Pearson Education..

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **Computer Application Lab**

L-0, T-04

Credit-2

Max Marks: 60

Lab would be based on the following topics:

1. All commands specified in unit III using Windows

2. Introduction to MS-Word:

Introduction to Word Processing, it's Features, Formatting Documents, Paragraph Formatting, Indents, Page Formatting, Header and Footer, Bullets and Numbering, Tabs, Tables, Formatting the Tables, Finding and Replacing Text, Mail Merging etc.

3. Introduction to MS-Excel:

Introduction to Electronic Spreadsheets, Entering Data, Entering Series, Editing Data, Cell Referencing, ranges, Formulae, Functions, Auto Sum, Copying Formula, Formatting Data, Creating Tables, Graphs and charts, Creating Database, Sorting Data, Filtering etc.

Advanced Excel: Advanced Functions of MS-Excel.

4. Introduction to MS PowerPoint:

PowerPoint, Features of MS PowerPoint Clipping, Slide Animation, Slide Shows, Formatting etc.

5. Computerized Accounting Software:

The students must be familiar with preparation of computerized accounts (By using Tally Software or any other popular accounting software): including creation of company, vouchers and recording transactions, preparing reports – cash book and bank book, ledger accounts, trial balance, profit and loss account (income statement) and balance sheets.

**SYLLABUS FOR BBA-MBA(INTEGRATED)**

**BBA 102: Cost Accounting**

L-4, T/P-0,

Credits: 04

Max Marks: 75

**Objectives:** The primary objective of the course is to familiarize the students with the basic cost concepts, allocation and control of various costs and methods of costing.

**Course Contents**

**Unit I**

Hours: 12

**Meaning and Scope of Cost Accounting:** Basic Cost Objectives and scope of cost accounting, Cost centres and cost units, Difference between financial, cost and management accounting. Basic Cost concepts - Cost classification and elements of cost.

**Materials Control:** Meaning, Steps Involved, Materials and Inventory, Techniques of

Material/Inventory Control (EOQ, FSND, ABC, Stock Levels, JIT, VED), Valuation of Inventory (FIFO, LIFO, Weighted average); Practical's of EOQ, stock levels, FIFO, LIFO

**Unit II**

Hours: 12

**Labour Cost:** Attendance and payroll procedures, overtime, idle time and incentives, direct and indirect labour, remuneration systems and incentive schemes (Halsey, Rowan, Taylor, Merrick, Bedaux, Emerson plans practical).

**Overheads:** Functional analysis – factory, administration, selling, distribution, research and development, fixed, variable, semi variable and step cost; Factory overheads, Administration overheads and Selling and distribution overheads (in brief about types of overheads). (Overhead rate, Machine rate, under & over absorption practical).

**Unit III**

Hours: 10

**Cost Sheet – Preparation of Cost Sheet (simple problems).**

**Process Costing - Meaning and computation of normal profits, abnormal effectives and abnormal loss.**

#### Unit IV

Hours: 10

Contract Costing: Progress payments, retention money, escalation clause, contract accounts, accounting for material, accounting for plant used in a contract, contract profit and balance sheet entries.

Operating Costing (basic problems related to transport only).

#### Text Books

1. Maheshwari, S. N. and Mittal, S. N. (2015), Cost Accounting – Theory and Problems, Shri Mahavir Book Depot.
2. Arora, M.N., (2012), Cost Accounting, Vikas Publishing House.

#### Reference Books

1. Lal, Jawahar and Srivastava, Seema, (2013), Cost Accounting, McGraw Hill Education.
2. Pandey, I.M., (2014), Management Accounting, Vikas Publishing House, Delhi.
3. R.Palaniappan & Hariharan; (2012), Cost Accounting Theory & Practices, I.K. International Publishing House, Delhi.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA-104 – Decision Sciences**

L-4, T-0

Credits -4

Max Marks: 75

Objectives: The objective of this paper is to develop student's familiarity with the basic concept and tools in statistics and operations research. These techniques assist specially in resolving complex problems serve as a valuable guide to the decision makers.

#### Course Contents

##### Unit I

Hours: - 10

Statistics: Definition, Importance & Limitation, Collection of data and formation of frequency distribution, Graphic presentation of Frequency distribution – Graphics, Bars, Histogram, Diagrammatic.

##### Unit II

Hours: - 10

Measures of Central Tendency – Mean Median and Mode, Partition values – quartiles, deciles and percentiles; Measures of variation – Range, IQR, quartile, deciles and percentiles, quartile deviation and standard deviation and Lorenz Curve.

##### Unit III

Hours: - 10

Correlation Analysis: Correlation Coefficient; Assumptions of Correlation Analysis; Coefficients of Determination and Correlation; Measurement of Correlation- Karl Person's Methods; Spearman's Rank correlation; Concurrent Deviation the Correlation Coefficient; Pitfalls and Limitations Associated with Regression and Correlation Analysis.

Unit IV

Hours: - 14

Linear Programming: Concept and Assumptions Usage in Business Decision Making, Linear Programming Problem: Formulation, Methods of Solving: Graphical and Simplex, problems with mixed constraints: Duality; Concept, Significance.

Transportation and Assignment problems: General Structure of Transportation Problem, Different Types Methods for Finding Initial Solution by North-West Corner Rule, Least Cost Method and Vogel Approximation Method and Testing for Optimality. Assignment Problem: Different Methods Operations, Scheduling: Scheduling Problems, Shop Floor Control, Gantt Charts, Principles of Work Center Scheduling, Principles of Job Shop Scheduling, Personnel Scheduling.

Text Books:

1. Vohra, N.D., (2011) Quantitative Techniques in Management, McGraw Hill Education.
2. Gupta, SP and Gupta, P.K. (2013), Quantative Techniques and Operation Research, Sultan Chand.

Reference Books

1. Rajagopalan, S. & Sattanathan, R., (2011) Business Statistics & Operations Research, McGraw Hill.
2. Sharma, J.K., (2010) Operations Research: Problems & Solutions, Macmillan India Ltd.
3. Render, Barry, Stair, R.M., Hanna, M.E., Badri, (2012) Quantitative Analysis for Management, Pearson Education.
4. Vishwanathan, P.K., (2010) Business Statistics and Applied Orientation, Pearson Education.

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **E-Commerce**

L-4, T-0,

Credits: 04

Max Marks: 75

Objectives: The course imparts understanding of the concepts and various application issues of e-business like Internet infrastructure, security over internet, payment systems and various online strategies for e-business.

## Course Contents

### Unit I

Hours: - 12

Introduction to E-Commerce: Electronic Business, Electronic Commerce, Types of Electronic Commerce, Benefits, Limitations and Barriers of E-commerce, Electronic Commerce Models, Value Chains in Electronic Commerce, E-Commerce in India., Web Based Tools for Electronic Commerce, e-Marketing, Intranet, Composition of Intranet, Business Applications on Intranet, Extranets. Electronic Data Interchange, Components of Electronic Data Interchange, Electronic Data Interchange Communication Process.

### Unit II

Hours: - 12

Security Issues in e-business: Basic E-Commerce Security issues, Electronic Commerce Threats, E-Commerce Security Strategy, Encryption, Digital Signatures, Digital Certificates, Securing E-commerce Networks: Firewalls, Personal Firewalls, IDS, VPNs, Public Key Infrastructure (PKI) for Security.

### Unit III

Hours: - 10

Electronic Payment System:

Concept of e-Money, Internet Banking, Electronic Payment System, Types of Electronic Payment Systems, Smart Cards, Infrastructure Issues in EPS, Electronic Fund Transfer.

### Unit IV

Hours: - 10

e-Business Applications & Strategies: Business Models & Revenue Models over Internet, Emerging Trends in e-Business, Digital Commerce, Mobile Commerce, Basics of Internet Enabled SCM—the Supply Chain, Strategies for E-Commerce, Internet based Business Models; Legal, Ethical and Societal Impacts of E-Commerce.

## Text Books

1. Efraim Turban, David King, Dennis Viehland, Jae Lee, (2012): Electronic Commerce – A Managerial Perspective, Pearson Education.



2. Bharat Bhaskar (2013). Electronic Commerce- Framework, Technologies and Applications, Tata McGraw Hill.

#### Reference Books

1. Elias M. Awad (2010). Electronic Commerce-From Vision to Fulfillment, PHI Learning.
2. Dave Chaffey (2013). E-Business and E-Commerce Management- Strategy, Implementation and Practice, Pearson Education.
3. Joseph, P.T. and S.J. (2012). E-Commerce – An Indian Perspective, PHI.
4. Schneider Gary, (2014). Electronic Commerce, Cengage Learning.

Note: Latest edition of text books may be used.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA 106: Business Communication**

L-4, T-0,

Credits: 04

Max Marks: 75

Objectives: To train students to enhance their skills in written as well as oral Communication through practical conduct of this course. This course will help students in understanding the principles & techniques of business communication.

#### Course Contents

##### Unit I

Hours: - 10

Fundamental of Communication English and Career Management: Meaning and significance of communication, Process of Communication, Principles of Effective Business Communication, 7Cs; How To Improve Command Over Spoken and Written English, Self Appraisal, Selection of Job to match your potential, Challenges of 21st Century managing carrier, Art of Effective Listening.

##### Unit II

Hours: - 10

Communicating in a Multicultural World: idea of a global world, Impact of globalization on organizational and multicultural communication, understanding culture for global communication; Etic and Emic approaches to culture, The Cross Cultural Dimensions of Business Communication, Technology and

Communication, Ethical & Legal Issues in Business Communication, overcoming cross cultural communication.

### UNIT III

Hours: - 12

Business letter writing and Presentation Tools: Business letters- Need, Functions and Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters and Complaints; Employment related letters Interview Letters, Promotion. Letters, Resignation Letters,

### UNIT IV

Hours: - 12

Departmental Communication: Barriers of Communication, Meaning, Need and Types, News Letters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, Minutes of the meeting. Project and Report writing, How to Make a Presentation, the Various Presentation Tools, along with Guidelines of Effective Presentation,

#### Text Books:

1. Lesikar et al (2014). Business Communication: Making Connections in a Digital World. Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. Boove, C.L., Thill, J.V. & Chaturvedi, M. (2014). Business Communication Today, Pearson.
3. Effective Business Communication. Centre for Education Growth and Research.

#### Reference Books:

1. Krizan et al (2014). Effective Business Communication, Cengage Learning.
2. Scot, O. (2012). Contemporary Business Communication, Biztantra, New Delhi.
3. Chaney & Martin (2012). Intercultural Business Communication, Pearson Education

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA 108: Management Development Program**

\*NUES: Non University Examination System

Objectives: The main aim of the course is to improve the self-confidence and groom the personality. The following topics are indicated as course line and should be explored through application based exercise and workshops to provide fundamental knowledge and exposure to the students.

Course Contents

Unit I

Hours: 6

Self: Core Competency, Understanding of Self, Components of Self – Self identity, Self concept, Self confidence and Self image. Skill Analysis and finding the right fit.

Unit II

Hours: 6

Self Esteem: Meaning & Importance, Components of self esteem, High and low self esteem, measuring your self esteem and its effectiveness, Personality mapping tests, Appreciative Intelligence.

Unit III

Hours: 6

Building Emotional Competence

Emotional Intelligence – Meaning, Components, Importance and Relevance, Positive and Negative Emotions.

Healthy and Unhealthy expression of Emotions, The six-phase model of Creative Thinking: ICEDIP model.

Unit IV

Hours: 6

Thinking skills

The Mind/Brain/Behaviour, Thinking skills, Critical Thinking and Learning, Making Predictions and Reasoning, Memory and Critical Thinking, Emotions and Critical Thinking.

Creativity

Definition and meaning of creativity, The nature of creative thinking, Convergent and Divergent thinking, Idea generation and evaluation (Brain Storming), Image generation and evaluation.

Debates, presentations, role plays and group discussions on current topics.

Audio and Video Recording of the above exercises to improve the non-verbal communication and professional etiquettes.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **E-Commerce Lab**

L-0, T/P-4

Credits: 02

Max Marks: 60

Lab would be based on the Paper 106. The objective of this lab is to understand the various application of e-business like Internet infrastructure, security over internet, payment systems, online transactions and online strategies for e-business.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA 201: Business Law**

L-4, T-0

Credit-4

Max Marks: 75

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case law.

#### **Contents**

#### **Unit I:**

Hours: - 10

The Indian Contract Act, 1872: General Principle of Law of Contract

- a) Contract – meaning, characteristics and kinds
- b) Essentials of valid contract - Offer and acceptance, consideration, contractual capacity, free consent, legality of objects.
- c) Contract of Indemnity and Guarantee
- d) Contract of Bailment & Pledge.

#### **Unit II: The Sale of Goods Act, 1930**

Hours: - 12

- a) Contract of sale, meaning and difference between sale and agreement to sell.
- b) Conditions and warranties
- c) Transfer of ownership in goods including sale by non-owners
- d) Performance of contract of sale

e) Unpaid seller – meaning and rights of an unpaid seller against the goods and the buyer.

#### Unit III:

Hours: - 12

The Companies Act 1956 with up-to-date Amendments (Basic elementary knowledge): Essential characteristics of a Company, Types of Companies, Memorandum and Articles of Association, Prospectus, Shares – Kinds, Allotment and Transfer, Debentures, Essential conditions for a valid Meeting, Kinds of Meetings and Resolutions; Directors and Remuneration, Directors, Managing Directors-their Appointment, Qualifications, Powers and Limits on their Remuneration, Prevention of Oppression and Mismanagement.

#### Unit IV: The Negotiable Instruments Act 1881

Hours: - 10

a) Meaning and Characteristics of Negotiable Instruments : Promissory Note, Bill of

Exchange, Cheque, Crossing of Cheque, Bouncing of Cheques

b) Holder and Holder in due Course, Privileges of Holder in Due Course.

c) Negotiation: Types of Endorsements

#### Text Books

1. Kuchhal, M.C. and Vivek Kuchhal, (2014) Business Law, Vikas Publishing House, New Delhi.
2. Maheshwari & Maheshwari, Principles of Business Law (2013), Himalaya Pub.House-New Delhi.

#### Reference Books

1. Ravinder Kumar, Legal Aspects of Business, (2013), Cengage Learning
2. Singh, Avtar, Business Law, (2014), Eastern Book Company, Lucknow.
3. N.D.Kapoor, (2010) Sultan Chand, New Delhi
4. Bulchandani K R, Business Law for Management, (2014), Himalaya Pub.House-New Delhi.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA-203: Marketing Management**

Objectives: The objective of this paper is to identify the foundation terms and concepts that are commonly used in marketing. This course will give complete relationship between marketing and other management functions.

## Course Contents

### Unit I

Hours: -10

Introduction to Marketing: Nature, Scope and Importance of Marketing, Basic concepts, Marketing Environment, Consumer Behavior, Market Segmentation, Targeting and Positioning.

### Unit II

Hours: -10

Product: Product Levels, Product Mix, Product Strategy, Product Development, Product Lifecycle and Product Mix.

Pricing Decisions: Designing Pricing Strategies and Programmes, Pricing Techniques.

### Unit III

Hours: -12

Place: Meaning & importance, Types of Channels, Channels Strategies, Designing and Managing Marketing Channel, Retailing, Physical Distribution, Marketing Logistics and Supply Chain Management.

### Unit IV

Hours: -12

Promotion: Promotion Mix, Push vs. Pull Strategy; Promotional Objectives, Advertising- Meaning and Importance, Types, Media Decisions, Promotion Mix, Personal Selling-Nature, Importance and Process, Sales Promotion – Purpose and Types; Publicity and Public Relations- Definition, Importance and Methods.

Emerging Issues in Marketing: Integrated Marketing, Online Marketing, Online Payments, Rural Marketing, Social Marketing, Green Marketing (Introductory aspects only).

## Text Books

1. Kotler, Armstrong, Agnihotri and Haque, (2012), Principles of Marketing- A South Asian Perspective, Pearson Education.

2. Ramaswamy and Namkumar,S.,(2013), Marketing Management Global Perspective: Indian Context, McMillan, Delhi.

#### References

1. Saxena, Rajan, (2012), Marketing Management, McGraw Hill Education.
2. Lamb, Charles W, (2012), MKTG: a South Asian Perspective, Cengage Learning.
3. Russel, Winer, (2012), Marketing Management, Pearson Education.
4. Kotler, Koshi Jha, (2014), Marketing Management, Pearson Education.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA 205: Business Ethics and Corporate Social Responsibility**

L-4, T/P-0,

Credits: 04

Max Marks: 75

**Objectives:** The basic objective of this paper is to make the students realize the importance of values and ethics in business. This course endeavors to provide a background to ethics as a prelude to learn the skills of ethical decision-making and, then, to apply those skills to the real and current challenges of the information professions.

#### Course Contents

##### Unit-I

Hours: -10

**Introduction:** Concept of Values, Types and Formation of Values, Values and Behaviour, Values of Indian Managers, Ethical Decision Making.

**Ethics:** Management Process and Ethics, Ethical Decision Making, Ethical Issues, Ethos of Vadanta in Management, Relevance of Ethics and Values in Business

##### Unit-II

Hours: -12

**Knowledge and Wisdom:** Meaning of Knowledge and Wisdom, Difference between Knowledge and Wisdom, Knowledge Worker versus Wisdom Worker, Concept of Knowledge Management and Wisdom management.

**Stress Management:** Meaning, Sources and Consequences of Stress, Stress Management and Detached Involvement.

Concept of Dharma & Karma Yoga: Concept of Karama and Kinds of Karam Yoga, Nishkam Karma, and Sakam Karma; Total Quality Management, Quality of life and Quality of Work Life.

### Unit-III

Hours: -12

Understanding Progress, and Success - Results & Managing Transformation: Progress and Results Definition, Functions of Progress, Transformation, Need for Transformation, Process & Challenges of Transformation.

Understanding Success: Definitions of Success, Principles for Competitive Success, Prerequisites to Create Blue Print for Success. Successful Stories of Business Gurus.

### Unit-IV

Hours: -10

Corporate Social Responsibility & Corporate Governance: Corporate Responsibility of Business: Employees, Consumers and Community, Corporate Governance, Code of Corporate Governance, Consumer Protection Act, Unethical issues in Business

### Text Books

1. Fernando, A.C., (2010), Business Ethics, Pearson education.
2. Hartman, Laura and Chatterjee, Abha, (2010), Perspectives in Business Ethics, McGraw Hill Education.

### Reference Books:

1. Govindarajan.M, Natarajan.S, Senthilkumar, V.S., (2013) Professional Ethics and Human Values, PHI
2. Rao, A.B., (2012), Business Ethics and Professional Values, Excel Book.
3. Manuel G.Velasquez, (2012), Business Ethics Concepts, Printice Hall of India.
4. Sison, Alejo G. Corporate Governance and Ethics, (2010) Edward Elgar Publishing Ltd.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA 207: Management Accounting**

L-4 T-0

Credits –4

Max Marks: 75



Objectives: The objective of the course is to familiarize the students with the basic management accounting concepts and their applications in managerial decision making.

## Course Contents

### Unit I

Lectures:-6

Management Accounting: Nature and Scope, Financial Accounting, Cost Accounting and Management Accounting, Advantages and Limitations of Management Accounting, Role of Management Accountant.

### Unit II

Lectures:-14

Financial Analysis: Financial Statements and their Limitations, Concepts of Financial Analysis, Tools of Financial Analysis: Comparative Financial Statements, Common Size Financial Statements, Trend Percentages.

Ratio Analysis: Nature and Interpretation, Classification of Ratios, Profitability Ratios, Turnover Ratios, Financial Ratios, Utility and Limitations of Ratios.

Cash Flow Analysis: Distribution of Cash from Funds, Utility of Cash Flow Statement, Accounting Standard 3 (AS 3: Revised), Construction of Cash Flow Statement.

### Unit III

Lectures:-10

Budgets and Budgetary Control: Concept of Budgets and Budgetary Control, Advantages and Limitations of Budgetary Control, Establishing a System of Budgetary Control, Preparation of Different Budgets, Fixed and Flexible Budgeting, Performance Budgeting and Zero Base Budgeting, Concept of Responsibility Accounting – Types of Responsibility Centres.

Standard Costing and Variance Analysis: Meaning of Standard Cost, Relevance of Standard Cost for Variance Analysis, Significance of Variance Analysis, Computation of Material, Labour Variances.

### Unit IV

Lectures:-14

Marginal Costing and Profit Planning: Marginal Costing Differentiated from Absorption Costing, Direct Costing, Differential Costing, Key Factor, Break-even Analysis, Margin of Safety, Cost-Volume-Profit Relationship, Advantages, Limitations and Applications of Marginal Costing.

Decisions Involving Alternative Choices: Concept of Relevant Costs, Steps in Decision Making, Decisions Regarding Determination of Sales Mix, Exploring new Markets, Discontinuance of a Product Line, Make or Buy, Equipment Replacement, Change Versus Status Quo, Expand or Contract and Shut-Down or Continue.

## Text Books

1. Maheshwari, S. N. and Mittal, S. N. (2015), Cost Accounting – Theory and Problems, Shri Mahavir Book Depot.
2. Maheshwari, S.N., (2014), Principles of Management Accounting, Sultan Chand & Sons.

## Reference Books

3. Arora, M.N., (2012), Cost Accounting, Vikas Publishing House.
4. Lal, Jawahar and Srivastava, Seema, (2013), Cost Accounting, McGraw Hill Education.
5. Bhattacharya, (2010), Management Accounting, Pearson Education.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA 209- Indian Economy**

L-4 T/P-0

Credits-4

Objectives: To help the students to understand the basics of Indian economy and to catch up with economic changes occurring at national and international levels.

## Course Contents

### Unit I

Hours: 10

Nature of Indian Economy: The need for Economic Development, causes of under development, determinates of development, National Income of India-estimates, Interregional variations of national income, NITI Aayog (National Institution for Transforming India).

### Unit II

Hours: 12

Human Resources and Economic Development – Demographic Features of Indian population, size and growth of population and economic development. Problem of over population. Human development Index. New Economy Policy; - Privatization, Liberalization, Globalization. Unemployment problem in India; Problem of Poverty.

### Unit III

Hours: 12

Industrialization- Growth and problems of major industries-Iron and Steel, Cotton Textiles, Cement, Sugar and Petroleum. Industrial policy. Small scale industries-Problems and policy.

Regional imbalances, Parallel Economy. India's foreign trade and balance of payment.

#### Unit IV

Hours: 10

Indian Finance System: Mobilization of resources for development, Fiscal policy. Economic Planning-Importance of planning for Economic development, Salient features of India's five years plans priorities-target achievements, failures, factors affecting successful implementations of plans.

#### Text Books

1. Datt, and Sundhram, R., (2013), Indian Economy, Sultan Chand & Sons.
2. Dhingra, I C., (2014), Indian Economy, Sultan Chand & Sons.

#### Reference Books

1. Singh Ramesh (2015), Indian Economy, McGraw Hill Education.
2. Mishra and Puri (2015), Indian economy, Himalaya Publishing House.
3. Banik Nilanjan (2015), The Indian Economy: A Macroeconomic Perspective, Sage India Publisher.
4. Kapila Uma (2015), Indian Economy: Performance and policies, Academic Foundation.
5. Economic survey 2017.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **Environmental Science\***

\*NUES: Non University Examination System

L-2, T/P-0,

Credits: 02

Max Marks: 75

Objectives: The basic objective of this paper is to understand the basic fundamental to environmental science, complexity of ecosystems, major environmental problems including their causes and consequences. This course endeavors to provide a background to current and controversial environmental issues and possible solutions to environmental problems.

## Course Contents

### Unit I

Hours: - 06

Ecosystems and how they work: Types of Eco-Systems, Geosphere – Biosphere and Hydrosphere introduction. Major issues of Biodiversity, Conservation of Bio-Diversity.

Concept of sustainability and international efforts for environmental protection: Concept of Sustainable Development, Emergence of Environmental Issues. International Protocols, WTO, Kyoto Protocol, International Agreement on Environmental Management.

### Unit II

Hours: - 06

Water Pollution: Water Resources of India, Hydrological Cycle, Methods of Water Conservation and Management, Rain Water Harvesting and their legal aspects, River Action Plan, Ground and Surface Water Pollution; Waste Water Management.

Air Pollution: Air Pollution and Air Pollutants, Sources of Air Pollution and its Effect on Human Health and Vegetations. Green House Effect, Global Warming and Climate Change.

### Unit III

Hours: -06

Solid Waste: Management – and Various Method Used, Composting, Land Fill Sites etc. Hazardous Waste Management, Biomedical Waste Management.

Environmental Impact Assessment and Environmental Management System - Introduction and its Impact.

### UNIT IV

Hours: -06

Introduction to Indian Environmental laws: Legal framework, The Indian Penal Code, Role of Judiciary in Environmental Protection, Water (Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution ) Act, 1981,

## Text Books

1. Miller Tyler, G. Jr., (2011), Environmental Science: Working with the Earth, Cengage Learning India Pvt. Ltd.
2. Mishra, S.P., and Panday, S.N., (2014), Essential Environment Studies, Ane Books Pvt. Ltd.

#### Reference Books

1. Chhatwal, Rajni Johar (2012), Environmental Science, UDH Publishers & Distributers (P) Ltd.
2. Ghosh Roy, M.K. (2014), Sustainable Development, Ane Books Pvt. Ltd.
3. Asthana, D.K. and Meera. (2014), Textbook on Environmental Studies. S.Chand.
4. Arumugam.N, & Kumaresan.V, (2014) Environmental Science & Engineering, Saras Publication.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA 202: Business Environment**

L-4, T-0,

Credits: 04

Max Marks: 75

**Objectives:** To familiarize the students with the nature and dimensions of evolving business environment in India to influence managerial decisions and how the Indian Economy is influencing the business environment in India context.

#### Course Contents

##### Unit I

Hours: - 10

An Overview of Business Environment: Type of Environment-Internal, External, Micro and Macro Environment, Competitive Structure of Industries, Environmental Analysis and Strategic Management, Managing Diversity, Scope of Business, Characteristics of Business, Process and Limitations of Environmental Analysis.

Structure of Indian Economy: Concept of Economic Growth and Economic Development, Growth and Development. Basic Characteristics of Indian Economy, Trends in National Income in India.

##### Unit II

Hours: - 10

Planning and Economic Development and Problems in Indian Economy: Industrial Policy-1991, Disinvestments of Public Enterprises; Economic Problems: Poverty, Inequality, Unemployment, Concentration of Economic Power, Low Capital Formation and Industrial Sickness.

##### Unit III

Hours: - 12

Concepts of Macro Economics and National Income Determination: Definitions, Importance, Limitations of Macro-Economics, Macro-Economic Variables, circular flow in 2,3,4 sector and multiplier in 2,3,4 sector.

National Income: Concepts, Definition, Methods of Measurement, National Income in India, Problems in Measurement of National Income & Precautions in Estimation of National Income.

Macro Economic Framework: Theory of Full Employment and Income: Classical, Modern (Keynesian) Approach, Consumption Function, Relationship between saving and Consumption, Investment function.

#### Unit IV

Hours: - 12

Economic Environment: Nature of Economic Environment, Economic, Nature and Structure of the Economy, Monetary and Fiscal Policies, FEMA, FDI, WTO, GATT.

Socio-Cultural Environment: Nature and Impact of Culture on Business, Culture and Globalization, Social Responsibilities of Business.

#### Text Books

1. Datt, and Sundhram, R., (2013), Indian Economy, Sultan Chand & Sons.
2. Cherunilam, Francis, (2014), Business Environment - Text and Cases, Himalaya Publishing House.
3. Prabhakaran Paleri (2014), Business Environment, Cengage Learning.

#### Reference Books

1. Dhingra, I C., (2014), Indian Economy, Sultan Chand & Sons.
2. Aswathappa, K., (2012), Essentials of Business Environment, Himalaya Publishing House.
3. Gupta C. B., (2012), Business Environment, Sultan Chand.
4. Dwivedi, D. N., (2014) Macro Economics, McGraw Hill Education.

Note: Latest edition of text books may be used.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA 204: Human Resource Management**

L-4, T-0

Credits: 04

Max Marks: 75

Objectives: The objective of this course is to make students familiarize with basic concepts of human resource management and people related issues.

## Course Content:

### Unit I:

Hours: -10

Human Resource Management: Concept and Functions, Role, Models, Status of HR , HR Policies, Evolution of HRM. Emerging Challenges of Human Resource Management; workforce diversity, empowerment, Downsizing; VRS; Human Capital; HRIS.

### Unit II

Hours: -12

Human Resource Planning: Human Resource Planning- Quantitative and Qualitative dimensions; Recruitment – Concept and sources; (E-recruitment, recruitment process outsourcing etc.); Selection – Concept and process; test and interview; placement induction. Job analysis – job description and job specification; job design; Job Enlargement; Job Enrichment and flexi-time; Career Planning; Succession Planning.

### Unit III

Hours: -12

Training and Development: Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role Specific and Competency Based Training; Evaluating Training Effectiveness; Management Development; Career Development ;

Performance appraisal: Nature and objectives; Techniques of performance appraisal; potential appraisal and employee counseling; Internal mobility – promotions, demotion, transfers and separation. Compensation: concept and policies; job evaluation.

### Unit IV

Hours: -10

Maintenance: Employee health and safety; employee welfare; social security; Industrial relations- an overview. Grievance handling and redressal Industrial Disputes causes and settlement machinery.

Strategic HRM: HRD audit, managing globalization; technology and HRM.

## Text Books

1. Gary Dessler. (2013) A Framework for Human Resource Management. Pearson.
2. David A. Decenzo, Stephen P. Robbins, Susan L. Verhulst, Human Resource Management”, (2015), Wiley India Private Limited.

## Reference Books

1. Bohlendar and Snell, Principles of Human Resource Management, (2013) Cengage Learning.
2. K. Aswathappa, Human Resource Management (2013), McGraw Hill Education (India) Private Limited.
3. Chhabra, T.N. Essentials of Human Resource Management. (2014) Sun India Publication New Delhi.
4. Robert L. Mathis and John Jackson, Human Resource Management (2011), South-Western Publisher.

### **BBA-MBA(INTEGRATED)**

#### **BBA-206: Financial Management**

L-4, T-0

Credit-4

Max Marks: 75

Objectives: Efficient Management of a business enterprise is closely linked with the efficient management of its finances. Accordingly, the objective of the course is to acquaint the students with the overall framework of financial decision- making in a business unit.

#### Course Contents

##### Unit I

Hours: -12

Financial Management: Meaning, Scope, Objectives of Financial Management, Profit Vs. Wealth Maximization. Financial Management and other Areas of Management, Methods of Financial Management, Organization of Finance Function.

Sources of Financing: Classification of Sources of Finance.

##### Unit II

Hours: -12

Capital Structure: Meaning and Theories of Capital Structure: Net Income, Net Operating Income and MM Approach and Traditional Approach, Factors Determining Capital Structure.

Cost of Capital: Concept, Importance, Classification and Determination of Cost of Capital (Cost of Equity, Preference, debt and WACC), Leverage: Financial, operating & composite leverage

##### Unit III

Hours: -12

Capital Budgeting: Concept, Importance and Appraisal Methods: Pay Back Period, Accounting Rate of Return, Net Present Value Method (NPV), Profitability Index, and IRR. Capital Rationing.

Dividend Policy: Theories for Relevance and Irrelevance Concepts of Dividend.



#### Unit IV

Hours: -8

Working Capital Management: Operating cycle, Working Capital Estimation, Concept, Management of cash: Preparation of Cash Budget.

#### Text Books

- 1 . Khan M.Y, Jain P.K., (2014), Financial Management, McGraw Hill Education.
2. Pandey I. M., (2015), Financial Management, Vikas Publishing House.
3. Brigham and Houston (2013) Financial Management, CENGAGE Learning

#### Reference Books

1. Kapil, Sheeba, (2012), Financial Management, Pearson Education.
2. Chandra Prasanna (2011), Financial Management: Theory and Practice, McGraw Hill.
3. Maheshwari, S.N. (2013), Financial Management: Principles and Practice, Sultan Chand.
4. Tulsian, P.C. (2010), Financial Management: A self study textbook, S. Chand.

LINGAYA'S UNIVERSITY, GREATER FARIDABAD, HARYANA

BBA-MBA(INTEGRATED)

BBA-208 Research Methodology

L-4, T-0,

Credits: 04

Max Marks: 75

Objectives: The objective of this paper is to understand the various aspects of research, identify the various tools available to a researcher. Research Methodology can help the business manager in decision making.

## Course Contents

### Unit I

Hours: -10

Introduction: Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

### Unit II

Hours: -10

Research Process: An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method, Existing Data Based Research, Longitudinal Studies, Panel Studies, Questionnaire Design.

### Unit III

Hours: -12

Measurement: Definition; Designing and writing items; Uni-dimensional and Multidimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurston, Likert and Semantic Differential scaling, Paired Comparison, Reliability and Validity Scale.

Sampling –Steps, Types, Sample Size Decision; Secondary data sources.

Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests.

### Unit IV

Hours: -12

Report Preparation: Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification.

Computerized Data Analysis: An overview, features, and role of Computerized Data Analysis (Advanced Excel / SPSS or any other analytical software) (Introductory aspects only).

## Text Books

1. Malhotra, Naresh, (2010), Marketing Research, Pearson education.
2. Cooper, Donald R. and Schindler, Pamela S. (2014), Business Research Methods, Tata McGraw Hill.
3. Rresearch Methodology for Facult(2016), Centre for Education Growth and Research Publication.

#### Reference Books

1. Nargundkar, Rajendra, (2011), Marketing Research: Text and Cases, McGraw Hill Education.
2. Kumar, Ranjit, (2014), Research Methodology: A step by step guide for Beginners. Pearson Educaion.
3. Levin, Richard and Rubin, DS, (2013), Statistics for Management, Pearson Education.
4. Beri, G.C., (2013), Marketing Research, McGraw Hill Education.
5. Deepak chawla & Neena Sondi, (2016), 2nd edition, Vikas Publishing House.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **Information System Management**

L-4 T-0

Credit-4

Max Marks: 75

**Objectives:** The objective of the course is to acquaint the students about the concept of information system in business organizations, and also the management control systems.

#### Course Contents

##### Unit I

Hours: -10

**Introduction:** Definition, Purpose, Objectives, and Role of MIS in Business Organization, pre-requisites for effective MIS, MIS Applications in Business.

**Information in Decision Making:** Meaning and importance, Sources and Types of Information, information requirements with particular reference to Management Levels, Relevance of Information in Decision Making, Strategic Business objectives of information system.

##### Unit II

Hours: -10

Cost Benefit Analysis: Quantitative and Qualitative Aspects, Assessing Information needs of the Organization.

System Development: Concept of System, Types of Systems – Open, Closed, Deterministic, Probabilistic, etc., System Approaches - System Development Life Cycle (SDLC), Prototyping, End User Development, Waterfall and Spiral method, System Analysis, Design and Implementation.

### Unit III

Hours: -12

Types of information system: Transaction Processing System, Expert System, Decision Support System, Executive Information system and Knowledge Management System.

Information Technology: Recent Developments in the Field of Information Technology, Impact of IT on Organization, Multimedia Approach to Information Processing, Centralized and Distributed Processing.

### Unit IV

Hours: -12

Emerging Concepts and Issues in Information Systems: ERP - An overview, Characteristics, and Role of ERP in Business Organization, Customer Relationship Management, Business Intelligence, Introduction to Database, Data Warehousing, Data Mining and its Applications, MIS and Information Security Challenges (Introductory aspects only).

### Text Books

1. Laudon and Laudon, Management Information Systems, Pearson Education, 2014.
2. Javadekar, W.S., "Management Information Systems", Tata McGraw Hill Publication, 2014.

### Reference Books

1. O'Brien, James A., "Management Information System", Tata McGraw Hill, 2014.
2. Davis, B. Gordon, "Management Information System", Tata McGraw Hill Publication, 2012.
3. Goyal D.P., "Management Information Systems", Macmillan Publication, 2014.
4. M Azam, "Management Information System", Tata McGraw Hill, 2012.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

## **BBA-252 Research Methodology -Lab**

L-0, T/P-2

Credit-2

Max Marks: 60

Lab would be based on the Paper 210. The objective of this lab is to understand the various aspects of research, identification and use of various Software tools available to a researcher. Research tools can help the business manager in decision making (By using any popular Software (Advanced Excel / SPSS or any other analytical software))

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA 301: Income Tax Law and Practice**

L-4, T/P-0,

Credits: 04

Max Marks: 75

**Objectives:** The course aims to help students to comprehend the basic principles of the laws governing Direct and Indirect taxes. Students are expected to have only elementary knowledge of the topics specified in the syllabus.

#### **Course Contents**

##### **Unit I**

Hours: -10

Introduction to Income Tax Act 1961, Salient Features and Basic Concepts – Previous Year, Assessment Year, Person, Gross Total Income and Agricultural Income, Residential Status and Incidence of Tax, Fully Exempted Incomes

##### **Unit II**

Hours: -12

Heads of Income-Salary (perquisites, allowances and retirement benefits), House Property, Business or Profession, Capital Gains, Other Sources

##### **Unit III**

Hours: -12

Deductions u/s 80C to 80U, Provisions for Clubbing of Income (simple problems), Meaning and Provisions of Set off and Carry Forward of Losses (simple problems)

##### **Unit IV**

Hours: -10

Deduction of Tax at Sources, Payment of Advance Tax, Assessment of Individuals (computation of Total Income and Tax Liability) and Procedure for filing of returns (online filing- ITR).

### Text Books

1. Lal, B.B., (2012), Income Tax and Central Sales tax Law and Practice, Pearson Education.
2. Singhania, V. K and Singhania, Monica, Students Guide to Income Tax, (2015), Taxman Publications.

### Reference Books

1. Ahuja, Girish and Gupta, Ravi, Systematic Approach to Income Tax, (2014), Bharat Law House.
2. Datey, V.S., Indirect Taxes-Law and Practice, (2015), Taxmann Publications.
3. Government of India, Bare Acts (2014), (Income Tax, Service Tax, Excise and Customs).
4. Vashisht, Nitin and Lal, B.B., (2012), Direct Taxes: Income Tax, Wealth Tax and Tax Planning, Pearson Education.

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA 303: Production & Operations Management**

L-4, T-0

Credit -4

Max Marks: 75

#### Objectives:

To develop basic understanding of concepts, theories and techniques of production process and operation management.

#### Course Contents

##### Unit I

Hours: -12

Introduction: Definition, Objectives, Scope and Functions of Production & Operations Management, Types of Production Systems, Transformation Process Model, Systems Perspectives of Operations Management, and Relationship of Operations Management with Other Functional Areas.

Production Planning and Control: Objectives, Importance, Levels and Procedures of Production Planning and Control.

Production Design and Development: Product Design, Factors determining the Design of a Product, Approaches to Product Design, Product Development Process, and Factors influencing Product Development.

## Unit II

Hours: -12

Plant Location and Layout: Factors affecting for location, criteria of site selection, Plant Location Methods, Factor Rating, Centre of Gravity Methods, Analytic Delphi Method, Objectives of Plant Layout, Factors affecting for plant layout, Types of layouts-Process, Product and Fixed position layout, Problems in Facility Layout.

Purchasing and Material Management: Objectives and Importance of Material Management, Organisation of Material Management, Factors responsible for providing economy in Material Management, Steps in purchasing procedure, and Methods of Purchasing.

## Unit III

Hours: -10

Inventory Management & JIT: Inventory management and analysis, Inventory Control, Essentials of a good Inventory Control System, Factors affecting Inventory Control Policy, Models / Methods of Inventory Control- EOQ, Re-order Level, ABC analysis, VED analysis, SDE analysis, HML analysis and FSN analysis. Just in Time Implementation Requirements.

Quality Management Systems and TQM: TQM, Phases of Quality Control, Specification of Quality, Quality at Source, Zero Defects, Cost of Quality, Continuous Improvement, Benchmarking, Poka-Yokes, ISO (9000&14000 Series), and Six Sigma (Introductory aspects only).

## Unit IV

Hours: -10

Plant Maintenance: Importance of Maintenance Management, Types of Maintenance- Breakdown, Preventive, Predictive, Routine and Planned Maintenance.

Emerging Concepts and Issues in Manufacturing Systems: IT in Modern Production Management, Supply Chain Management, CAD / CAM Systems, ERP in Manufacturing Systems (Introductory aspects only).

## Text Books

1. Aswathappa, K. Production and Operation Management, (2011), Himalaya Publishing.
2. Mahadevan, B. Operation Management: theory and practice, (2015), Pearson Education India.

Reference Books:

1. Charry, S., “Production and Operation Management”, Tata McGraw-Hill, 2012.
2. Panneerselvam R. “Production and Operation Management”, Prentice Hall, 2012.
3. Chase, R.B, et. Al (2011), Operations Management for Competitive Advantage, Tata McGraw Hill, New Delhi.
4. Stevenson W. J (2014). Operations Management, Tata McGraw Hill, New Delhi.

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA-305 Sales & Distribution Management**

L-4, T/P-0,

Credits: 04

Max Marks: 75

Objective: The course aims to impart the knowledge and skills needed to manage the sales force and distribution functions in a business organization so as to help gain a competitive advantage.

Course Contents:

Unit I

Hours: -10

Introduction to Sales Management: Scope and Importance; The Evolving Face of Personal Selling; Personal Selling Process and Approaches; Sales Organization Structure; Sales Strategies, Sales Forecasting; Sales Territory Design.

Unit II

Hours: -12

Sales Force Management: Sales Force Job Description; Recruitment and Selection; Training Sales Personnel; Sales Force Motivation; Compensation; Sales Quotas: Evaluating Sales Performance; Information Technology in Sales Management;

Unit III

Hours: -12

Distribution Planning and Control: Functions of Intermediaries; Types and Role of Channel Intermediaries in India for Consumer and Industrial products: Wholesale and Retail Structure, Channel Strategy and Design; Selection, Motivation and Evaluation of Intermediaries; Managing Channel Dynamics, Relationships and



Channel Conflict; Ethical and Legal Issues in Sales and Distribution Management in Indian context.

#### Unit IV

Hours: -10

Distribution System and Logistics: Physical Distribution System –Objectives and Decision Areas; Customer Service Goals; Logistics Planning; An overview of Transportation, Warehousing and Inventory Decisions; Efficient Supply Chain Management (SCM); Integration of Sales and Distribution Strategy.

#### Text Books

1. Still. K.R., Cundiff. E.W & Govoni. N.A.P (2014). Sales Management. Pearson Education, New Delhi.
2. Rosenbloom, Bert (2014) Marketing Channels: A Management View, Cengage Learning, New Delhi.

#### Reference Books

1. Jobber , David and Lancaster, Geoffery (2012), Selling and Sales Management, Pearson Education, New Delhi
2. Tanner Jr., J.F., Honeycutt Jr., E.D. and Erffmeyer, R.C. (2014), Sales Management:, Pearson Education, New Delhi
3. Panda, T.K. and Sahadev, S (2012) Sales and Distribution Management, Oxford University Press, New Delhi.
4. Havaladar, K K. and Cavale, VM. (2012), Sales and Distribution Management: Text and Cases, Tata McGraw Hill, New Delhi.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA 307: Digital Marketing**

L-4 T/P-0

Credits-4

Max Marks: 75

Objectives: This course aims at creating an understanding of the concepts and techniques of internet and digital marketing so as to exploit the opportunities of this medium to support the organization's marketing activities

## Course Contents

### Unit I

Hours: -10

Role of Communications in Marketing, Advertising Vs Digital Advertising, Sales Promotions, Integrated Marketing Communications. Evolution of internet as a medium for communication.

Introduction to Digital Marketing: Digital Marketing meaning scope and importance, Internet versus traditional marketing communication, internet microenvironment; Use of Business to Consumer and Business to Business Internet Marketing; Internet marketing strategy.

### Unit II

Hours: -12

Use of Internet in Relationship Marketing ( e-CRM) Approaches to Implementing e-CRM; Product Life Cycle Management with internet, Online buyer behavior and Models; The Marketing Mix (7- Ps) in online context. Managing the Online Customer Experience: Planning website design, Understanding site user requirement, site design and structure, developing and testing content, Integrated Internet Marketing Communications (IIMC); Objectives and Measurement of Interactive marketing communication, Service quality.

### Unit III

Hours: -12

Digital Promotion Techniques: Email Marketing, Opt-in-e-mail-Permission Marketing, Social Media Marketing, Online PR, Interactive Advertising, Online Partnerships, Viral Marketing Search Engine Marketing, Mobile Marketing, Blogs. Search Engine Marketing (SEM): Search Engines, Search Engine Optimization, Website Optimization, Content Marketing, Designing content for social media marketing, Campaign management.

### Unit IV

Hours: -10

Web Analytics: Creating a performance system, defining the performance metrics framework, Organic and paid search advertising and analytics, Electronic word-of-mouth analytics, Social media analytics Tools and techniques for Measurement, Website Maintenance Process, tools for web analytics, tools for social media analytics.

## Text Books

1. Chaffey, D., Ellis-Chadwick, F., Johnston, K. and Mayer, R. (2009) Internet Marketing: Strategy, Implementation and Practice, Third Edition, Pearson Education, New Delhi.

2. Strauss, Judy and Frost, Raymond (2009), E-Marketing, 5th Edition, PHI Learning Pvt. Ltd., New Delhi.

#### Reference Books

1. Roberts, M.L. (2009) Internet Marketing, 1st Indian Edition, Cengage Learning, New Delhi.

2. Hanson, W. and Kalyanam, (2010), e-Commerce and Web Marketing 1st Edition, Cengage Learning, New Delhi.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA-309 Entrepreneurship Development**

L-4 T-0

Credits –4

Max Marks: 75

**Objectives:** It provides exposure to the students to the entrepreneurial cultural and industrial growth so as to prepare them to set up and manage their own small units.

#### Course Contents

##### Unit I

Hours: -10

**Introduction:** The Entrepreneur: Definition, Emergence of Entrepreneurial Class; Theories of Entrepreneurship.

##### Unit II

Hours: -10

**Promotion of a Venture:** Opportunity Analysis; External Environmental Analysis Economic, Social and Technological; Competitive factors; Legal requirements of establishment of a new unit and Raising of Funds; Venture Capital Sources and Documentation Required, Forms of Ownership.

##### Unit III

Hours: -12

**Entrepreneurial Behaviour:** Innovation and Entrepreneur; Entrepreneurial Behaviour and Psycho- theories, Social responsibility.

**Entrepreneurial Development Programmes (EDP):** EDP, Their Role, Relevance and Achievements; Role of Government in Organizing EDP's Critical Evaluation.

##### Unit IV

Hours: -12

**Role of Entrepreneur:** Role of an Entrepreneur in Economic Growth as an Innovator, Generation of Employment Opportunities, Complimenting and Supplementing Economic Growth, Bringing about Social Stability and Balanced Regional Development of Industries: Role in Export Promotion and Import Substitution, Forex Earnings.

#### Text Books

1. Hisrich, Robert and Peters, Michael, (2012), Entrepreneurship, McGraw Hill Education.

2. Charantimani, (2014), Entrepreneurship Development and Small Business Enterprise, Pearson Education.

#### Reference Books

1. Balaraju, Theduri, (2012), Entrepreneurship Development: An Analytical Study, Akansha Publishing House.
2. David, Otes, (2014), A Guide to Entrepreneurship, Jaico Books Publishing House, Delhi.
3. Kaulgud, Aruna, (2012), Entrepreneurship Management, Vikas Publishing House, Delhi.
4. Chhabra, T.N. (2014), Entrepreneurship Development, Sun India.

Note: Latest edition of text books may be used.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA 351: Summer Training Report & Viva Voce**

L-0, T-0

Credit-6

Max Marks: 100

Each student shall undergo practical training of eight weeks during the vacations after fourth semester in an approved business / industrial / service organization and submit at least two copies of the Summer Training Report to the Director / Principal of the Institution before the commencement of the end-term Examination. The Summer Training Report shall Carry 100 marks. It shall be evaluated for 50 marks by an External Examiner to be appointed by the University and for the rest of the 50 marks by an Internal Examiner to be appointed by the Director / Principal of the Institution.

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA-313: Goods & Services Tax (GST)**

L-4 T-0

Credits –4

Max Marks: 75

Objective: The Objective of the course is to acquaint the student about the introduction of GST in India and the replacement of all Indirect Taxes with GST to make India Level playing field with outside world.

Unit-I

Indirect Taxes – Meaning and Types of Indirect Taxes, Central Excise Duty - features, nature, scope, salient features of central excise Duty Act; Procedure for excise registration and documents needed; CENVAT MODVAT provisions; Exemptions to small scale industries; Introduction to custom duties; its types, calculation and related issues. Hours: 14

#### Unit-II

VAT – Introduction, meaning, features, merits and demerits, tax calculation, difference from sales tax, value addition with example; Different forms for VAT; VAT refund; Importance of CST Act 1956 Various Provisions; Different categories; CST Calculations; Introduction to Services Tax Act 2007; Types of Services covered; relevant provisions; Rates of Service Tax and its calculation. Hours: 14

#### Unit-III

Goods and Service Tax (GST) - Constitutional Amendment, Features of GST, Importance and benefits; Difference between GST and other Taxes; Migration to GST; Registration of dealers under GST, Exempted List; Rate Structure under GST; Procedure for obtaining registration certificate, concept of IGST; CGST; SGST and its calculation with working examples. Hours: 14

#### Unit-IV

Implementation of GST: GST Council, its members; composition; its role; GST Infrastructure; Impact of GST on Business; Salient features of GST Model. How to file refund under GST, Transfer of Input Tax credit and its related issues; Penalties and appeals under GST; Future of GST in India. Hours: 14

#### Text Books

1. Mehrotra H.C., Agrawal V. P., (2016), Indirect Taxes, Sahitya Bhawan Publication.
2. B. Viswanathan, (2016), Goods and Services Tax in India, New Century Publications.

#### Reference Books

1. Singhaia Vinod K. & Singhania Monica, (2016), Students Guide to Indirect Tax Laws, Taxman Publications.
2. Datey V S. (2017), All about GST – A Complete guide to model GST Law, 5/e, Taxman Publications.
3. Gupta K Atul, (2016), GST- Concept and Roadmap, 1/e, LexisNexis Publisher.
4. Ahuja Girish & Gupta Ravi, (2016), Practical Approach to Direct & Indirect Taxes, (Income Tax, Excise, Customs, CST, VAT, Service Tax, & Wealth Tax 34/e, CCH India

### **SYLLABUS FOR BBA-MBA(INTEGRATED)**

#### **BBA-302 PROJECT MANAGEMENT**

L-4, T-0

Credits –4

Max Marks: 75

### Objectives:

The basic objective of this course is to familiarize the students with the various aspects of Projects and key guidelines relevant to project planning, analysis, financing, selection, implementation and review.

### Course Contents

#### UNIT - I

Hours: -12

Introduction: Projects, Project Management, Objectives and Importance of Project Management, Tools and Techniques for Project Management, Project Team, Roles and Responsibilities of Project Manager, Determinants of Project Success.

Project Life Cycle: Phases of Project Life Cycle, Classification of Projects.

Project Management Process and Project Selection: Process of Project Management, Project Selection Methods, Project Selection Criteria.

Generation and Screening of Project Ideas: Generation of Ideas, SWOT Analysis, Monitoring the Environment, Corporate Appraisal, Profit Potential of Industries (Porter Model, analysis for Project Ideas, Preliminary Screening, Project Rating Analysis, Entry barriers Analysis, Review of Project Planning.

Project Organizational Structure: Forms of Organizational Structure - Functional Organization, Project Organization, Matrix Organization.

#### UNIT-II

Hours: -10

Technical Analysis: Factors Considered in Technical Analysis, Factors Affecting Selection of Locations, Need for Considering Alternatives, Technology Selection, Sources of Technology, Appropriate Technology.

Market Analysis: Conduct of Market Survey, Characterization of Market, Market Planning (Introductory aspects only).

Network Techniques: Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (Simple problems only).

#### UNIT-III

Hours: -10

Financial Estimates and Projections: Feasibility Study, Types of Feasibility Study, Steps of Feasibility Study, Importance and Steps of Financial Feasibility, Components of Cost of Project and Its Estimation (Introductory aspects only).

Financing of Projects: Capital Structure, Sources of Long-term Finance, Debt Financing, Characteristics of Debt, Types of Debts, Equity Financing, Preferential Shares, Equity Shares, Retained Earnings, Short-term Sources for Working Capital, Newer Sources of Finance, Venture Capital.

#### UNIT-IV

Hours: -12

Project Evaluation and Control: Project Monitoring and Controlling, Project Evaluation, Post Project Evaluation (Post Audit), Abandonment Analysis.

Social Cost Benefit Analysis: Social Cost, Social Benefit.

Risk Analysis: Process of Risk Management, Sources of Risk in Project Management, Managing Risk.

International Project Management: Introduction, Types of International Projects, Process of International Project Management, Financing International Projects, Risks Associated with International Projects.

Emerging Concepts and Issues in Project Management: Role of Information Technology in Project Management, Future of Project Management.

#### Text Books

1. Chandra, Prasanna, "Projects: Planning, Analysis, Financing, Implementation and Review", Tata McGraw Hill Publishing Company Limited, 2014.
2. Nagarajan, K., "Project Management", New Age International (P) limited, Publishers, 2015.

#### Reference Books

1. R. Panneerselvam. R, Senthilkumar. P., "Project Management", PHI Learning, (P) limited, Publishers, 2013.
2. Maheshwari, S.N., "Financial and Management Accounting", Sultan Chand & Sons, 2012.
3. Jeffrey K. Pinto, "Project Management: Achieving Competitive Advantage", Pearson Education, 2012.
4. Desai, Vasant, "Project Management", Himalaya Publishing House, 2013.

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA-304 Services Marketing**

L-4 T-0

Credits –4

Max Marks: 75

Objective: This course aims at enabling students to apply marketing concepts and principles to the unique challenges and opportunities of services marketing to create customer value.

Course Contents:

#### **UNIT - I**

Hours: -10

Introduction to Services Marketing: Meaning and Nature of Services Growing Importance of Services Sector; Classification of Services and Marketing Implications; Services Marketing Management Process.

#### **UNIT - II**

Hours: -12

Understanding Consumer Behavior in Services; Customer Expectations and Perceptions; Defining and Measuring Service Quality and Customer Satisfaction, Servqual, House of Quality, Return on Quality; GAPs Model; Service Recovery.

#### **UNIT - III**

Hours: -12

Services Marketing Mix: Service Positioning, Services Design and Development; Service Blueprinting; Service Process; Pricing of services; Services Distribution Management; Managing the Integrated Services Communication Mix; Physical Evidence and Servicescape; Managing Service Personnel; Employee and Customer Role in Service Delivery.

#### **UNIT - IV**

Hours: -10

Marketing Applications in Select Service Industries: IT, Hospitality Services, Airlines, Tourism Services, Health Care and Wellness: Banking and Insurance Services.

#### **Text Books**

1. Zeithaml V. A., Bitner M. J. and Pandit, A. (2013), Services Marketing, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Lovelock C. H., Wirtz, J. and Chatterjee, J. (2012). Service Marketing: People, Technology, Strategy, Pearson Education, New Delhi.



## Reference Books

1. Hoffman, K. D. & Bateson, J. E.G. (2012), Marketing of Services, Cengage Learning.
2. Kurtz D. L. and Clow K. E. (2013). Services Marketing. Biztantra, New Delhi.
3. Nargundkar, Rajendra, (2012), Services Marketing Text and Cases, Tata McGraw Hill Publishing Co. Ltd.
4. Fitzsimmons, JA, and Fitzsimmons, M.J (2012) Service Management: Operations, Strategy, and Information Technology, Irwin/McGraw-Hill

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA-306 International Business Management**

L-4, T-0

Credits-4

Max Marks: 75

Objectives: The basis objective of this course is to provide understanding to the students with the global dimensions of management.

## Course Contents

### UNIT I

Hours: -12

Overview: International Business- Introduction, Concept, Definition, Scope, Trends, Challenges and Opportunities; Nature, Meaning and Importance of International Competitive Advantage, Multidimensional view of Competitiveness.

Financial Perspectives: International Monetary Systems and Financial Markets, IMF, World Bank, IBRD, IFC, IDA, Existing International Arrangements; Globalization and Foreign Investment- Introduction FDI, national FDI Policy Framework, FPI.

### UNIT II

Hours: -10

Globalization: Impact of Globalization, Technology and its Impact, Enhancing Technological Capabilities, Technology Generation, Technology Transfer, Diffusion, Dissemination and Spill Over, Rationale for Globalization, Liberalization and Unification of World Economics, International Business Theories, Trade Barriers- Tariff and Non Tariff Barriers.

### UNIT III

Hours: -10

Strategy making and International Business: Structure of Global Organizations, Types of Strategies used in Strategic Planning for achieving Global Competitive Advantage, Meaning, Concept and scope of Distinctive Competitive Advantage, Financial Integration, Cross border Merger and Acquisitions.

### UNIT IV

Hours: -12

Socio Cultural Environment- Managing Diversity within and across Cultures, Country Risk analysis, Macro Environmental Risk Assessment, Need for Risk Evaluation; Corporate governance, Globalization with social responsibility- Introduction, Social responsibility of TNC, Recent development in corporate social responsibility and policy implications.

Global Human Resource Management- Selection, Development, Performance Appraisal and compensation, Motivating employees in the global context and managing groups across cultures, Multicultural management.

#### Text Books

1. Tamer, Cavusgil, Gary, Knight, (2012), International Business: Strategy, Management and the New Realities,  
Pearson Education.
2. K. Aswathappa, (2012), International Business, McGraw Hill Education.

#### Reference Books

1. Sinha P.K, (2012), International Business Management, Excel Books.
2. Singh Shamsher, (2013) International Business, Galgotia Publishing Company.
3. Cherunilam Francis (2010), International Business, PHI.
4. Deresky, (2012), International Management: Managing Across Borders and Culture, Pearson Education.

Note: Latest edition of text books may be used.

**LINGAYA'S UNIVERSITY, GREATER FARIDABAD, HARYANA**

**BBA-MBA(INTEGRATED)**

**BBA 308: Business Policy & Strategy**

L-4 T-0

Credits-4

Max Marks: 75

**Objectives:** The course aims to acquaint the students with the nature, scope and dimensions of Business Policy and Strategy Management Process.

## Course Contents

### Unit I

Hours: -10

**Introduction:** Nature, Scope and Importance of Business Policy; Evolution; Forecasting, Long-Range Planning, Strategic Planning and Strategic Management.

**Strategic Management Process:** Formulation Phase – Vision, Mission, Environmental Scanning, Objectives and Strategy; Implementation phase – Strategic Activities, Evaluation and Control.

### Unit II

Hours: -12

**Environmental Analysis:** Need, Characteristics and Categorization of Environmental Factors; Approaches to the Environmental Scanning Process – Structural Analysis of Competitive Environment; ETOP a Diagnosis Tool.

**Analysis of Internal Resources:** Strengths and Weakness; Resource Audit; Strategic Advantage Analysis; Value-Chain Approach to Internal Analysis; Methods of Analysis and Diagnosing Corporate Capabilities – Functional Area Profile and Resource Deployment Matrix, Strategic Advantage Profile; SWOT analysis. McKinsey's 7s Framework.

### Unit III

Hours: -12

**Formulation of Corporate Strategies:** Approaches to Strategy formation; Major Strategy options – Stability, Growth and Expansion: Concentration, Integration, Diversification, Internationalization, Cooperation and Digitalization, Retrenchment, Combination Strategies.

### Unit IV

Hours: -10

**Choice of Business Strategies:** BCG Model; Stop-Light Strategy Model; Directional Policy Matrix (DPM) Model, Product/Market Evolution – Matrix and Profit Impact of Market Strategy (PIMS) Model.

**Major Issues involved in the Implementation of strategy:** Organizational Cultural and Behaviour factors, Organization Structure; Role of Leadership, Resource Allocation.

### Text Books

1. Kazmi, Azhar, (2014), Strategic Management and Business Policy, McGraw Hill Education.
2. Ghosh, P. K., (2012), Strategic Planning and Management, Sultan Chand & Sons, New Delhi.

### Reference Books

1. Hill, Charls WL and Jones Gareth R. (2011), An Integrated Approach to Strategic Management, Cengage Learning.
2. Walker, Gordon, (2012), Modern Competitive Strategy, McGraw Hill Education.
3. Weelen, (2012), Concepts in Strategic Management and Business Policy, Pearson Education.
4. Fred, David, (2011), Strategic Management: Concepts and Cases, Prentice hall of India

Note: Latest edition of text books may be used.

## **SYLLABUS FOR BBA-MBA(INTEGRATED)**

### **BBA-352 PROJECT REPORT AND VIVA VOCE**

L-0 T-0

Credits-6

Max Marks : 100

During the sixth semester each student shall undertake a project to be pursued by him / her under the supervision of an Internal Supervisor to be appointed by the Director / Principal. The project should preferably be based on primary data. Both the subject and the name of the Supervisor will be approved by the Director / Principal of the Institution. The Project Report in duplicate along with one soft copy in a CD/DVD will be submitted at least three weeks prior to the commencement of the End Term Examination of the Sixth Semester. Project Report shall carry 100 marks. It shall be evaluated for 50 marks by an External Examiner to

be appointed by the University and for the rest of the 50 marks by an Internal Examiner to be appointed by the Director / Principal of the Institution.

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-201A      STRATEGIC MANAGEMENT**

#### **OBJECTIVE**

The objective of the course is to develop a holistic perspective of an organization and to enable the students to analyze the strategic situation facing the organization, to access strategic options available to the organization and to implement the strategic choices made by it.

1.      **INTRODUCTION:** Concept of Strategy, Ansaff's Matrix, SM, importance, levels of approaches, process of SM: roles of strategies, mission and objectives; components of strategies, environment – concepts, components and appraisal, vision, mission and objective.
2.      **FORMULATION:** Organization appraisal and strategy formulation; Organizational dynamics and structuring organizational appraisal, SWOT analysis, formulation-corporate level strategies and business strategies.
3.      **ANALYSIS:** Strategy Analysis and Choice – the process, BCG matrix, GE matrix, SPACE approach, QSP matrix and strategic plan.
4.      **IMPLEMENTATION:** Strategy implementation; aspects, structures, design and change; behavioral implementation-leadership, culture, values and ethics. (a brief discussion), policies: Functional implementation; functional strategies, plans and policies; marketing; financial; personnel; operations, its plans and policies.
5.      **EVALUATION:** Strategic evaluation and control – an overview of strategic evaluation and control, techniques of strategic evaluation and control.

#### **REFERENCE BOOKS**

1.      Kazmi, Azhar, Business Policy and Strategic Management, Tata McGraw Hill Publishing Company Ltd. New Delhi
  2.      David, Fred R. Strategic Management-Concept and cases, Pearson Education, Delhi.
- Pearce II J A and Robinson Jr., R.B., Strategic Management-Strategy Formulation and Implementation, AITBS Publishers and Distributors, Delhi.

## **SYLLABUS FOR BBA-MBA(I)**

## **BA-202A – OPERATIONS RESEARCH**

### **COURSE OBJECTIVE:**

The objective of this paper is to acquaint the students with various quantitative techniques which are of great importance for quantitative decision-making.

#### **Unit-I**

Operations Research: Evolution, methodology and role in managerial decision making; Linear programming: Meaning, assumptions, advantages, scope and limitations, Formulation of problem and its solution by graphical and simplex methods; special cases in simplex method: infeasibility, degeneracy, unboundedness and multiple optimal solutions; duality.

#### **Unit-II**

Transportation problems including transshipment problems; Special cases in transportation problems: unbalanced problems, degeneracy, maximization objective and multiple optimal solutions; assignment problems including traveling salesman's problem.

#### **Unit-III**

PERT/CPM: Difference between PERT and CPM, network construction, calculating EST, EFT, LST, LFT and floats, probability considerations in PERT, time -cost trade-off, Decision theory: decision making under uncertainty and risk, Bayesian analysis, decision trees.

#### **Unit-IV**

Game theory, pure and mixed strategy games; principle of dominance; two person zero sum game; Queuing theory: concept, assumptions and applications;

#### **Unit-V**

Poisson distributed arrivals and exponentially distributed service time models (MM1 and MMK); Simulation; meaning, process, advantages, limitations and applications.

#### **Suggested Readings:**

1. Paneerselvam, Operations Research, Prentice Hall of India, N.Delhi.
2. Taha, Operations Research: An Introduction, Prentice Hall of India, N.Delhi.
3. Vohra, N.D.; Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Kapoor, V.K., Operations Research; Sultan Chand & Sons, New Delhi.

LINGAYA'S UNIVERSITY, FARIDABAD

BBA-MBA(I)

## INTERNATIONAL BUSINESS

Objective: The purpose of this paper is to enable the students learn nature scope and structure of International Business, and understand the influence of various environmental factors on international business operations.

1. Introduction to International Business: Importance nature and scope of International business; modes of entry into International Business internationalization process and managerial implications, Framework for analyzing international business environment.
2. Global Trading Environment: World trade in goods and services – Major trends and developments; World trade and protectionism – Tariff and non-tariff barriers; Counter trade, international trade theory, e-commerce.
3. International Financial Environment: Foreign investments-Pattern, Structure and effects; Movements in foreign exchange and interest rates and then impact on trade and investment flows, strategizing foreign entry
4. International Economic Institutions and Agreements: WTO, IMF, World Bank UNCTAD, Agreement on Textiles and Clothing (ATC), GSP, GSTP and other International agreements; International commodity trading and agreements, functioning of NAFTA
5. Multinational Corporations and their involvement in International Business: Issues in foreign investments, technology transfer, pricing and regulations; International collaborative arrangements and strategic alliances, Growing concern for ecology; Counter trade; IT and international business.

### Suggested Readings:

1. Bennet, Roger, International Business, Financial Times, Pitman Publishing, London, 1999.
2. Bhattacharya, B., Going International: Respon se Strategies of the Indian Sector, Wheeler Publishing, New Delhi, 1996.
3. Czinkota, Michael R., et. al., International Business, the Dryden Press, Fortworth, 1999.
4. Danoes, John D. and Radebaugh, Lee H., International Business: Environment and Operations, 8th ed., Addison Wesley, Readings, 1998.
5. Griffin, Ricky W. and Pustay, Michael W, International Business: A Managerial Perspective, Addison Wesley, Readings, 1999.
6. Hill, Charles W. L., International Business, McGraw Hill, New York, 2000.

LINGAYA'S UNIVERSITY, FARIDABAD

BBA-MBA(I)

BA-103A ACCOUNTING FOR MANAGERS

### OBJECTIVE

The objective of this course is to acquaint the students regarding various accounting concepts and its applications in managerial decision making.

1. INTRODUCTION: Financial Accounting –concepts; importance and scope, accounting principles; journal; ledger trial balance. Depreciation; depreciation (straight line and diminishing balance methods);
2. PREPARATION OF FINAL ACCOUNTS WITH ADJUSTMENTS.
3. FINANCIAL STATEMENT: Analysis and interpretation of financial statements- meaning importance and techniques. Analysis: Ratio analysis; fund flow analysis; cash flow analysis (AS-3)
4. COST ACCOUNTING: Cost accounting-meaning, importance; methods, techniques classification of costs and cost sheet; inventory valuation; an elementary knowledge of activity based costing
5. MANAGEMENT ACCOUNTING: Management accounting- meaning, need objectives, budgetary control; meaning objectives & advantage; fixed of flexible budgets, cash budget, other types of budgets. Standard Costing: Standard costing and variance analysis (materials, labour); marginal costing and its application in managerial decision making;

### REFERENCE BOOKS

1. Singhal, A.K. and Ghosh, Roy H.J., “Accounting for Managers”, JBC Publishers and Distributors, New Delhi
2. Pandey, I.M., “Management Accounting”, Vikas Publishing House, New Delhi
3. Homgren, Sundem and Stratton, “Introduction to Management”, Accounting, Pearson Education, New Delhi
4. Anthony R N and Reece J.S. Management Accounting Principle, Homeward, Illinois Richard, D Irwin.
5. Khan, my and Jain P K, Management Accounting, TMH, New-Delhi

### SYLLABUS FOR BBA-MBA(I)



## **BA-272A      ENTREPRENEURSHIP DEVELOPMENT**

### **OBJECTIVE**

To acquaint the students with the challenges of starting new ventures and enable them to investigate, understand and internalize the process of setting up a business.

1. **CONCEPT OF ENTREPRENEURSHIP:** meaning and characteristics of entrepreneurship, entrepreneurial culture, factor responsible for the emergence and growth of entrepreneurship, factors affecting entrepreneurship, conceptual model of entrepreneurship, qualities of a successful entrepreneur, intra-preneur and manager
2. **STRATING THE VENTURE: GENERATING BUSINESS IDEA:** source of new ideas, methods of generating ideas, creative problem solving, opportunity recognition; environmental scanning, competitor and industry analysis; feasibility study – market feasibility; technical/operational feasibility, financial feasibility; drawing business plan; preparing project report; presenting business plan to investors
3. **LEGAL FORMS OF BUSINESS:** sole proprietorship, partnership; Joint Hindu Family firm, joint stock company, co-operative organization. **The Marketing Plan:** marketing research for the new venture, steps observed in marketing research, understanding the marketing plan, marketing mix, steps in preparing the marketing plan, contingency plan
4. **THE FINANCIAL PLAN:** nature and significance of business finance, Financial planning & its role, capital structure, factors influencing capital structure, assessment of capital requirements; fixed capital and working capital; factors affecting fixed capital, operating cycle of working capital, factors affecting working capital, cash budget, Proforma Income Statement, Proforma cash flow & Proforma Balance Sheet, Break-even analysis.
5. **SOURCES OF FINANCE:** Debt & Equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; Legal Issues for the Entrepreneur and International Entrepreneurship; legal issues- intellectual property rights, patents, trademarks, copy rights, trade secrets, licensing, franchising. International entrepreneurship; introduction, driving and restraining forces, importance of international entrepreneurship, international versus domestic entrepreneurship

### **TEXT BOOK**

1. Gupta C. B. and Srinivasan N. P., “Entrepreneurial Development”, Sultan Chand & Sons
2. Vasant Desai, “Management of a Small Scale Industry”, Himalaya Publishing House
3. Hisrich, Robert D, Michael Peters and Dean shepherd, Entrepreneurship, TMG, N.Delhi
4. Barringer, Brace R and R Duane Ireland Entrepreneurship prentice hall N. Jersey.
5. Lall, Mahurima and Shikha, Entrepreneurship, Excel Book, N. Delhi

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-212A      E-COMMERCE**

**OBJECTIVE :** The advent of e-commerce has posed many new issues in the development of business information systems, including Accounting Information Systems. In order to develop effectively and efficiently information systems for contemporary business, the IS specialists should understand new contexts, practices, and appropriate IT - specifically web-based technologies.

1. Introduction to E – Commerce & E-Business: Introduction; Definition; Forces fueling E-Com; E-Com Vs E-Business; Challenges in E – Commerce; E-Business Communities. : Model for E-Business: Channel Reconfiguration, Transaction, Event, and Market Segment Aggregation; Value Chain Integration, Strategic Model; E-Com Industry Framework; Information Superhighway; Types of E-Com; E-Business Trident: E-SCM, E-CRM, and E-RP

2. E – Security : Firewalls & N/W Security; Type of Firewall, Security Policies; Emerging Firewall Management Issue; Transaction Security; Types of Online Transactions; Requirement for Online Transactions; Encryption & Transaction Security; Secret – Key Encryption; Public Key Encryption; Implementation & Management Issues; WWW & Security; Netscape’s Secure Socket Layers; Security & Online Web Based Banking Security.

3. Electronic Payment System: Overview of E-Payment System; Digital Cash, Properties; Electronic Check & Benefits; Online Credit Card System; Types of Credit Card Payments; Secure Electronic Transactions (SET). Other Emerging Financial Instruments; Debit Card and Point of Sale (POS); Debit Card and E - Benefit Transfer; Smart Cards; Electronic Fund Transfer; Intelligent Agents.

4. E–Com Banking, E–Com Retailing and Publishing : Electronic Commerce and Banking; Home Banking History; Banking via Online Services; Management Issues in Online Banking. Electronic Commerce and Retailing; Management Challenges in Online Retailing; Electronic Commerce and Online Publishing; Advertising and Online Publishing.

5. Internet Marketing & E–Com Strategies : Introduction: Definition and Scope; The 7 Stages of Internet Marketing; Critical Success factors for Internet Marketing.

E-Commerce Strategies for Development; Element of National E-Commerce Strategies; Legal and Regulatory Issues; E-Commerce and Sales Strategy.

#### **SUGGESTED READING:**

1. Electronic Commerce-A managers Guide by Ravi Kalakota and Andrew Whinston, Publisher: Pearson Education India
2. Global Electronic Commerce by Westland J. Christopher and Clark Theodore, Publisher: Academic Press
3. Internet Marketing by Rafi A. Mohammed and Robert J. Fisher, Publisher: McGraw Hill

## **SYLLABUS FOR BBA-MBA(I)**

### **BA- 264A      Managerial Skills**

**Objectives:** The objective of this course is to develop a basic understanding about the management concepts as well as of human in various managerial processes in organization

#### **UNIT-1**

Skill Development - Writing Business Letter, Official letters, 7C's & 4'S in Communication , Report writing , Skills, Presentation Skills , Communication : Concept, Types , process, barriers, making Communication effective .Managerial creativity- Business Process Re-engineering - Concept , Process, Redesign, BPR, experiences in Indian Industry , Total Quality Management(TQM) - Concept , Systems model of Quality, Deming's approach, TQM as a business Strategy .

#### **UNIT-2**

Technology led development- Knowledge Management (KM)- What , why, how, of Knowledge Management , KM process , approach, strategies, tools. E-commerce- Ideology, methodology, classification by application /nature of transactions , Driving Forces of EC, Impact of EC, Scope .Leadership for managers - Concept , Traits, Styles, Types of leadership, Leadership for managers-varied case studies for identifying and imbibing leadership attributes.

#### **UNIT-3**

Selling & Negotiation Skills-Types of Negotiation , Negotiation Strategies ,Selling skills – Selling to customers , Selling skills – Body language, Conceptual selling, Strategic selling

#### **UNIT-4**

Conflict Management- Conflict Management - Types of conflicts and Conflict Management , Coping strategies and Conflict Management, Conflict Management Styles

#### **UNIT-5**

Positive thinking -Attitudes , Beliefs, Positive thinking – Martin Seligman's theory of Learned Helplessness , Learned Optimism, Case Studies and Presentations

#### **References**

- 1.Stoner, Freeman , Gilbert Jr. : Management (Pearson education)
- 2.Kootz,O'Donnell , Weighrich : Essentials of Management
- 3.Michael , J. Stahl : Management -Total Quality in a global environment ( Blackwell Business)
- 4.Newman , Warren and Summer : The Process of Management , Concept, Behaviour & Practice .

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-305A      PERFORMANCE MANAGEMENT**

#### **OBJECTIVE**

Performance management is the most critical function and strong determinant of organizational excellence. This course is designed to develop appreciation and skills essential for designing and instituting effective performance management systems.

1. **INTRODUCTION:** Concept, characteristics, role and significance of performance management; performance appraisal vis-à-vis performance management; process of performance management; performance management and strategic planning linkages.
2. **PMS:** Establishing and operational ting performance management system; measuring performance – (various aspects), conducting performance review discussion; harnessing performance management system for performance improvement.
3. **STRATEGIES:** Performance management strategies and interventions – reward based performance management; Career based performance management, team based performance management.
4. **CULTURAL ASPECTS:** Culture based performance management; measurement based performance management.
5. **COMPETENCY BASED PMS:** Concept, types of competencies, competency devt, competency modeling a matrix, competency based pms.

#### **REFERENCE BOOKS**

1. Aguinis, Herman, “Performance Management”, Pearson Education
2. Sahu, R.K., “Performance Management System”, Excel Books, New Delhi
3. Cardy, Robert L, “Performance Management: Concepts, Skills and Exercises”, Prentice Hall of India, New Delhi.
4. Kandula, Srinivas R, “Performance Management”, Prentice Hall of India, New Delhi

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-306A      TRAINING AND DEVELOPMENT**

#### **OBJECTIVE**

This course is designed to provide in depth understanding and enable the students to manage training processes and system for developing human resource of the organization.

1. INTRODUCTION: Training – concept and rationale; training process: different between training & development
2. ASSESSMENT: Training needs assessment – organizational analysis, operational analysis, person analysis; competency mapping, person and setting training assessment & design-designing the training – essential factors to be considered in training design, learning process & different learning style.
3. METHODS and TECHNIQUES: Training methods and techniques – role playing, business games, in basket exercises, laboratory training; incidents and cases; seminars, syndicates and group discussion; lecture, programmed instructions; brainstorming, mind mapping, electronic enacted
4. EVALUATION: Evaluation of training - need for evaluation, principles of evaluation, model of evaluation, return on investment in training, process of calculation of ROI in training,
5. GLOBAL PERSPECTIVE: Emerging trends in training and development; new perspectives on training – cross cultural training, and knowledge management.

#### REFERENCE BOOK

1. Sahu, R.K., “Training for Development”, Excel Books, New Delhi

Blanchard, P Nick, James W. Thacker, “Effective Training – Systems, Strategies and Practices”, Pearson Education, New Delhi.

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-307A ORGANIZATIONAL CHANGE AND DEVELOPMENT**

#### OBJECTIVE

This course is designed to provide in depth understanding of behavioural interventions and enable the students to apply these interventions for building individual, team, systems and process related competencies and helping organizational to achieve peak performance and become self sustaining.

1. INTRODUCTION: Organizational Change – meaning, nature, types; theories of planned change; organizational Development.
2. INTERVENTIONS: Human Process Interventions – T group, process consultation, third party interventions.
3. TEAM BUILDING: Team building; organizational confrontation meeting, coaching and mentoring, role focused interventions.

4. **RESTRUCTURING:** Techno structural Interventions- restructuring organization, reengineering, employee involvement, work design, strategic, intervention.
5. **ETHICS AND VALUES:** OD practioners-role, competencies requirement, professional ethics and values future trends in OD in service sector.

#### REFERENCE BOOKS

1. Cummings, Christopher, “Organization Development and Change”, Thomson Learning
2. Chowdhury, Subir, “Organization 21C”, Pearson Education
3. French, Wendell, Bell, “Organization Development”, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-308A      COMPENSATION MANAGEMENT**

#### OBJECTIVE

The course is designed to promote understanding issues related to compensation in corporate sector and impart skills in designing, analysis, and restructuring compensation management system, policies and strategies.

1. **INTRODUCTION:** Concept, Role of compensation in organization: economic and behavioral theories related to compensation, Strategic perspectives of compensation; compensation as motivational tool; compensation policy.
2. **EQUITIES:** Internal and external equities in compensation system; determining of the worth of job; understanding inter and intra industry compensation differentials.
3. **DESIGN:** Designing pay structure and administering compensation package; understanding different components of compensation package like Fringe benefits, incentives and retirement plans; pay for performance plans.
4. **SPECIAL GROUPS:** Compensation of special groups; Corporate Director, Chief Executives, Senior Managers; Professionals and knowledge workers, R and D staff Components of Executive compensation package

5. **STATUTORY PROVISIONS:** Statutory provisions governing different components of reward systems; working of different institutions related to reward system like wage boards, pay commissions, role of trade unions in compensation management, tax planning.

#### REFERENCE BOOKS

1. Milkovich, George T and Newman J.M., “Compensation”, Tata McGraw Hill
  2. Martocchio, J.J., “Strategic Compensation”, Pearson Education
  3. Armstrong, M and Murlis, H, “Reward Management”, Kogan Page, UK
- Henderson, R.O., “Compensation Management”, Pearson Education

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-405A TALENT MANAGEMENT**

#### OBJECTIVE

The objective of this course is designed to create symbiotic relationship between talent and organization accelerate the performance involvements by instituting talent management system that ensures identification, management and development of talent portfolio.

1. **INTRODUCTION:** Talent – engine of new economy, difference between talents and knowledge workers, leveraging talent, a talent value chain.
2. **TALENT MANAGEMENT SYSTEM:** Talent Management System – elements and benefits of TMS; creating TMS, challenges of TMS; building blocks of talents management, talent friendly organization.
3. **TALENT PLANNING:** Talent planning – succession management process; cross-functional capabilities and fusion of talents, competences – types, concept & development methods.
4. **BUDGETING:** Talent development budget, value-driven cost structure; contingency plan for talent; building a reservoir of talent.
5. **RETURN ON TALENT:** Return on talent; ROT measurements; optimizing investment in talent; integrating compensation with talent management; developing talent management information system.

## REFERENCE BOOKS

1. Chowdhury, Subir, “The Talent Era”, Financial Times / Prentice Hall International
2. Berger, Lance A and Dorothy, Berger (Eds.), “The Talent Management Handbook”, Tata McGraw Hill, New Delhi
3. Sanghi, Seema, “The Handbook of competency Mapping”, Response Books, New Delhi

LINGAYA’S UNIVERSITY, FARIDABAD

BBA-MBA(I)

BA-406A INDUSTRIAL RELATIONS AND LABOR LEGISLATIONS

## OBJECTIVE

The objective of the course is to sensitise and expose the students to the task, functions and issues of industrial relations and to gain insight into the dynamics of employee management relations on different job situations.

1. INTRODUCTION: Industrial relations- concept, scope and objectives, emerging economic and profile, impact of technology change on industrial relations.



2. **ROLE OF STATE:** Factors affecting industrial relations. Prevention and settlement of disputes. Dynamics of Industrial Conflicts: Dynamics of industrial conflicts, discipline and Grievance management, negotiation and collective bargaining.
3. **TRADE UNIONS:** Development of trade unions in India. Pattern of trade unions in structure, central trade Union organization, Registration and recognition of trade union. Rules of liabilities of TU.
4. **INDUSTRIAL LAWS:** Social security laws, Factories Act, Industrial Dispute Act, (Workmen's compensation, ESI, PF, Gratuity, Maternity relief) in brief.
5. **WORKERS PARTICIPATION:** Co-ownership management. Concept and significance, involvement of workers with management processes. Strategic implementation of WPM.

#### REFERENCE BOOKS

1. Ramaswamy, E., "Managing Human Resources", Oxford University Press, New Delhi
2. Monappa, A., "Managing Human Resources", Tata McGraw Hill, New Delhi
3. Dutta, S.K., "Guide to Disciplinary Action", Tata McGraw Hill, New Delhi.
4. Venkataratnam, Sinha, "Trade Union Challenges at the Designing of 21st Century". Excel Books, New Delhi.
5. Venkataratnam, "Industrial Relations", Oxford University Press, N.Delhi.

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-407A STRATEGIC HUMAN RESOURCE MANAGEMENT**

#### OBJECTIVE

The primary concern of this course is to develop in depth understanding of the strategic role performed by HR in business organizations and to gain insight of the alignment between different HR systems and organizational outcomes.

1. **INTRODUCTION:** HRM in knowledge economy; concept of SHRM: investment perspective of SHRM, **STRATEGIC PERSPECTIVE:** Evolution of SHRM, strategic vs. traditional HR, barrier to strategic HR, role of HR in strategic planning.
2. **FRAMEWORK AND APPROACHES:** Strategic fit frameworks: linking business strategy and HR strategy, HR bundles approach, best practice approach; business strategy and human resource planning, **MEASURES:** HRM and firm performance linkages – measures of HRM performance.
3. **HR SYSTEMS:** HR systems: staffing systems, reward and compensation systems, employee and career development systems, performance management systems.

4. STRATEGIC HR DECISIONS: Strategic options and HR decisions – Downsizing and restructuring.
5. GLOBAL PERSPECTIVE: Domestic and international labor market, mergers and acquisitions, outsourcing and off-shoring.

#### REFERENCE BOOKS

1. Agarwala, Tanuja, “Strategic Human Resource Management”, Oxford University Press, New Delhi
2. Mello, Jeffrey A., “Strategic Human Resource Management”, Thomson Learning Inc.
3. Greer, Charles, “Strategic Human Resource Management”, Pearson Education

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-408A CROSS-CULTURAL HUMAN RESOURCE MANAGEMENT**

#### OBJECTIVE

This course builds on the notions and frameworks in developing and understanding about the diverse nature of behavior patterns and issues involved in multivariate values and culture systems to maintain excellence of management.

1. HUMAN RESOURCE MANAGEMENT: Human resource management in global organization: meaning and concept, characteristics and elements.
2. HUMAN AND CULTURAL VARIABLES: Human and cultural variables of organization; cultural diversity, models and attitudinal dimensions; cultural differences, similarities and managerial implications.
3. GLOBAL ISSUES: Global HR issues: cross –national differences, differences in communication work setting, negotiations, leadership, Motivational context, standardization and adoption of work practice; training and development of international system.
4. GLOBAL STAFF MANAGEMENT: Managing global staff: recruitment, selection criteria and issues, Retention and motivating international staff, bargaining behavior and negotiation strategies; culture caricatures, team development and cooperation.

5. **COMPENSATION:** Compensation: objectives, determinants and key components; standards of performance management in global perspective; issues and challenges in global perspective; expatriate and repatriate issues in global context.

#### REFERENCE BOOKS

1. Holt, David H, “International Management–Text and Cases”, Dry Den Press, Thomson Learning, Bombay
2. Peter, J., Dolling, Danice, E. Welch, “International Human Resource Management”, Thomson learning – Excel books
3. Cullen, “Multinational Management”, Thomson Learning Bombay
4. Harzing and Van Ruysseveldt, “International Human Resource Management”, Sage Publication, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-309A MANAGEMENT OF FINANCIAL SERVICES and INSTITUTIONS**

#### OBJECTIVE

The objective of this paper is to acquaint the students about major financial services and institutions.

1. **INTRODUCTION:** Financial services: salient features, scope and problems; mutual funds; venture capital financing. Regulatory framework: Regulatory and theoretical framework of leasing; issue management activities/procedures of merchant banking.
2. **CREDIT RATING:** Credit rating: factoring and forfeiting; housing finance. Mergers: Merger/amalgamation and acquisition /takeover; debt securitization.
3. **DEVELOPMENT BANKING:** Development banks: operational policies and practices of IDBI, ICICI, IFCI, SIDBI, EXIM BANK, UTI, LIC.
4. **MONEY MARKET INSTRUMENTS:** Segment/instruments of money market; SEBI: its objective, functions and power.
5. **SECURITY TRADING:** Mechanism of security trading: NSE, OTCEI, scriptless trading; depository; system and custodial services.

## REFERENCE BOOKS

1. Khan, M.Y., “Indian Financial System”, Tata McGraw Hill, New Delhi
2. Bhole, L.M., “Financial institutions and Markets”, Tata McGraw Hill, New Delhi
3. Khan, M.Y., “Financial Services”, Tata McGraw Hill, New Delhi
4. Machirajn, HR, Indian Financial System, Vikas Publishing House Pvt. Ltd. New-Delhi
5. Vasant Desai, The Indian Financial System, Himalaya Publishing House, New-Delhi

## SYLLABUS FOR BBA-MBA(I)

### **BA-310A PROJECT MANAGEMENT AND INFRASTRUCTURE FINANCE**

#### COURSE OBJECTICE:

The objective of this paper is to acquaint the students about the project planning, appraisal and control and financing of infrastructure projects.

#### Unit-I

Phases and objectives of capital budgeting; generation and screening of project ideas. Market, demand and situational analysis, technical analysis and financial analysis.

#### Unit-II

Special decision situations, analysis of project risk; appraisal criteria, firm risk and market risk.

Social cost benefit analysis, UNIDO approach, SCBA by financial institutions.

#### Unit-III

Project financing in India -project appraisal by financial institutions, environmental appraisal of Projects.

## Unit-IV

Project management: organisation, planning, control, human aspects and pre -requisites.

## Unit-V

Financing infrastructure projects: Concept, rational and financial instruments; Public finance for infrastructure projects; BOOT/ BOT system for infrastructure projects.

### Suggested Readings

1. Chandra, Prasanna, Projects : Planning Analysis, Selection, Implementation and Review, Tata McGraw Hill, New Delhi, 2002.
2. Bhavesh, M Patel, Project Management, Vikas Publishing House, New Delhi.
3. Machiraju, H. R., Project Finance, Vikas Publishing House, New Delhi.
4. Rao, P.C.K., Project Management and Control , Sultan Chand & Sons, N.Delhi.
5. Nijiru, Cyrus and Merna,Tony, Financing Infrastructure Projects, Thomas Telford, UK, ISBN

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-311A      STRATEGIC COST MANAGEMENT AND CONTROL**

#### OBJECTIVE

This course aims to acquaint the students with concepts and various aspects of cost management from strategic perspective.

1.      **INTRODUCTION:** Conceptual framework of SCM, environmental influences on cost management practices, role of SCM in strategic positioning, cost management tools –life cycles costing, target costing, kaizan costing, JIT and theory of constraints, BPR and bench marking.
2.      **ABC:** Nature of activity –based costing (ABC); benefits and limitations of ABC; limitations of volume –based costing system, indicates of ABC; activity hierarchies; cost drivers; designing an ABC system activity based management; operational and strategic application of ABC.
3.      **ANALYSIS:** Customer profitability analysis, process value analysis, financial measures of activity efficiency; nature of value chain analysis; activity analysis and linkage analysis; application of linkage analysis in cost reduction and value addition.
4.      **PLANNING AND CONTROL:** Functional –based planning and control; budgeting –nature administration and effectiveness; budgeting cycle; activity based budgeting; kaizan approach; ZBB; performance budgeting, human aspects of budgeting; responsibility centre and financial control –nature and

role of responsibility centers accounting and evaluation of responsibility centre measuring the performance of investment centre –ROI, RI, EVA; transfer pricing and its applications.

5 **PERFORMANCE MEASUREMENT SYSTEM:** Strategic based performance measurement system: balanced score card –prospective and limitations; establishing objectives and performance measures in different perspectives of balance score card; productivity measurement and control; productivity efficiency; partial and total productivity measurement; measuring changes in activity and process efficiency; quality cost management and reporting system.

#### REFERENCE BOOKS

1. Drury, Colin, “Management Accounting and Control”, Thomson Learning
  2. Hansen and Mowen, “Cost Management”, Thomson learning
  3. Kaplan, Atkinson, “Advanced Management Accounting”, Pearson Learning
- Horngren, Datar Foster, “Cost Accounting”, Pearson Education

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-312A MULTINATIONAL FINANCIAL MANAGEMENT**

#### OBJECTIVE

International boundaries are blurring. Therefore, MNCs can raise funds from international financial management. The purpose of this paper is to equip the students with financial and investment decision of MNCs.

1. **INTRODUCTION:** Importance factors leading to internationalization of finance, structure of International Funds Flow, International Monetary system, evaluation of control.
2. **FINANCIAL RISK DETERMINED:** BOP, PPP, International parity, Development of international marketing.
3. **INTERNATIONAL MONEY & CAPITAL MARKETING:** International capital money market; euro dollar and currency market; financial market instrument –GDRs, ADRs, Euro issues, CP and ECB, **INTERNATIONAL SYSTEM:** International working capital management, international cash management, international receivable management, managing short term assets and liabilities.
4. **INTERNATIONAL STRUCTURE AND CAPITAL BUDGETING:** Multinational capital budgeting, cost of capital. **CAPITAL STRUCTURE:** Capital structure decisions; dividend policy of multinational firm.

5. INTERNATIONAL FINANCIAL RISK MANAGEMENT: Measuring and managing various risks and exposure, country risk analysis; taxation in multinational firms.

#### REFERENCE BOOKS

1. Madura, Jeff, "International Financial Management", Thomson learning
2. Eitman, David K., Stonehill, Arthur I, Moffet, Michael H. and Pandey, Alok, "Multinational Business Finance", Pearson Education

Sharan, V, "International Financial Management", Prentice Hall India, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-409A TAXATION LAWS AND PLANNING**

#### OBJECTIVE

The objective of this course is to acquaint the students with tax laws and tax planning

1. **INTRODUCTION:** Basic concepts of income tax, residential status and its incidence on tax liability, incomes exempt from tax; income from the had salary; income from house property.
2. **PROFITS:** Profits and gains of business and profession including depreciation; capital gains; income from other sources.
3. **CLUBBING OF INCOMES:** Clubbing of incomes, setting off and carrying forward of losses; general deductions from gross total income, assessment of individuals computation of tax liability.
4. **TAX PLANNING:** tax planning in reference to employees remuneration; returns of income and assessment of income; deduction and collection of tax at source; income tax authorities and their powers.
5. **TAX AVOIDANCE AND EVASION:** laws relating to them, managerial decisions: relating to own or lease, make or buy, export or import, tax returns: various features and assessment of income.

#### REFERENCE BOOKS

1. Singhania, V.K. and Singhania, Kapil, "Direct Taxes Law and Practices", Taxman Publications
2. Mehrotara and Goyal, "Income Tax Law and Practice", Sahitya Bhawan Pub. Agra.

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-410A      MANAGEMENT OF BANKING AND INSURANCE**

#### **OBJECTIVE**

The attempt of this paper is to impart knowledge of various functional areas and risk management in banking and insurance sectors.

1. **INTRODUCTION:** An overview of the banking sector – growth and structure; functions and operations – RBI, Commercial Banks, RRBs, Cooperative Banks and NABARD.
2. **REGULATORY ISSUES:** Regulatory issues for governance of banking sector – role of RBI and Ministry of Finance; marketing in banking industry – components of bank marketing strategy; role of technology in banking.
3. **ALM:** Components of ALM and their management; liquidity management, interest rate management, management of credit and operational risk; treasury operations and management; managing capital adequacy and profit sharing; managing NPAs.
4. **INSURANCE SECTOR:** Origin and development of insurance sector; objective and process of risk management; types and structure of insurance plans, Investment pattern and policies of insurance companies; challenges of insurance marketing; role of IRDA; pension funds in India.
5. **LIFE AND NON-LIFE INSURANCE COMPANIES:** Organizational forms, structure and administration of life and non-life insurance companies, Life and non-life insurance management – strategic management, planning and control cycle, use of life insurance in personal and business planning; life and non-life(health and motor vehicles) insurance underwriting; financial management of life insurance companies.

#### **REFERENCE BOOK**

1. Shekhar, K.C. and Shekhar, Lekshmy, "Banking Theories and Practices", Vikas Publication
2. Risk management, "Indian Institute of banking and Finance", McMillan Publisher

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-411A      SECURITY ANALYSIS and PORTFOLIO MANAGEMENT**



## OBJECTIVE

The objective of this paper is to acquaint the students about the investment decisions, risks involved in them, theories of security valuation, fundamental and technical analysis and theories and concepts involved in portfolio management.

1. INVESTMENTS: meaning & objectives, benefits, need instruments & marketing, process.
2. RISK & RETURN: Definition of return, methods of calculation of return, definition of risk, types of risk, systematic & unsystematic, risk – return analysis of colist-prices securities & variables income security, fundamental & technical analysis.
3. PORTFILIO: Definition of Portfolio & need & advantage, portfolio construction, meaning of portfolio management.
4. PORTFOLIO MANAGEMENT MODELS: Advantages & Selection, selection problems of models- Traditional, Markowitz, CAPM, APT, Sharp single index.
5. PORTFOLIO MANAGEMENT STRATEGIES & EVALUATION: Passive and Active Strategies, formula plans–constant dollar-value plan, constant ratio plan, variable ratio plan; portfolio performance evaluation; risk adjusted measures of performance.

## REFERENCE BOOKS

1. Reiley and Brown, “Investment Analysis and Portfolio Management”, Thomson Learning, Bombay
2. Sharpe, Alexander and Wiley, “Investment”, Prentice Hall of India, New Delhi
3. Alexander, Gorden J. and Bailey, Jeffery V., “Investment Analysis and Portfolio Management”, Dry den press, Thomson Learning, Bombay
4. Pandian, “Security Analysis and Portfolio Management”, Vikas Publishing House, New Delhi

## SYLLABUS FOR BBA-MBA(I)

### BA-412A FINANCIAL DERIVATIVES

## OBJECTIVE

To acquaint the students with the basics of financial derivatives and their use in managing risk with their synergic effect on financial returns.

1. INTRODUCTION: Concepts and types of derivatives; participant– hedgers, speculators, arbitragers and scalpers; uses of derivatives, types of orders; derivative markets in India– current trends and future prospects.
2. FUTURES AND FORWARDS: Fundamentals of futures and forwards– concept of futures; trading mechanics; basics of stock index future; interest rate futures; currency futures(basics), use of futures for hedging; difference between forward and future contracts; clearing process.

3.      **OPTIONS:** Types of options, trading strategies involving options; black scholars option pricing model.
4.      **SWAPS:** Fundamentals of swaps – introduction to swaps; interest rate swaps, currency swaps.
5.      **MECHANICS OF SWAPS:** Mechanics of swaps – interest swap and currency swaps; swap pricing.

#### **REFERENCE BOOKS**

1.      Chance, Don M., “An Introduction to Derivatives and Risk Management”, Harcourt College Publishing
2.      Hull, John C., “Futures and other Derivatives Securities”, Prentice Hall India, New Delhi
3.      Redhead, “Financial Derivatives: An Introduction to Future/Forward, Options and Swaps”, Prentice Hall India, New Delhi

Robert A Strong, “Derivatives: An Introduction”, Thomson Learning, Bombay

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-317A      FOREIGN EXCHANGE MANAGEMENT**

**Objective:** The purpose of the course is to enhance the skill the students in the instruments, techniques and applications of foreign exchange management. It exposes the students to the functional and operational aspects of foreign exchange market and the intricacies of the risks involved.

**Unit 1: Introduction:** Definition of Foreign Exchange, Nature of foreign exchange, Type of Foreign Exchange Markets and Transactions ;Outline of Exchange Rate and Types; Determination of rate of exchange; monetary portfolio balance, overvalued and undervalued currencies; exchange rate systems; Statutory basis of Foreign Exchange, Management of Foreign Exchange with special reference to India: Evolution of Exchange Control; Convertibility; Central banking intervention for exchange rate stability;

**Unit 2: Exchange Rate principles:** Purchasing Power Parity , Interest Rate Parity , International Fisher Effect; Portfolio Balance , Demand and Supply Growth ; BOP- Monetary Approach.

**Unit 3: (Financial Aspect:** Financing of Imports by Opening of Letter of Credit(LC): Documents required, Trade and Exchange Control Formalities, Sanction of LC Limit;) **Export Finance:** Financing of Export/ Deemed Export: Pre ship, and Post Ship Finance; Export Methods - how to start export; Documents involved in International trade: Statutory Documents, Transport Documents,

**Unit 4: (External commercial Borrowings:** Buyers Credit, Suppliers Credit), Forfeiting /Factoring; **INCOTERMS:** C.I.F., F.O.B., C.I.P; **Methods of Trade Settlement:** Open Account, Clean Advance, Documentary Credit, And Documentary Collection.

Unit-5: Risk Exposure: Measuring foreign exchange risk and exposure; basic techniques of exposure management. Risk Bearing Documents. Tax Treatment of Foreign Exchange Gains and Losses as per FEMA; Euro currency market and its instruments;

References:

1. Aliber, A. Z., Exchange Risk and Corporate International Finance, Macmillan, London,
2. Luca Cornelius, Trading in the Global Currency Markets, NJ Prentice Hall.
3. Sutton, W. H., Trading in Currency Options, New York Institute of Finance.

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-318A      INTERNATIONAL MARKETING**

#### **COURSE OBJECTIVE:**

The course seeks to develop international marketing skills on a sound theoretical and conceptual foundation. It provides an insight into global marketing environment and the managerial decision making in the context of contemporary dynamics of the global markets.

#### **Unit-I Introduction:**

Nature of international marketing; domestic vs. international and global marketing; benefits, tasks and challenges of international marketing; organizational structure for international marketing; international marketing environment; screening international marketing opportunities; techniques of foreign market selection.

#### **Unit-II International Marketing Research & Strategies**

International marketing research and information system; foreign market entry modes; global marketing operations and strategies;

#### **Unit-III International Product Strategies:**

International product, branding decision, PLC, pricing strategies; environmental factors affecting international prices; international dumping; financing international marketing transactions, consideration (factor) affecting, product strategy, product adoption & standardization, new product development.

#### Unit-IV International Pricing Strategies

International direct marketing; international promotion mix; push and pull strategies; aspects of international sales management;

#### Unit-V International Distribution & Promotion Strategies

Global media strategy; (challenges of international advertising; the structure of international distribution systems; channel selection decisions; managing channel conflicts; aspects of international supply chain management), operations and control; managing risk in international marketing.

#### Suggested Readings:

1. Onkvisit Sak and John J. Shaw, International Marketing – Analysis and Strategy, PHI, New Delhi
2. Doole Isobel and Robin Lawe, International Marketing Strategy, Thomson Learning,
3. Keegan Warren J., Global Marketing Management, Pearson Education, Delhi
4. Joshi, Rakesh Mohan, International Marketing, Oxford University Press, New Delhi
5. Rajgopal, International Marketing, Vikas, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-319A      MULTINATIONAL BANKING**

##### Unit-I

Structure and growth of international banking; eurocurrency markets; growth of Eurocurrency deposits and credit; determination of eurocurrency interest rates, Eurocurrency instruments, multinational banking

##### Unit-II

Regulatory environment for international banking; international banking risks; capital adequacy; syndication techniques in international lending, role of bank for international settlements

### Unit-III

International payment systems; international asset and liabilities management; derivatives trading by multinational banks.

### Unit-IV

Bank asset portfolio management; strategies for managing non-performing assets; international credit appraisal techniques.

### Unit-V

Banks' participation in international money and capital markets; international banking mergers and acquisitions.

### Suggested Readings:

1. Macdonald S. Scott and Timothy W. Koch, Management of Banking, Thomson Learning, Singapore
2. Fabozzi Frank J. , et. al., Foundations of Financial Markets and Institutions, Pearson Education, Delhi
3. Giddy Ian H., Global Financial Markets, AITBS, New Delhi
4. Robinson Stuart W., Multinational Banking, A.W. Sijthoff International, Leiden
5. Lees Francis A., International Banking and Finance, John Wiley, New York

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-320A      INTERNATIONAL TRADE THEORY AND PRACTICE**

### **COURSE OBJECTIVE:**

The paper seeks to develop conceptual and analytical framework within which the students can analyze international trade problems and issues. It further enables the students to understand the practical parts of trade policy within which the business is required to make adjustments.

### Unit-I

Growing importance of trade in world economy; trade as an agent of globalization; alternative bases and explanations of trade; gains from trade; Term of trade – alternative concepts; trade equilibrium and determination of terms of trade; significance of conceptual understanding of trade theories for IB manager.

## Unit-II

Free trade versus protection; tariff classification; economic effects of tariff; tariff retaliation; export subsidies, countervailing duties and dumping; effects of a quota, International economic integration – forms and levels; trade creating and trade diverting effects of a custom union; repercussions of regional economic groupings on the strategy of international marketers

## Unit-III

Components of international trade policy; export promotion strategies; import substitution; rationale and working of free trade zones; assessing export potential for specific products in specific markets.

## Unit-IV

Logic of state trading and canalized trade; trade fairs and exhibition; commercial intelligence, major quantitative and qualitative; trends in India's foreign trade since 1991; major schemes and incentives for exporters.

## Unit-V

Import control regime; impact of WTO provisions on trade policy; overall assessment of India's trade policy.

### Suggested Readings:

1. Krugman, Paul R. and Maurice Obstfeld, International Economics: Theory and Policy, Pearson Education, Delhi
2. Bo Sodersten, International Economics, Macmillan, London
3. D. Salvatore, Theory and Problems of International Economics, McGraw Hill, New York
4. H. Robert Heller, International Trade, Prentice Hall of India, New Delhi

## **SYLLABUS FOR BBA-MBA(I)**

**BA-417A      GLOBAL STRATEGIC MANAGEMENT**

COURSE OBJECTIVE: The objective of the paper is to offer an insight into the impact of globalization on business organization and how managers can take strategic decisions in the global context.

#### Unit-I

The phenomenon of globalization; drivers and obstacles to globalization; motives and determinants of internationalization of firms; components and challenges of international strategic management, developing a strategic planning model for an MNC; approaches to multinational corporate strategy; impact of personal values and corporate and culture on international strategy.

#### Unit-II

Strategic value of an alliance; partner analysis; criteria for successful alliances; cross -border mergers and acquisitions; managing integration, transition and consolidation phases.

#### Unit-III

Strategic considerations in foreign market identification, entry and exit; product strategies for global markets; strategic decisions over different stages of international product lifecycle; R&D networking and technology strategy; global knowledge management, Integrating ethical and social responsibility concerns with strategic management; communication and negotiation strategies; e-commerce strategy, Risk strategies in multinational management; global capital structure decisions.

#### Unit-IV

Strategic considerations in expatriate personnel management; HR strategies in cross-cultural environment; international control system; challenges of multinational recruitment, selection and performance appraisal.

#### Unit-V

Managing international intra-company accounts; management of blocked funds; managing project, working capital and trade finance; strategies for global competitive advantage.

#### Suggested Readings:

1. Cullen John B., Multinational Management – A Strategic Approach, South-Western, Ohio.
2. Sindhvani Trilok N., The Global Business Game – A Strategic Perspective , MacMillan, New Delhi
3. Daniels John D. et.al., International Business – Environment and Operations, Pearson

Education, New Delhi

4. Lasserre Philippe, Global Strategic Management, Palgrave MacMillan, Hampshire

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-419A      INTERNATIONAL LOGISTICS**

#### **COURSE OBJECTIVE:**

The purpose of the paper is to expose the students to the practical aspects of international trade and the domestic and international institutional and regulatory arrangements for this part of international business.

#### **Unit-I**

Trends in world trade growth; nature, significance and components of international logistics; creating an export organization; registration and licensing; selecting export products and markets and channels.

#### **Unit-II**

Export costing and pricing procedures incoterms; deciding payment terms; export contracts; deciding currency of payment; export order processing; international logistics infrastructure, arranging pre -shipment finance; export procurement; quality control and pre -shipment inspection; packing and labeling of export consignments;

#### **Unit-III**

Basic procedure and documentation for excise and custom clearance; ADS; Cargo insurance; shipping modes procedures and documentation; role of forwarding agents, arranging post-shipment finance; documentary collection of export bills; UCPDC guidelines; managing exchange earners' foreign currency accounts; availing foreign exchange facilities; protecting against adverse movements in exchange rates.

#### **Unit-IV**

Role of EXIM Bank; major provisions of FEMA relating to exporters; export credit risk insurance and the role of ECGC, major export promotion schemes in India; export assistance to export houses; SEZ units, EOUs, EHTP, STP and BTP units; facilities for deemed exports.

#### **Unit-V**

Marketing development assistance; trade information support; role of commodity boards and export promotion councils in trade promotion; facilities for service exports.

#### **Suggested Readings:**

1. Paras Ram, Export: What, When, How, Anupam Publications, New Delhi
2. Khurana, P.K., Export Management, Galgotia Publishing, New Delhi



3. Shavaramu, Export Marketing – A Practical Guide for Exporters , Wheeler Publishing,  
New Delhi

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-420A      INTERNATIONAL ACCOUNTING**

**Objectives:** The objectives of this course are to acquaint the students with the accounting needs of International Financial markets and to analyse the accounting measurement and reporting issues unique to Multinational Business Transactions.

**Course Contents:**

#### **Unit-I**

International dimensions of Accounting; Conceptual and Comparative Developments, International Accounting Standards.

#### **Unit-II**

Concept and Mechanism of setting International Accounting Standards, disclosure requirements of International Accounting Standards, International Audit Environment.

#### **Unit-III**

Dimensions of Financial Reporting : Concept and Development of International Financial Reporting Standards(IFRS), Dimensions of IFRS.

#### **Unit-IV**

Types of Foreign Currency Transactions, Managing International Information system, Analyzing Foreign Financial Statements: Accounting for Foreign Currency Translation.

#### **Unit-V**

Accounting for Inflationary Trends, Accounting for Environmental Protection Measures. Concept and setting of Transfer Pricing.

## Suggested Readings

1. V. Sharan : International Financial Management, New Delhi, Prentice Hall of India.
2. Hennie Van Greuning, World Bank : International Accounting Standards: A Practical Guide.
3. Lee H. Radebaugh, Sidney J. Gray, Ervin L. Black International accounting and multinational enterprises.
4. Shirin Rathore: International Accounts, PHI.

## **SYLLABUS FOR BBA-MBA(I)**

### **BA-321A      BRAND MANAGEMENT**

#### **OBJECTIVE**

To introduce the concept of branding and brand management with special emphasis on developing brand Equity

1. **BRANDING CONCEPTS**; concepts; branding challenges and opportunities; brand equity concepts; strategic brand management process; customer based brand equity; building a strong brand and its implications; identifying and establishing brand value.
2. **BRAND EQUITY**: Choosing brand elements to build brand equity; designing marketing programs to build brand equity; integrating marketing communication to build brand equity; information processing model of communication marketing, communication options.
3. **LEVERAGING PROCESS**: leveraging secondary brand knowledge to build brand equity: conceptualizing the leveraging knowledge to build brand equity; conceptualizing the leveraging process, country of origin; co-branding, licensing, celebrity endorsement, sporting, cultural and other events.

4. **BRAND EQUITY MANAGEMENT & MEASUREMENT SYSTEM:** Developing a brand equity measurement and management system; establishing brand equity management system, qualitative research techniques, quantitative research techniques; measuring outcomes of brand equity.
5. **DESIGNING AND IMPLEMENTING:** Designing and implementing branding strategies: brand-product matrix, brand hierarchy and meaning new products and brand extensions, managing brands over time: managing brands over geographic boundaries and market segments.

#### REFERENCE BOOKS

1. Kapferer, Jean Noel, "Strategic Brand Management", Kogan Page, New Delhi
2. Kapoor, Jagdeep, "24 Brand Mantras", Sage Publication, New Delhi
3. Sengupta, subroto, "Brand Positioning Strategies for competitive Advantage", Tata McGraw Hill; New Delhi
4. Kumar, S. Ramesh, "Marketing and Branding", The Indian Scenario, Pearson Education, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-322A INTEGRATED MARKETING COMMUNICATION**

##### OBJECTIVE

The objective is to introduce the students to the integrated role of promotion techniques with the special emphasis on advertising.

1. **INTRODUCTION:** Marketing communication; functional areas of marketing communication; sales promotion, integrated marketing communication; types of advertising agencies; media partners and their role; compensating the advertising agencies; agency evaluation.
2. **CAMPAIGN PLANNING:** IMC planning process; internal marketing; segmenting and targeting; types of segmentation; message and profitability targeting; digitization of brand information.
3. **IMC MESSAGE STRATEGY:** Developing creative message strategy; process of developing IMC message strategy; methods of getting creative ideas; brand-message execution; copywriting; writing for print and electronic media; print layout and design; execution.
4. **MEDIA CLASSIFICATION:** Media classification; media strength and weakness; wireless communication; e-mail marketing; integrating social media, integrating online brand communication;

5. **IMC PLANING & EVALUATION:** Interactive and personal dimension of direct marketing; methods of direct marketing; event marketing; trade shows and other participation events; sponsorships; strengths and customer service; objectives and strategies of customer service; social, economic and ethical issues in IMC; evaluation and measurement of brand messages; measurement and evaluation methods.

#### REFERENCE BOOKS

1. Duncan, Tom, "Principles of Advertising and IMC", Tata McGraw Hill, New Delhi
2. Jethwaney, Jaishree and Jain, Shruti, "Advertising Management", Oxford University Press, New Delhi
3. Belch, George and Belch, Michael, "Advertising and Promotion", Tata McGraw Hill, New Delhi
4. Wells, William, Brunett, John and Moriarty, Sandra, "Advertising Principles and Practice", Pearson Education, New Delhi.
5. Clow, Kenneth and Baack, Donald, "Integrated Advertising Promotion and Marketing Communication", Pearson Education, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-323A SERVICE MARKETING**

#### OBJECTIVE

To understand the service product and key elements of services marketing mix. Another objective deals with managing the service delivery process and the implementation of services marketing.

1. **INTRODUCTION:** Introduction to services marketing; Implication to marketers, role of services marketing; consumer behavior in service encounters; customer interaction, purchase process, positioning services in competitive markets;.
2. **SERVICE PRODUCT AND PRICING:** Creating & pricing the service product; identifying and classifying supplementary services, planning and branding service products, new service development; setting pricing objectives and foundations for setting prices, pricing strategies.
3. **DISTRIBUTING SERVICES AND PROMOTION:** Distributing & promotion services: options for service delivery, place and time decisions, delivery in cyberspace, role of intermediaries, Distribution strategies. Designing and managing service processes: service process redesign, Promotion strategies, challenges in promoting services.

4. **DEMAND AND CAPACITY:** Balancing demand and capacity: fluctuations in demand, capacity constrain, service environment, managing relationship and building loyalty: customer-firm relationship, analyzing and managing customer base:
5. **CUSTOMER SERVICING:** Customer feedback and service recovery: customer complaining behavior, principles and responses to effective service recovery, service quality and the gap model, measuring and improving service quality defining, measuring and improving service productivity.

#### REFERENCE BOOK

1. Lovelock, Christopher, Wirtz, Jochen and Chatterjee Jayanta, “Services Marketing – People Technology, Strategy” Pearson Education, New Delhi
  2. Zeithaml, Valarie A. and Bitner, Mary Jo, “Services Marketing–Integrating Customer Focus Across The Firm”, Tata McGraw Hill, New Delhi
  3. Rao, K. Rama Mohana, “Services Marketing”, Pearson Education, New Delhi
  4. Hoffman and Bateson, “Essentials of Service Marketing”, Thomson Asia Ptc. Ltd., New Delhi
  5. Rampal, M.K. and Gupta, S.L., “Services Marketing”, Galgotia Publication, New Delhi
- Harsh Verma, “ Service Marketing”, Tata Mcgraw.

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA- 324A CONSUMER BEHAVIOUR**

#### OBJECTIVE

The subject explores the mysterious world of the consumer’s psyche and guidelines to the students to understand what makes consumers to purchase particular product or avail a particular service.

1. **INTRODUCTION:** Consumer behavior and consumer research; importance of consumer behavior, evolution of consumer behavior; consumer decision process model; variables affecting the decision process; types of decision process; factors influencing the extent of problem solving.

**PURCHASE PROCESS:** Purchase processes; need recognition; internal and external search; pre-purchase evaluation; different types of purchase situations.

2. **CONSUMPTION EXPERIENCES:** Consumption experiences; importance of customer satisfaction; factors affecting satisfaction level; demographics and consumer behavior; economic resources and consumer behaviour.

MOTIVATING FACTORS: Personality and consumer behaviour; personal values; lifestyle motivational conflict and need priorities; motivational intensity; motivating consumer; attitude theories perception.

3. CULTURAL EFFECTS: Culture and its effect on consumer behaviour; changing values and its effect on consumer behaviour changing values and its effect on marketing; determinates of social class; social class and consumer behaviour; role behaviour; importance of families and households on consumer behavior; role behaviour and it influence on the decision process; family life cycles; changing roles of women; children and household consumer behaviour.

4. GROUP INFLUENCES: Group and personal influences on individuals; reference group and its influence on individual; transmission of influence through dyadic exchanges; word of mouth and opinion leaders in advertising and marketing strategy.

5. CONSUMER OPNION & LEARNING: Diffusion of innovations; diffusion process; reaching the consumer; gaining consumer's attention; shaping consumer's opinion; opinions change; product's and advertising's role in shaping consumer opinion; cognitive learning; retrieval of information; company's role in helping consumers to remember.

#### REFERENCE BOOKS

1. Blackwell, Roger, Miniard, Paul and Engel, James, "Consumer Behaviour", Thomson Learning, New Delhi
2. Soloman, Michael R, "Consumer Behaviour – Buying Having and Being", Pearson Education; New Delhi
3. Schiffman, Leon G. and Kanuk, Leslie Lazar, "Consumer Behaviour", Pearson Education; New Delhi
- Loudon, David J. and Dellabitta, Albert, "Consumer Behaviour" Tata McGraw Hill, New Delhi.

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-421A CUSTOMER RELATIONSHIP MANAGEMENT**

#### OBJECTIVE

The customer is gaining more and more importance in the current scenario, the key behind the successful organization is retention of the customer. The key objective of this subject is to introduce the students to the current thinking about the customer.

1. INTRODUCTION: Cost of acquiring customers; turning customer acquisition into customer loyalty; internet and its effect on CRM: CRM and business intelligence; marketing retrospective on product to customer.

2. **MARKETING INITIATIVES:** Campaign management; CRM marketing initiatives; customer privacy; marketing automation; call centre and customer care; automating the contact centre; customer service for success.
3. **SALE FORCE AUTOMATION:** Sale force automation, key area of sales force automation sales force automation and mobile CRM field force automation; evolution of eCRM, multi-channel CRM, B 2 B marketing, enterprise resource planning; supply chain management; supplier relationship management; partner relationship management.
4. **AN ANALYSIS:** Integrated data; major types of data analysis; click stream analysis; personalization and collaborative filtering; defining CRM readiness; maintaining a customer focus; defining CRM functionality; defining technical requirement; development approaches towards purchasing CRM software.
5. **IMPLEMENTATION:** Pre-implementation checklist; CRM development team; CRM implementation; avoiding failures in implementing CRM, Selling CRM idea inside the organization; CRM road blocks–process, perception, privacy and politics, future of CRM.

#### **BOOKS**

1. Dyche, Jill, “The CRM Handbook”, Pearson Education, New Delhi
2. Sheth, Jagdish N, “Customer Relationship Management”, Tata McGraw Hill
3. Greenberg, Paul, “CRM at The Speed of Light”, Tata McGraw Hills, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-422A ADVERTISING MANAGEMENT**

**Objective:** The objective of this course is to develop the understanding about the marketing communication tools and implement them in designing Advertisement strategies. the impact this philosophy has on the organisation and operation of the business.

1. **INTRODUCTION OF MARKETING-** Meaning Definition and objectives of Advertising Communication and Advertising-Overview of marketing communication, Factors affecting the marketing communication mix, Integrated Marketing Communication
2. **ETHICAL AND SOCIAL ISSUES** in marketing communication. Advertising as a Management Function. Role of Advertising in the Marketing Process. Types of Advertising.
3. **MARKETING COMMUNICATION PLANNING** - Models of marketing communication, developing & control of marketing communication, marketing communication planning procedure.

4. ADVERTISING AGENCY-, Meaning, functions, role, Benefits to Media, Types of ad agencies, selection of organization client-agency relationship-meaning, principles, remuneration.

5. MEASURING ADVERTISING EFFECTIVENESS; Approaches; Method of measuring, Preparation and choice of methods of advertising budget; factors affecting advertisement budget.

**Suggested Readings:**

1. Kenneth Clow. Donald Baack, “Integrated Advertisements, Promotion and Marketing communication”, Prentice Hall of India, New Delhi, 2003.
2. S.H.H.Kazmi, Satish K Batra, “Advertising & Sales Promotion”, Excel Books, New Delhi, 2001.
3. George E Belch, Michel A Belch, “Advertising & Promotion”, McGraw Hill, Singapore, 1998.
4. Belch M A and Belch G E- Advertising and Promotion – An Integrated Marketing Communication Perspective (Tata McGraw-Hill) 2003. 6th ed

**SYLLABUS FOR BBA-MBA(I)**

**BA-423A      RETAIL MANAGEMENT**

**OBJECTIVE**

The objective of the course is to provide insights on retail operations. This will enable the students to become good retail planners and decision-makers and help focus on change and adaptation to change.

1.      **INTRODUCTION:** Introduction to retail: retail in India; retail models and theories of retail development; retail life cycle, retail owning behavior of consumers; ethical issues in retailing, e-retailing.
2.      **STRATEGY:** Retail marketing strategy; retail franchising; retail store location and site selection, types of stores; non-store retailing, store layout and design; visual merchandising.
3.      **MERCHANDISING:** Basics of retail merchandising; the process of retail merchandising; the method of merchandise procurement, evaluating merchandise performance
4.      **PRICING AND PROMOTION:** Retail pricing and retail communication mix & promotion, servicing the retail customers.



5. **FINANCIAL AND OPERATIONAL ASPECTS:** Financial aspects of retail management; retail information system; supply chain management in retailing; retail store operations, retail human resource management.

#### **REFERENCE BOOKS**

1. Pradhan, Swapna, “Retailing Management”, Tata McGraw Hill, New Delhi
  2. Berman, Barry and Evans, Joel R., “Retail Management-A Strategic approach”, Pearson Education/Prentice Hall of India, New Delhi
  3. Levy, Michael and Weitz, Barton A., “Retailing Management”, Tata McGraw Hill, New Delhi
- Bajaj, Chetan, Tuli, Rajnish and Srivastava, Nidhi, “Retail Management”, Oxford University Press, New Delhi

### **SYLLABUS FOR BBA-MBA(I)**

#### **BA-424A SALES AND DISTRIBUTION MANAGEMENT**

##### **OBJECTIVE**

The Objective of paper is to acquaint the students about selling process, designing the distribution channels, distribution logistics etc.

1. **INTRODUCTION:** Nature and scope of sales management, setting and formulating personal selling objectives; theories of selling, steps in personal selling, size of salesforce, types of selling.
2. **SALES FORCE MANAGEMENT:** Recruitment and selection of salesperson, compensation and motivation of sales force; training of sales force, performance evaluation, Monitoring and performance evaluation.

3. **SALES CONTROL:** sales displays; sales territories; sales budget; sales quota; types of sales quota, sales meetings & contest; controlling of evaluation, controlling the sales effort.

4. **DISTRIBUTION SYSTEM:** Participants in distribution system, role and function of intermediaries, designing the distribution channel; conflict and power in the channel, channel decisions, channel management, selection and motivation of intermediaries, distribution analysis.

5. **MARKET LOGISTICS AND SCM:** Control and management distribution logistics; Logistics, Management, International sales distribution.

#### REFERENCE BOOKS

1. Havaldar, “ Sales & Distribution management”, TMH

2 Gupta, S.L., “Sales and Distribution Management”, Excel Books, New Delhi

3 Pelton, Lou E, Strutton David and Lumpkin, James R, “Marketing Channels – A Relationship Management Approach”, Tata McGraw Hill, New Delhi.

4. Richard, Still, Edward, Cundiff and Norman, Govoni, “Sales Management: Decisions, Strategies and Cases”, Prentice Hall of India Pvt. Ltd., New Delhi

### Scheme for B.Com (Hons.)

B.Com (Hons.)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM 1101	Management Process & Organizational Behavior	4	0	0	4
2	BCOM 1103	Financial Accounting	4	0	0	4
3	BCOM 1105	Micro Economics	4	0	0	4
4	MA-107/MA-109	Business Mathematics	4	0	0	4
5	CS-1105	Computer Application	4	0	0	4

6	CS-1155	Computer Application Lab	0	4	0	4
7	PD-191A	<i>HOBBY CLUB</i>	0	1	0	1
		<b>Total</b>	<b>20</b>	<b>5</b>	<b>0</b>	<b>25</b>

B.Com (Hons.)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM 1102	Business Communication	4	0	0	4
2	BCOM 1104	Macro Economics	4	0	0	4
3	BCOM 1106	Cost Accounting	4	0	0	4
4	BCOM 1108	Business Studies	4	0	0	4
5	CS-1206	E-Commerce	4	0	0	4
6	CS-1256	E-Commerce-Lab	0	4	0	4
7	BCOM 2109	Managerial Personality Development (NUES)*	2	0	0	2
		<b>Total</b>	<b>22</b>	<b>4</b>	<b>0</b>	<b>26</b>

B.Com (Hons.)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM 2101	Marketing Management	4	0	0	4
2	BCOM 2103	Management Accounting	4	0	0	4
3	BCOM 2105	Business Laws & Company Laws	4	0	0	4
4	BCOM 2107	Business Ethics and Corporate Social Responsibility	4	0	0	4
5	MA-111	Business Statistics	4	0	0	4
6	BCOM 2109	Indian Economy	4	0	0	4

7	CS-2151	Computerized Accounting Software (Computer Lab)	0	0	4	2
8	CE-2303	Environmental Science* (NUES)	2	0	0	2
9	BCOM 001	Minor Project Report	0	0	12	6
10	PD	<i>PDP</i>	0	1	0	1
<b>Total</b>			<b>26</b>	<b>1</b>	<b>16</b>	<b>35</b>

<b>B.Com (Hons.)</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BCOM 2202	Financial Management	4	0	0	4
2	BCOM 2204	Auditing	4	0	0	4
3	BCOM 2206	Corporate Accounting	4	0	0	4
4	BCOM 2208	Human Resource Management	4	0	0	4
5	CS 2202	Information System Management	4	0	0	4
6	BCOM 2210	Research Methodology	4	0	0	4
7	BCOM 2252	Research Methodology - Lab	0	0	4	2
8	PD	PDP	2	0	0	2
<b>Total</b>			<b>26</b>	<b>0</b>	<b>4</b>	<b>28</b>

<b>B.Com (Hons.)</b>			<b>Semester</b>			<b>V</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BCOM 3101	Income-Tax Law and Practice	4	0	0	4
2	BCOM 3103	Financial Modeling	4	0	0	4
3	BCOM 3105	Goods & Services Tax (GST)	4	0	0	4
4	BCOM 3107	Digital Marketing	4	0	0	4

5	BCOM 002	Summer Training Report & Viva Voce	0	4	4	6
6	BCOM	Elective I (Any <i>one</i> of the following)	4	0	0	4
7	BCOM 3151	Financial Modeling –Lab	0	0	4	2
8	PD	<i>PDP</i>	0	1	0	1
<b>Total</b>			<b>20</b>	<b>5</b>	<b>8</b>	<b>29</b>

B.Com (Hons.)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM 3202	Project Management	4	0	0	4
2	BCOM 3204	Entrepreneurship Development	4	0	0	4
3	BCOM 3206	Sales & Distribution Management	4	0	0	4
4	BCOM 3208	Business Policy & Strategy	4	0	0	4
5	BCOM 003	Research Project and Viva Voce	0	0	6	3
6	BCOM	ELECTIVE II (Any one of the following)	4	0	0	4
	PD	<i>PDP</i>	0	1	0	1
<b>Total</b>			<b>20</b>	<b>1</b>	<b>6</b>	<b>24</b>

### BACHELOR OF COMMERCE (Hons)

#### BCOM 1101- Management Process & Organizational Behaviour

**L-4, T-0**

**Credits –4**

**Max Marks: 75**

**Objectives:** The course aims at providing fundamental knowledge and exposure to the concepts, theories and practices in the field of management.

#### Course Contents

#### Unit I

**Lectures:- 10**

**Management:** Concept, Nature, Process, Significance; Managerial levels, skills, Functions and Roles; Management vs. Administration; Coordination as Essence of Management.

Development of Management Thought: Classical, Neo-Classical, Behavioral, Systems and Contingency Approaches.

**Planning:** Nature, Scope and Objectives of Planning; Types of plans; Planning Process; Business Forecasting; MBO: Concept, Types, Process and Techniques of Decision-Making; Bounded Rationality. **Organising:** Concept, Principles of an Organization; Span of Control; Departmentation; Types of an Organization; Authority-Responsibility; Delegation and Decentralization.

## **Unit II**

**Lectures: - 12**

**Staffing:** Concept, Nature and Importance of Staffing. Motivating and Leading: Nature and Importance of Motivation; Types of Motivation; Theories of Motivation: Maslow, Herzberg, X, Y and Z; Leadership: Meaning and Importance; Traits of a leader; Leadership Styles – Likert's Systems of Management, Tannenbaum & Schmidt Model and Managerial Grid.

**Controlling:** Nature and Scope of Control; Types of Control; Control Process; Control Techniques – Traditional and Modern; Effective Control System.

## **Unit III**

**Lectures: - 12**

**Organizational Behaviour-1:** Concept and nature of Organizational behavior, O.B. Models, Importance, Challenges and Opportunities,

**Individual & Interpersonal Behaviour:** Personality – Determinants and Traits; Emotions; Learning-Theories, Perception –Process and Errors, Attitudes- Formation, Theories, Relationship between Attitude and Behavior; **Interpersonal Behaviour:** Johari Window; Transactional Analysis – Ego States, Types of Transactions, Life Positions, Applications of T.A.

## **Unit IV**

**Lectures: - 10**

**Group Behaviour & Team Development:** Concept of Group and Group Dynamics, Stages of Group Development, Theories of Group Formation; Concept of Team Vs. Group; Types of Teams; Building and Managing Effective Teams.

**Organization Culture and Change Management:** Concept of Organizational Culture, Managing Conflict, Managing Change; Resistance to Change, Managing cross Cultures.

## **Text Books**

1. Robbins, (2011). Fundamentals of Management: Essentials Concepts and Applications, Pearson Education.
2. Robbins, S.P. and Sanghi, S., (2009), Organizational Behaviour; 13th edition, Pearson Education.

3. Stoner, Freeman and Gilbert Jr. ((2010)) Management, 8th Edition, Pearson Education.

### **Reference Books**

1. Koontz, H.( 2014), Essentials of Management, McGraw Hill Education.
2. Ghillyer, A, W., (2008) Management- A Real World Approach, McGraw Hill Education.
3. Mukherjee, K, (2009), Principles of Management, 2nd Edition, McGraw Hill Education.
4. Luthans, Fred, (2008), Organizational Behavior, 11th Edition, McGraw Hill Education.

**Note: Latest edition of text books may be used.**

## **BACHELOR OF COMMERCE (Hons)**

### **BCOM 1103- Financial Accounting**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The objective of this paper is to help students to acquire conceptual knowledge of the financial accounting and to impart skills for recording various kinds of business transactions.

**Course Contents:**

## **Unit: I**

**Hours: 10**

**Meaning and Scope of Accounting:** Objectives and nature of Accounting, Definition and Functions of Accounting, Book Keeping and Accounting, Interrelationship of Accounting with other Disciplines, Branches of Accounting, Limitation of Accounting.

**Accounting Principles and Standards:** Accounting Principles, Accounting Concepts and Conventions, Meaning and relevance of GAAP, Accounting cycle system of accounting Introduction to Accounting Standards Issued by ICAI.

**Contemporary Issues & Challenges in Accounting:** Human Resource Accounting, Green Accounting, Inflation Accounting, Price level Accounting, Social Responsibility Accounting

Need and significance of International Financial Reporting Standards (IFRS).

## **Unit II**

**Hours: 10**

**Journalising Transactions:** Journal Entries, compound Journal entries, Opening Entry.

**Ledger Posting and Trial Balance:** Preparation of Ledger, Posting, Cash book, Sales and Purchase book and Trial Balance.

**Company Final Accounts:** Preparation of Final Accounts with adjustments, Trading Account, Profit & Loss Account, Balance Sheet, Requirements of Schedule-VI.

## **Unit III**

**Hours: 12**

**Depreciation Accounting:** Concept of Depreciation-Nature, Objectives, Methods of computing (straight line method and written down value method). Change of Method-Accounting standard 6 (ICAI), salient features of Accounting Standard (AS) - 6 (ICAI) (Revised)

**Revenue recognition:** salient features of accounting standard (AS-9), recognition of expenses (only theory).

## **Unit IV**

**Hours: 12**

**Branch Accounting:** Concept of Dependent branches; accounting system; debtors system, stock and debtors system. Independent branches: Accounting System-important adjustment entries and preparation of consolidated profit and loss account and balance sheet.

### **Text Books**

1. Tulsian, P.C., (2012), Financial Accounting, Pearson Education.
2. Maheshwari, S.N. and. S. K. Maheshwari, (2012), Financial Accounting, Vikas Publishing House, New Delhi.

### **Reference Books**



1. Bhattacharyya, Asish K., (2010) Essentials of Financial Accounting, Prentice Hall of India.
2. Rajasekran, (2012), Financial Accounting, Pearson Education.
3. Bhattacharya, S.K. and Dearden, J., (2010) Accounting for Manager – Text and Cases, Vikas Publishing House.
4. Glautier, M.W.E. and Underdown, B. (2010). Accounting Theory and Practice, Pearson Education.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **BCOM 1105- Micro Economics**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objective:** The objective of this course is to familiarize students about the dynamics of business language and discourse.

### **Course Content:**

#### **Unit I**

**Hours: 10**

**Introduction to Business Economics and Fundamental concepts:** Nature, Scope, Definitions of Business Economics, Difference between Business Economics and Economics, Contribution and Application of Business Economics to Business. Micro vs. Macro Economics. Opportunity Costs, Time Value of Money, Marginalism, Incrementalism, Market Forces and Equilibrium, Risk, Return and Profits.

## **Unit II**

**Hours: 12**

### **Consumer Behavior and Demand Analysis**

Cardinal Utility Approach: Diminishing Marginal Utility, Law of Equi-Marginal Utility. Ordinal Utility Approach: Indifference Curves, Marginal Rate of Substitution, Budget Line and Consumer Equilibrium. Theory of Demand, Law of Demand, Movement along vs. Shift in Demand Curve, Concept of Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Income Elasticity of Demand, Cross Elasticity of Demand, Advertising Elasticity of Demand. Demand Forecasting: Need, Objectives and Methods (Brief).

## **Unit III**

**Hours: 10**

**Theory of Production:** Meaning and Concept of Production, Factors of Production and Production function, Fixed and Variable Factors, Law of Variable Proportion (Short Run Production Analysis), Law of Returns to a Scale (Long Run Production Analysis) through the use of ISO QUANTS.

## **Unit IV**

**Hours: 12**

**Cost Analysis & Price Output Decisions:** Concept of Cost, Cost Function, Short Run Cost, Long Run Cost, Economies and Diseconomies of Scale, Explicit Cost and Implicit Cost, Private and Social Cost. Pricing Under Perfect Competition, Pricing Under Monopoly, Control of Monopoly, Price Discrimination, Pricing Under Monopolistic Competition, Pricing Under Oligopoly.

### **Text Books:**

1. Samuelson, P & Nordhaus, W. (2010) Economics, McGraw Hill Education.
2. Dwivedi, D.N.( 2010) Managerial Economics, Vikas Publishing House.

### **Reference Books:**

1. Salvatore, D. (2014) Managerial Economics in a Global Economy, Oxford University Press.
2. Kreps, D. (2010) Microeconomics for Managers, Viva Books Pvt. Ltd.
3. Mankiw, NG, (2011), Principles of Economics, Cengage Learning.

4. Peterson, L. and Jain (2012), Managerial Economics, Pearson Education.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **MA 107- Business Mathematics**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objective:** The basic objective of this paper is to equip students with simple techniques of algebra and calculus which will help them in advanced courses in finance.

#### **Course Contents :**

#### **Unit I**

**Hours: 12**

**Principle of Counting:** Permutations and Combination, Concept of Factorial, Principle of Counting, Permutation with Restriction, Circular Permutation and Combination with Restriction; Mathematics Induction: Principle, Sequences & Series - Arithmetic Progression & Geometric Progression.

#### **Unit II**

**Hours: 10**

**Matrix Algebra:** Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of a Matrix, Inverse of a Matrix via adjoint Matrix;, Elementary Transformations, Solution of System of Linear equations (not more than three variables) using Matrix Method, Cramer's Rule and Gauss-Jordan Method, Homogeneous System of Linear equations: Condition for Consistency of homogeneous system; Application to Business Problems.

#### **Unit III**

**Hours: 12**

**Differential Calculus:** Concepts of function, limit and continuity, definition of derivative; Rules for differentiation, Implicit differentiation, Logarithmic and successive differentiation, Partial Derivatives(up to second order); Homogenous Functions and Euler's Theorem; Maxima- minima of Functions of one and two variables; Lagrangian multipliers; Applications of differentiation in Business.

## Unit IV

**Hours: 10**

**Integral Calculus:** Concept of Integration- as anti-derivative process; Standard forms; Methods of integration-by substitution, by parts, and partial fractions; Definite integration; Applications of Integration: Application to marginal analysis, Consumers' and producers' surplus, Learning curve.

### Text Books

1. Trivedi, (2012), Business Mathematics, Pearson Education.
2. Bhardwaj, R.S. (2013). Mathematics and Statistics for Business, Excel Books.

### References

5. Khan, Shadab, (2012) A Text Book of Business Mathematics, Anmol Publications.
6. Raghavachari, M, (2011), Mathematics for Management, McGraw Hill Education.
7. Tuttle, Michael, D., (2012) Practical Business Math: An Applications Approach, Prentice Hall.
8. Hazarika, P. (2010), A textbook of Business Mathematics, S. Chand Publication.

**Note: Latest edition of text books may be used.**

## SYLLABUS FOR BACHELOR OF COMMERCE (Hons)

### CS-1105 Computer Application

**L-3T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** This is a basic paper for Commerce students to familiarize with computer and it's applications in the relevant fields and expose them to other related papers of IT.

### Course Contents

#### Unit I

**Hours: 10**

**Basics of Computer:** Characteristics of Computers, Input-output Devices (Hardware, Software, Human ware and Firmware), Function of Different Units of Computer, Classification of Computers. Computer Memory: Primary Memory, Secondary memory.

## Unit II

**Hours: 10**

**Computer Software:** Types of Software, Introduction to Operating System; Function of OS, Types of Operating Systems, Details of Basic System Configuration, Important Terms like Directory, File, Volume, Label, Drive Name, etc; Introduction to GUI using Windows Operating System, Compiler, Interpreter and assembler; Application Software: MS Word & MS Excel.

## Unit III

**Hours: 12**

**DBMS:** Introduction to DBMS; Structure of a DBMS and Advantages of DBMS; Creation of database in MS Access.

**Information Technology and Society:** Indian IT Act, Application of information Technology in Railways, Airlines, Banking, Online Banking System, Insurance, Inventory Control, Financial systems, Hotel management, Education, entertainment and health, security issues in information technology.

## Unit IV

**Hours: 12**

**Concepts of Web Technology:** Internet, Intranet and Extranets; Applications of internet, Basics services over Internet like WWW, FTP, Telnet, Gopher etc., IP addresses, ISPs, URL, Domain Names, Web Browsers, Internet Protocols, Search Engines, e-mail.

**Protection & Security:** Goals of Protection and Security, Concept of Encryption & Decryption, Virus, Worm, Antivirus, Firewall.

## Text Books

3. Leon and Leon, (2012), Introduction to Information Technology, Vikas Publishing House.
4. Sinha, Pradeep K. Foundations of Computing, (2012), BPB Publisher

## Reference Books

6. Joseph A.Brady and Ellen F Monk, (2012), Problem Solving Cases in Microsoft and Excel, Thomson Learning.
7. Tanenbaum, A. S., (2011), Computer Networks, Pearson Education.
8. Goyal, Anita, (2012) Computer Fundamentals, Pearson Education.
9. ITL, ESL, (2008) Introduction to Infotech, Pearson Education..

**Note: Latest edition of text books may be used.**

## BACHELOR OF COMMERCE (Hons)

### CS-1155 Computer Application Lab

**L-0 T/P-4**

**Credits-2**

**Max Marks: 60**

The Computer lab will be based on the following topics:

1. **Introduction to MS-Word:**

Introduction to Word Processing, it's Features, Formatting Documents, Paragraph Formatting, Indents, Page Formatting, Header and Footer, Bullets and Numbering, Tabs, Tables, Formatting the Tables, Finding and Replacing Text, Mail Merging etc.

2. **Introduction to MS-Excel:**

Introduction to Electronic Spreadsheets, Feature of MS-Excel, Entering Data, Entering Series, Editing Data, Cell Referencing, ranges.

5. **Introduction to MS PowerPoint**

PowerPoint, Features of MS PowerPoint Clipping, Slide Animation, Slide Shows, Formatting etc.

6. **Introduction to MS Access**

Creation of database, concept of primary & secondary key, linking of tables, etc.

**SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

**CS-1155 Computer Application Lab**

**L-0 T/P-4**

**Credits-2**

**Max Marks: 60**

The Computer lab will be based on the following topics:

1. **Introduction to MS-Word:**

Introduction to Word Processing, it's Features, Formatting Documents, Paragraph Formatting, Indents, Page Formatting, Header and Footer, Bullets and Numbering, Tabs, Tables, Formatting the Tables, Finding and Replacing Text, Mail Merging etc.

2. **Introduction to MS-Excel:**

Introduction to Electronic Spreadsheets, Feature of MS-Excel, Entering Data, Entering Series, Editing Data, Cell Referencing, ranges.

### **3. Introduction to MS PowerPoint**

PowerPoint, Features of MS PowerPoint Clipping, Slide Animation, Slide Shows, Formatting etc.

### **4. Introduction to MS Access**

Creation of database, concept of primary & secondary key, linking of tables, etc.

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **BCOM 1104- Macro Economics**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The objective of this subject is to give understanding of the basic concepts and issues in business economics and their application in business decisions.

### **Course Contents**

#### **Unit I**

**Hours: 10**

*Concepts of Macro Economics and National Income Determination: Definitions, Importance, Limitations of Macro-Economics, Macro-Economic Variables. Circular Flow of Income in Two, Three, Four Sector Economy, Relation between Leakages and Injections in Circular Flow; National Income: Concepts, Definition, Methods of Measurement, National Income in India, Problems in Measurement of National Income & Precautions in Estimation of National Income.*

## Unit II

Hours: 12

**Macro Economic Framework:** Theory of Full Employment and Income: Classical, Modern (Keynesian) Approach, Consumption Function, Relationship between Saving and Consumption. Investment function, Concept of Marginal Efficiency of Capital and Marginal Efficiency of Investment; National Income Determination in Two, Three and Four Sector Models; Multiplier in Two, Three and Four Sector Model.

## Unit III

Hours: 12

**Analysis of Money Supply and Inflation:** Functions and Forms of Money, Demand for Money-Classical, Quantity Theory of Money (Fishers, Cambridge, Keynesian and Friedman Approach), and Measures of Money Supply; Inflation - Types, Causes, Impact and Remedies, Deflation.

## Unit IV

Hours: 10

**Equilibrium of Product and Money Market:** Introduction to IS-LM Model, Equilibrium- Product Market and Money Market, Monetary Policy, Fiscal Policy.

### Text Books

1. Mc Eachern, William, Indira, A., (2013), Macro ECON, Cengage Learning.
2. Gupta G.S. (2014), Macroeconomics: Theory and Applications, McGraw Hill Education (India) Private Limited

### Reference Books:

1. Dwivedi, D. N., (2010), Macro Economics, McGraw Hill Education.
2. Schiller, (2015), The Macro Economy Today, McGraw-Hill Higher Education.
3. Dorn Busch, (2013), Macro Economics, Tata McGraw Hill Education.
4. Baumol William J. and Blinder Alan S., (2015), Macroeconomics: Principles and Policy, CENGAGE Learning Custom Publishing.

**Note: Latest edition of text books may be used.**

## SYLLABUS FOR BACHELOR OF COMMERCE (Hons)

### BCOM 1106 - Cost Accounting

L-4 T/P-0

Credits-4

Max Marks: 75

**Objectives:** The primary objective of the course is to familiarize the students with the basic cost concepts, allocation and control of various costs and methods of costing.



## Course Contents

### Unit I

**Hours: 12**

**Meaning and Scope of Cost Accounting:** Basic Cost Objectives and scope of cost accounting, Cost centres and cost units, Difference between financial, cost and management accounting. Basic Cost concepts - Cost classification and elements of cost.

**Materials Control:** Meaning, Steps Involved, Materials and Inventory, Techniques of

Material/Inventory Control (EOQ, FSND, ABC, Stock Levels, JIT, VED), Valuation of Inventory (FIFO, LIFO, Weighted average); Practical's of EOQ, stock levels, FIFO, LIFO.

### Unit II

**Hours: 12**

**Labour Cost:** Attendance and payroll procedures, overtime, idle time and incentives, direct and indirect labour, remuneration systems and incentive schemes (Halsey, Rowan, Taylor, Merrick, Bedaux, Emerson plans practical).

**Overheads: Functional analysis** – factory, administration, selling, distribution, research and development, fixed, variable, semi variable and step cost; Factory overheads, Administration overheads and Selling and distribution overheads (in brief about types of overheads). (Overhead rate, Machine rate, under & over absorption practical).

### Unit III

**Hours: 10**

**Cost Sheet** – Preparation of Cost Sheet (simple problems).

**Process Costing** - Meaning and computation of normal profits, abnormal effective and abnormal loss.

### Unit IV

**Hours: 10**

**Contract Costing:** Progress payments, retention money, escalation clause, contract accounts, accounting for material, accounting for plant used in a contract, contract profit and balance sheet entries.

Operating Costing (basic problems related to transport only).

## Text Books

1. Maheshwari, S. N. and Mittal, S. N. (2015), Cost Accounting – Theory and Problems, Shri Mahavir Book Depot.

2. Arora, M.N., (2012), Cost Accounting, Vikas Publishing House.

### **Reference Books**

1. Lal, Jawahar and Srivastava, Seema, (2013), Cost Accounting, McGraw Hill Education.
2. Pandey, I.M., (2014), Management Accounting, Vikas Publishing House, Delhi.
3. R.Palaniappan & Hariharan;(2012),Cost Accounting Theory& Practices,I.K. International Publishing House,Delhi
4. P.C.Tulsian; (2013),Introduction to Cost Accounting (2013),S.Chand, Delhi

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **BCOM 1108- Business Studies**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** Objectives: The course aims to provide basic concepts and knowledge with regard to a business enterprise and its various functional areas.

### **Course Contents**

#### **Unit I**

**Hours: 10**

Introduction: Concept, Nature and Scope of Business; Concept of Business as a System; Business Objectives; Business Environment - concept and importance; Scope of Business Environment - Economic, Social, Technological, Political and Legal; Impact of Government policy changes on business, Introduction to Business Ethics and Social Responsibility of Business.

#### **Unit II**

**Hours: 12**

**Types of Business Enterprises:** Entrepreneurship – Concept & Nature, process of setting up a new business; Forms of Business Organization: Sole Proprietorship, Joint Hindu Family Firm, Partnership firm, Joint Stock Company,

Cooperative Organization, Limited Liability Partnership; Types of Companies, Choice of form of organization; 'Startup' as a recent trend & its future potential

### Unit III

**Hours: 12**

**Financing Business:** Financial planning - concept and importance, Sources of finance; Financial Markets: concept and types; Money market and its instruments, Capital market and its types (primary and secondary); Capital Structure - concept and factors affecting; Securities and Exchange Board of India (SEBI); Recent trends in financing: venture capital, Private equity, loan syndication.

### Unit IV

**Hours: 10**

**Small Business:** Meaning, Scope and role; Government Policies. Government & Business Interface: Rationale; Forms of Government and Business Interface, SIDBI.

**Multinationals:** Concept and role of MNCs; Transactional Corporations (TNCs); International Business Risks.

**Institutions:** Chambers of Commerce and Industry in India; FICCI, CII, ASSOCHAM, etc.

### Text Books

1. Robert; Lawrence, (2009) Modern Business Organization, McMillan India.
2. 2. Tulsian, P. C., (2009) Business Organisation & Management, 2nd edition, Pearson Education.

### Reference Books

1. Basu, C. R. (2008) Business Organization and Management, McGraw Hill Education.
2. Basu, C, (2010) Business Organisation and Management, 1st Edition, McGraw Hill Education.
3. Gupta, C.B., (2010) Modern Business Organization and Management, Dhanpat Rai & Sons.
4. Agarwal, N. P., Tailor, R. K., (2008) Business Organisation and Management, Dhanpat Rai & Sons.

**Note: Latest edition of text books may be used.**

## SYLLABUS FOR BACHELOR OF COMMERCE (Hons)

### CS-1206 E-Commerce

**L-4, T-0,**

**Credits: 04**

**Max Marks: 75**

**Objectives:** The course imparts understanding of the concepts and various application issues of e-business like Internet infrastructure, security over internet, payment systems and various online strategies for e-business.

## **Course Contents**

### **Unit I**

**Hours: - 12**

**Introduction to E-Commerce:** Electronic Business, Electronic Commerce, Types of Electronic Commerce, Benefits, Limitations and Barriers of E-commerce, Electronic Commerce Models, Value Chains in Electronic Commerce, E-Commerce in India., Web Based Tools for Electronic Commerce, e-Marketing, Intranet, Composition of Intranet, Business Applications on Intranet, Extranets. Electronic Data Interchange, Components of Electronic Data Interchange, Electronic Data Interchange Communication Process.

### **Unit II**

**Hours: - 12**

**Security Issues in e-business:** Basic E-Commerce Security issues, Electronic Commerce Threats, E-Commerce Security Strategy, Encryption, Digital Signatures, Digital Certificates, Securing E-commerce Networks: Firewalls, Personal Firewalls, IDS, VPNs, Public Key Infrastructure (PKI) for Security.

### **Unit III**

**Hours: - 10**

#### **Electronic Payment System:**

Concept of e-Money, Internet Banking, Electronic Payment System, Types of Electronic Payment Systems, Smart Cards, Infrastructure Issues in EPS, Electronic Fund Transfer.

### **Unit IV**

**Hours: - 10**

**e-Business Applications & Strategies:** Business Models & Revenue Models over Internet, Emerging Trends in e-Business, Digital Commerce, Mobile Commerce, Basics of Internet Enabled SCM-e Supply Chain, Strategies for E-Commerce, Internet based Business Models; Legal, Ethical and Societal Impacts of E-Commerce.

### **Text Books**

5. Efraim Turban, David King, Dennis Viehland, Jae Lee, (2012): Electronic Commerce – A Managerial Perspective, Pearson Education.
2. Bharat Bhaskar (2013). Electronic Commerce- Framework, Technologies and Applications, Tata McGraw Hill.

### **Reference Books**

1. Elias M. Awad (2010). Electronic Commerce-From Vision to Fulfillment, PHI Learning.

6. Dave Chaffey (2013). E-Business and E-Commerce Management- Strategy, Implementation and Practice, Pearson Education.
3. Joseph, P.T. and S.J. (2012). E-Commerce – An Indian Perspective, PHI.
4. Schneider Gary, (2014). Electronic Commerce, Cengage Learning.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons.)**

### **BCOM 2109 - Managerial Personality Development (NUES)**

**L-2, T/P-0**

**Credits: 02**

**Max Marks: 100**

\*NUES: Non University Examination System

**Objectives:** The main aim of the course is to improve the self-confidence and groom the personality. The following topics are indicated as course line and should be explored through application based exercise and workshops to provide fundamental knowledge and exposure to the students.

#### **Course Contents**

##### **Unit I**

**Hours: 6**

**Self:** Core Competency, Understanding of Self, Components of Self – Self identity, Self concept, Self confidence and Self image. Skill Analysis and finding the right fit.

##### **Unit II**

**Hours: 6**

**Self Esteem:** Meaning & Importance, Components of self esteem, High and low self esteem, measuring your self esteem and its effectiveness, Personality mapping tests, Appreciative Intelligence.

### **Unit III**

**Hours: 6**

#### **Building Emotional Competence**

Emotional Intelligence – Meaning, Components, Importance and Relevance, Positive and Negative Emotions

Healthy and Unhealthy expression of Emotions, The six-phase model of Creative Thinking: ICEDIP model

### **Unit IV**

**Hours: 6**

#### **Thinking skills**

The Mind/Brain/Behaviour, Thinking skills, Critical Thinking and Learning, Making Predictions and Reasoning, Memory and Critical Thinking, Emotions and Critical Thinking.

#### **Creativity**

Definition and meaning of creativity, The nature of creative thinking, Convergent and Divergent thinking, Idea generation and evaluation (Brain Storming), Image generation and evaluation.

**Debates, presentations, role plays and group discussions on current topics.**

**Audio and Video Recording of the above exercises to improve the non-verbal communication and professional etiquettes.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **CS-1256 E-Commerce Lab**

**L-0, T/P-4**

**Credits: 02**

**Max Marks: 60**

Lab would be based on the Paper 106. The objective of this lab is to understand the various application of e-business like Internet infrastructure, security over internet, payment systems, online transactions and online strategies for e-business.

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **BCOM 2101- Marketing Management**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The objective of this paper is to identify the foundation terms and concepts that are commonly used in marketing. It also identifies the essential elements for effective marketing practice. This course will give complete relationship between marketing and other management functions.

#### **Course Contents**

##### **Unit I**

**Hours: -10**

**Introduction to Marketing:** Nature, Scope and Importance of Marketing, Basic concepts, Marketing Environment, Consumer Behavior, Market Segmentation, Targeting and Positioning.

##### **Unit II**

**Hours: -10**

**Product:** Product Levels, Product Mix, Product Strategy, Product Development, Product Lifecycle and Product Mix.

**Pricing Decisions:** Designing Pricing Strategies and Programmes, Pricing Techniques.

##### **Unit III**

**Hours: -12**

**Place:** Meaning & importance, Types of Channels, Channels Strategies, Designing and Managing Marketing Channel, Retailing, Physical Distribution, Marketing Logistics and Supply Chain Management.

#### **Unit IV**

**Hours: -12**

**Promotion:** Promotion Mix, Push vs. Pull Strategy; Promotional Objectives, Advertising- Meaning and Importance, Types, Media Decisions, Promotion Mix, Personal Selling-Nature, Importance and Process, Sales Promotion – Purpose and Types; Publicity and Public Relations- Definition, Importance and Methods.

**Emerging Issues in Marketing:** Integrated Marketing, Online Marketing, Online Payments, Rural Marketing, Social Marketing, Green Marketing (Introductory aspects only).

#### **Text Books**

1. Kotler, Armstrong, Agnihotri and Haque, (2012), Principles of Marketing- A South Asian Perspective, Pearson Education.
2. Ramaswamy and Namkumar,S.,(2013), Marketing Management Global Perspective: Indian Context, McMillan, Delhi.

#### **References**

- 1) Saxena, Rajan, (2012), Marketing Management, McGraw Hill Education.
- 2) Lamb, Charles W, (2012), MKTG: a South Asian Perspective, Cengage Learning.
- 3) Russel, Winer, (2012), Marketing Management, Pearson Education.
- 4) Kotler, Koshi Jha, (2014), Marketing Management, Pearson Education.

**Note: Latest edition of text books may be used.**

### **SYLLABUS FOR BACHELOR OF COMMERCE (B.Com Hons)**

#### **BCOM 2103– Management Accounting**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The objective of the course is to familiarize the students with the basic management accounting concepts and their applications in managerial decision making.

#### **Course Contents**

##### **Unit I**

**Lectures:-06**

**Management Accounting:** Nature and Scope, Financial Accounting, Cost Accounting and Management Accounting, Advantages and Limitations of Management Accounting, Role of Management Accountant.

##### **Unit II**

**Lectures:-14**



**Financial Analysis:** Financial Statements and their Limitations, Concepts of Financial Analysis, Tools of Financial Analysis: Comparative Financial Statements, Common Size Financial Statements, Trend Percentages, Ratio Analysis, Fund Flow and Cash Flow Analysis.

**Ratio Analysis:** Nature and Interpretation, Classification of Ratios, Profitability Ratios, Turnover Ratios, Financial Ratios, Utility and Limitations of Ratios.

**Cash Flow Analysis:** Distribution of Cash from Funds, Utility of Cash Flow Statement, Accounting Standard 3 (AS 3: Revised), Construction of Cash Flow Statement.

### **Unit III**

**Lectures:-10**

**Budgets and Budgetary Control:** Concept of Budgets and Budgetary Control, Advantages and Limitations of Budgetary Control, Establishing a System of Budgetary Control, Preparation of Different Budgets, Fixed and Flexible Budgeting, Performance Budgeting and Zero Base Budgeting, Concept of Responsibility Accounting – Types of Responsibility Centres.

**Standard Costing and Variance Analysis:** Meaning of Standard Cost, Relevance of Standard Cost for Variance Analysis, Significance of Variance Analysis, Computation of Material, Labour Variances.

### **Unit IV**

**Lectures:-14**

**Marginal Costing and Profit Planning:** Marginal Costing Differentiated from Absorption Costing, Direct Costing, Differential Costing, Key Factor, Break-even Analysis, Margin of Safety, Cost-Volume-Profit Relationship, Advantages, Limitations and Applications of Marginal Costing.

**Decisions Involving Alternative Choices:** Concept of Relevant Costs, Steps in Decision Making, Decisions Regarding Determination of Sales Mix, Exploring new Markets, Discontinuance of a Product Line, Make or Buy, Equipment Replacement, Change Versus Status Quo, Expand or Contract and Shut-Down or Continue.

### **Text Books**

1. Maheshwari, S. N. and Mittal, S. N. (2015), Cost Accounting – Theory and Problems, Shri Mahavir Book Depot.
2. Maheshwari, S.N., (2014), Principles of Management Accounting, Sultan Chand & Sons.

### **Reference Books**

1. Arora, M.N., (2012), Cost Accounting, Vikas Publishing House.
2. Lal, Jawahar and Srivastava, Seema, (2013), Cost Accounting, McGraw Hill Education.
3. Bhattacharya, (2010), Management Accounting, Pearson Education.
4. Pandey, I.M., (2014), Management Accounting, Vikas Publishing House, Delhi.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF Commerce (Hons)**

### **BCOM 2105- Business Laws and Company Laws**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objective:** The objective of the course is to impart basic knowledge of the important business laws along with relevant case law.

#### **Contents**

##### **Unit I:**

**Hours: - 10**

##### **The Indian Contract Act, 1872: General Principle of Law of Contract**

- a) Contract – meaning, characteristics and kinds
- b) Essentials of valid contract - Offer and acceptance, consideration, contractual capacity, free consent, legality of objects.
- c) Contract of Indemnity and Guarantee
- d) Contract of Bailment & Pledge.

##### **Unit II: The Sale of Goods Act, 1930**

**Hours: - 12**

- a) Contract of sale, meaning and difference between sale and agreement to sell.
- b) Conditions and warranties
- c) Transfer of ownership in goods including sale by non-owners
- d) Performance of contract of sale
- e) Unpaid seller – meaning and rights of an unpaid seller against the goods and the buyer.

##### **Unit III:**

**Hours: - 12**

**The Companies Act 1956 with up-to-date Amendments** (Basic elementary knowledge): Essential characteristics of a Company, Types of Companies, Memorandum and Articles of Association, Prospectus, Shares – Kinds, Allotment and Transfer, Debentures, Essential conditions for a valid Meeting, Kinds of Meetings and Resolutions; Directors and Remuneration, Directors, Managing Directors-their Appointment, Qualifications, Powers and Limits on their Remuneration, Prevention of Oppression and Mismanagement.

#### **Unit IV: The Negotiable Instruments Act 1881**

**Hours: - 10**

- a) Meaning and Characteristics of Negotiable Instruments : Promissory Note, Bill of Exchange, Cheque, Crossing of Cheque, Bouncing of Cheques
- b) Holder and Holder in due Course, Privileges of Holder in Due Course.
- c) Negotiation: Types of Endorsements.

#### **Text Books**

- 1. Kuchhal, M.C. and Vivek Kuchhal, (2014) *Business Law*, Vikas Publishing House, New Delhi.
- 2. Maheshwari & Maheshwari, Principles of Business Law (2013), Himalaya Pub.House-New Delhi.

#### **Reference Books**

- 1. Ravinder Kumar, Legal Aspects of Business, (2013), Cengage Learning
- 2. Singh, Avtar, *Business Law*, (2014), Eastern Book Company, Lucknow.
- 3. N.D.Kapoor, (2010) Sultan Chand, New Delhi
- 4. **Bulchandani K R**, Business Law for Management, (2014), Himalaya Pub.House-New Delhi.

**Note: Latest edition of text books may be used.**

### **SYLLABUS FOR BACHELOR OF Commerce (Hons.)**

#### **BCOM 2107 - Business Ethics and Corporate Social Responsibility**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** To acquaint students with the basics of business ethics and corporate social responsibility of business.

#### **Course Contents**

##### **Unit-I**

**Hours: 10**

**Introduction:** Concept of Values, Types and Formation of Values, Values and Behaviour, Values of Indian Managers, Ethical Decision Making.

**Ethics:** Management Process and Ethics, Ethical Decision Making, Ethical Issues, Ethos of Vedanta in Management, Relevance of Ethics and Values in Business.

## **Unit-II**

**Hours: 14**

**Knowledge and Wisdom:** Meaning of Knowledge and Wisdom, Difference between Knowledge and Wisdom, Knowledge Worker versus Wisdom Worker, Concept of Knowledge Management and Wisdom management, Wisdom Based Management.

**Stress Management:** Meaning, Sources and Consequences of Stress, Stress Management and Detached Involvement.

**Concept of Dharma & Karma Yoga:** Concept of Karma and Kinds of Karam Yoga, Nishkam Karma, and Sakam Karma; Total Quality Management, Quality of life and Quality of Work Life.

## **Unit-III**

**Hours: 10**

**Understanding Progress, and Success - Results & Managing Transformation:** Progress and Results Definition, Functions of Progress, Transformation, Need for Transformation, Process & Challenges of Transformation.

**Understanding Success:** Definitions of Success, Principles for Competitive Success, Prerequisites to Create Blue Print for Success. Successful Stories of Business Gurus.

## **Unit-IV**

**Hours: 10**

**Corporate Social Responsibility & Corporate Governance:** Corporate Responsibility of Business: Employees, Consumers and Community, Corporate Governance, Code of Corporate Governance, Consumer Protection Act, Unethical issues in Business

## **Text Books**

1. Fernando, A.C., (2010), Business Ethics, Pearson education.
2. Hartman, Laura and Chatterjee, Abha, (2010), Perspectives in Business Ethics, McGraw Hill Education.

## **Reference Books:**

1. Govindarajan.M, Natarajan.S, Senthilkumar, V.S., (2013) Professional Ethics and Human Values, PHI
2. Rao, A.B., (2012), Business Ethics and Professional Values, Excel Book.
3. Manuel G.Velasquez, (2012), Business Ethics Concepts, Printice Hall of India.
4. Sison, Alejo G. Corporate Governance and Ethics, (2010) Edward Elgar Publishing Ltd.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **MA 111- Business Statistics**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The objective of this course is to familiarize students with the basic statistical tools used to summarize and analyze quantitative information for decision making.

### **COURSE CONTENTS**

#### **Unit I**

**Hours: 11**

**Statistics:** Definition, Importance & Limitation, Collection of data and formation of frequency distribution, Graphic presentation of Frequency distribution – Graphics, Bars, Histogram, Diagrammatic. Measures of Central Tendency – Mean Median and Mode. Partition values – quartiles, deciles and percentiles.

#### **Unit II**

**Hours: 11**

**Measures of Variation:** Measures of variation – Range, coefficient of range, IQR, coefficient of quartile deviation, mean deviation, standard deviation, and coefficient of variation.

#### **Unit III**

**Hours: 11**

**Correlation Analysis:** Correlation: Meaning & Types of correlation, Karl Pearson coefficient of Correlation, Spearman Rank Correlation, Coefficient of Determination; Regression: Meaning & difference between correlation & Regression, Simple linear regression – X on Y & Y on X. Pitfalls and Limitations Associated with Regression and Correlation Analysis.

#### **Unit IV**

**Hours: 11**

**Index numbers and Time series analysis:** Definition, Characteristics, uses, types, problems related to Index numbers, methods of constructing Index numbers, Price, Quantity and Value Indices, Chain Index numbers, Test for consistency of Index numbers; **Time series analysis:** secular trend, cyclical variations, seasonal and irregular variation; methods of forecasting.

### **Text Books**

1. Vohra, N.D., (2012) Business Statistics, McGraw Hill Education.
2. Gupta, SP and Gupta, P.K. (2013), Business Statistics and Business Mathematics, Sultan Chand & Sons.

### **Reference Books**

1. Sharma, J.K., (2014) Business Statistics, Vikas Publishing House.
2. Rajagopalan, S. & Sattanathan, R., (2011) Business Statistics & Operations Research, VNI Publisher.
3. Beri G. (2009) Business Statistics, McGraw Hill Education (India) Private Limited.
4. **Gupta S.C.** (2014) Fundamentals of Applied Statistics, Sultan Chand & Sons.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

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**L-4 T/P-0**

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#### **Unit I**

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**Statistics:** Definition, Importance & Limitation, Collection of data and formation of frequency distribution, Graphic presentation of Frequency distribution – Graphics, Bars, Histogram, Diagrammatic. Measures of Central Tendency – Mean Median and Mode. Partition values – quartiles, deciles and percentiles.

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**Hours: 11**

**Measures of Variation:** Measures of variation – Range, coefficient of range, IQR, coefficient of quartile deviation, mean deviation, standard deviation, and coefficient of variation.

#### **Unit III**

**Hours: 11**

**Correlation Analysis:** Correlation: Meaning & Types of correlation, Karl Pearson coefficient of Correlation, Spearman Rank Correlation, Coefficient of Determination; Regression: Meaning & difference between correlation & Regression, Simple linear regression – X on Y & Y on X. Pitfalls and Limitations Associated with Regression and Correlation Analysis.

#### **Unit IV**

**Hours: 11**

**Index numbers and Time series analysis:** Definition, Characteristics, uses, types, problems related to Index numbers, methods of constructing Index numbers, Price, Quantity and Value Indices, Chain Index numbers, Test for consistency of Index numbers; **Time series analysis:** secular trend, cyclical variations, seasonal and irregular variation; methods of forecasting.

### **Text Books**

1. Vohra, N.D., (2012) Business Statistics, McGraw Hill Education.
2. Gupta, SP and Gupta, P.K. (2013), Business Statistics and Business Mathematics, Sultan Chand & Sons.

### **Reference Books**

5. Sharma, J.K., (2014) Business Statistics, Vikas Publishing House.
6. Rajagopalan, S. & Sattanathan, R., (2011) Business Statistics & Operations Research, VNI Publisher.
7. Beri G. (2009) Business Statistics, McGraw Hill Education (India) Private Limited.
8. **Gupta S.C.** (2014) Fundamentals of Applied Statistics, Sultan Chand & Sons.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **CS-2151- Computerized Accounting Software (Computer Lab)**

**L-0 T/P-4**

**Credits-2**

**Max Marks: 60**

**Objectives:** To equip students with basic knowledge of Tally.ERP 9.

### **Unit I**

#### **Basic of Accounting**

Accounting Principles, Concepts and Conventions, Types of accounts, Rules of Journal entries, Methods of accounting.

### **Unit II**

## **Fundamentals of Tally. ERP 9**

Introduction, Getting functional with Tally. ERP 9, Creation of Company in Tally.ERP 9, Configuration, and Creation/alteration/deletion of ledger accounts, Passing and deletion of journal entries in accounting vouchers, searching entries.

## **Unit III**

### **Some useful features of Tally. ERP 9**

Bank Reconciliation statement, import and export of the data from/ to MS-Excel, Order processing, Re-order levels, Bill wise details, Bill of materials, Invoicing, Ratio analysis, security controls, interest calculation, Back up and restores.

## **Unit IV**

### **Generating basic reports**

Financial statements, Accounting Books, Exception reports, Printing cheque and vouchers.

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **CE 2303- Environmental Science (NUES)**

**\*NUES: Non University Examination System**

**L-2, T/P-0,**

**Credits: 02**

**Max Marks: 100**

**Objectives:** The basic objective of this paper is to understand the basic fundamental to environmental science, complexity of ecosystems, major environmental problems including their causes and consequences. This course endeavors to provide a background to current and controversial environmental issues and possible solutions to environmental problems.

## **Course Contents**

### **Unit I**

**Hours: 06**

**Ecosystems and how they work:** Types of Eco-Systems, Geosphere – Biosphere and Hydrosphere introduction. Major issues of Biodiversity, Conservation of Bio-Diversity.

**Concept of sustainability and international efforts for environmental protection:** Concept of Sustainable Development, Emergence of Environmental Issues. International Protocols, WTO, Kyoto Protocol, International Agreement on Environmental Management.



## **Unit II**

**Hours: 06**

**Water Pollution:** Water Resources of India, Hydrological Cycle, Methods of Water Conservation and Management, Rain Water Harvesting and their legal aspects, River Action Plan, Ground and Surface Water Pollution; Waste Water Management.

**Air Pollution:** Air Pollution and Air Pollutants, Sources of Air Pollution and its Effect on Human Health and Vegetations. Green House Effect, Global Warming and Climate Change.

## **Unit III**

**Hours: 06**

**Solid Waste:** Management – and Various Method Used, Composting, Land Fill Sites etc. Hazardous Waste Management, Biomedical Waste Management.

Environmental Impact Assessment and Environmental Management System - Introduction and its Impact.

## **UNIT IV**

**Hours: 06**

**Introduction to Indian Environmental laws:** Legal framework: , the Indian Penal Code, Role of Judiciary in Environmental Protection, Water (Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution ) Act, 1981,

### **Text Books**

1. Miller Tyler, G. Jr., (2011), Environmental Science: Working with the Earth, Cengage Learning India Pvt. Ltd.
2. Mishra, S.P., and Panday, S.N., (2014), Essential Environment Studies, Ane Books Pvt. Ltd.

### **Reference Books**

9. Chhatwal, Rajni Johar (2012), Environmental Science, UDH Publishers & Distributers (P) Ltd.
10. Ghosh Roy, M.K. (2014), Sustainable Development, Ane Books Pvt. Ltd.
11. Asthana, D.K. and Meera. (2014), Textbook on Environmental Studies. S.Chand.
12. Arumugam.N, & Kumaresan.V, (2014) Environmental Science & Engineering, Saras Publication.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **BCOM 001- Minor Project Report**

**L-0, T-0,**

**Credits: 06**

**Max Marks: 100**

During the second semester each student shall undertake a project to be pursued by him / her under the supervision of an Internal Supervisor to be appointed by the Director / Principal. The project should preferably be based on primary / secondary data. Both the subject and the name of the Supervisor will be approved by the Director / Principal of the Institution. The Minor Project Report in duplicate along with one soft copy in a CD/DVD will be submitted at least three weeks prior to the commencement of the End Term Examination of the Second Semester. Minor Project Report shall carry 100 marks. It shall be evaluated for 50 marks by an External Examiner to be appointed by the University from panel of experts approved by BOS of USMS and for the rest of the 50 marks by an Internal Examiner to be appointed by the Director / Principal of the Institution.

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons.)**

### **BCOM- 2202: Financial Management**

**L-4, T-0**

**Credits: 04**

**Max Marks: 75**

**Objectives:** Efficient Management of a business enterprise is closely linked with the efficient management of its finances. Accordingly, the objective of the course is to acquaint the students with the overall framework of financial decision- making in a business unit.

### **Course Contents**

#### **Unit I**

**Hours: 10**

**Financial Management:** Nature, scope and objectives of financial management, Time value of money, Concept of Risk and Return (including Capital Asset Pricing Model), Valuation of Securities: Debentures, Preference shares and Equity Shares.

**Sources of Financing:** Classification of Sources of Finance, Security Financing, Loan Financing, Project Financing, Loan Syndication- Book Building, New Financial Institutions and Instruments(in brief)viz. Depositories, Factoring, Venture Capital, Credit Rating, Commercial Paper, Certificate of Deposit, Stock Invest, Global Depository Receipts.

## **Unit II**

**Hours: 10**

**Capital Budgeting:** Concept, Importance and Appraisal Methods: Pay Back Period, Accounting Rate of Return, Net Present Value Method (NPV), Profitability Index, and IRR. Capital budgeting under Risk-Certainty Equivalent Approach and Risk Adjusted Discount Rate.

## **Unit III**

**Hours: 14**

**Cost of Capital:** Meaning, classification and methods of calculating cost of equity capital, cost of retained Earnings, Cost of Debts, Cost of Preference Capital and Weighted Average Cost of Capital (WACC).

**Capital structure:** Theories of Capital Structure (Net income, Net Operating Income, MM Hypothesis, Traditional Approach), Determinants of Capital structure.

**Leverage:** Concept, significance and types of leverage: Operating and Financial leverage.

## **Unit IV**

**Hours: 10**

**Dividend Decision:** Retained Earnings Vs Dividend Decision, Gordon Model, Walter Model, MM Approach, Determinants of Dividend.

**Working capital Management:** meaning and nature of Working Capital, Working Capital estimation, Inventory and Payable management.

## **Text Books**

1. Khan M.Y, Jain P.K., (2014), Financial Management, McGraw Hill Education.
2. Pandey I. M., (2015), Financial Management, Vikas Publishing House.
3. Brigham and Houston (2013) Financial Management, CENGAGE Learning.

## **Reference Books**

1. Kapil, Sheeba, (2012), Financial Management, Pearson Education.
2. Chandra Prasanna (2011), Financial Management: Theory and Practice, McGraw Hill.
3. Maheshwari, S.N. (2013), Financial Management: Principles and Practice, Sultan Chand.
4. Tulsian, P.C. (2010), Financial Management: a self study textbook, S. Chand.

**Note: Latest edition of text books may be used.**

## **BCOM 2204- Auditing**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The objective of this course is to familiarize students with auditing principles and procedures.

### **COURSE CONTENTS**

#### **Unit - I**

**Hours: 12**

**Auditing:** Meaning, definition, Importance, Accounting and Auditing, Limitations ,Concept of Auditing & Standards, Detection and Prevention of Frauds and Errors, Basic principles governing an audit, Types of audit; Internal Control, Internal Check and Internal Audit, Evaluation of Internal Control System, Internal Control System regarding purchases, sales, salaries and wages.

#### **Unit- II**

**Hours: 10**

Audit Procedure: Audit planning, Audit Programme, Audit working papers, Audit files; Audit Evidence: Methods of obtaining audit evidence; Special auditing techniques.

#### **Unit III**

**Hours: 12**

Vouching-Meaning, Importance, Vouching of cash and trading transactions, Routine Checking and Test Checking; Company Auditors; Appointment, Removal, Rights, Duties, and Liabilities. Auditor's Report. Cost Audit, Social Audit.

#### **Unit – IV**

**Hours: 10**

Verification and valuation of Assets and Liabilities; Auditors' Report: Clean and Qualified Audit Report, Disclaimer of opinion, Audit Certificate, Company Auditor Report.

### **Text Books**

3. Kumar, Ravinder, and Sharma, Virender, (2015), Auditing: Principles and Practices, PHI.
4. Jha, Aruna, (2014), Auditing, Taxmann Publishers.

## Reference Books

1. Garg Pankaj CA, (2015), Advanced Auditing and Professional Ethics, Taxmann Publisher.
2. Bansal Surbhi CA, (2015), Advanced Auditing and Professional Ethics, Bestword Publication Pvt.Ltd.
3. Oberio, SP and Jha, Aruna, (2015), Fundamentals Of Accounting And Auditing, Taxmann Publisher.
4. Sheth Tejpal (2013), Fundamentals of Accounting and Auditing, Pearson Education.

**Note: Latest edition of text books may be used.**

## BACHELOR OF COMMERCE (Hons)

### BCOM 2206- Corporate Accounting

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** To help the students to acquire the conceptual knowledge of accounting for corporate and to acquaint the students with the accounting problems associated with the incorporation, expansion or liquidation of public limited or joint stock companies.

## Course Contents

### Unit I

**Hours: 12**

**Share Capital and Debentures:** IPO book building, Issues and forfeiture and buy-back of shares;

Redemption of preference shares; issue and redemption of debentures, Right issue and bonus shares; Accounting for employee stock option plan.

### Unit II

**Hours: 10**

**Final accounts of companies:** preparing profit and loss account and balance sheet as per revised schedule VI; Holding companies accounts (excluding cross holding).as per Provisions of Accounting Standard; Preparation of consolidated balance sheet; Valuation of Shares and Goodwill.

### **Unit III**

**Hours: 12**

**Amalgamation of Companies:** Amalgamation and Internal Reconstruction of Companies as per

Accounting Standard; (excluding problems of amalgamation of inter-company holding); Accounting involved in liquidation of companies.

### **Unit IV**

**Hours: 10**

**Banking and Insurance Companies:** Accounts of banking and insurance companies; Accounting statements of electricity companies. Prudential norms: basis of accounting, income recognition asset classification.

### **Text Books**

1. Sehgal, Ashok and Sehgal, Deepak, (2008), Advanced Accountancy, 6th edition, Taxmann Allied Pvt. Ltd.
2. Maheshwari, S.N., (2009), Corporate Accounting, Vikas Publishing House, New Delhi

### **Reference Books**

1. Shukla, M.C., Grewal, T.S.; and Gupta, S.C., (2008) Advanced Accounts, S.Chand& Co. New Delhi
2. Tulsian, P.C., (2010) Corporate Accounting, Tata McGraw Hill Publications
3. Sehgal, A., (2010), Fundamentals of Corporate Accounting, Taxmann Publications.
4. Dicksee ,Lawrence R., (2007), The Student's Guide to Accountancy. Marcel Press.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **BCOM 2208- Human Resource Management**

**L-4, T-0**

**Credits: 04**

**Max Marks: 75**

**Objectives:** The objective of this course is to make students familiarize with basic concepts of human resource management and people related issues.

## **Course Content**

### **Unit I**

**Hours: -10**

**Human Resource Management:** Concept and Functions, Role, Models, Status of HR, HR Policies, Evolution of HRM. Emerging Challenges of Human Resource Management; workforce diversity, empowerment, Downsizing; VRS; Human Capital; HRIS; Kaizen; TQM & Six Sigma

### **Unit II**

**Hours: -12**

**Human Resource Planning:** Human Resource Planning- Quantitative and Qualitative dimensions; **Recruitment** – Concept and sources; (E-recruitment, recruitment process outsourcing etc.); **Selection** – Concept and process; test and interview; placement induction. Job analysis – job description and job specification; job design; Job Enlargement; Job Enrichment and flexi-time; Career Planning; Succession Planning.

### **Unit III**

**Hours: -12**

**Training and Development:** Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role Specific and Competency Based Training; Evaluating Training Effectiveness; Management Development; Career Development.

**Performance appraisal:** Nature and objectives; Techniques of performance appraisal; potential appraisal and employee counseling; Internal mobility – promotions, demotion, transfers and separation. Compensation: concept and policies; job evaluation.

### **Unit IV**

**Hours: -10**

**Maintenance:** Employee health and safety; employee welfare; social security; Industrial relations- an overview. Grievance handling and redressal Industrial Disputes causes and settlement machinery.

**Strategic HRM:** HRD audit, managing globalization; technology and HRM.

## **Text Books**

1. Gary Dessler. (2013) A Framework for *Human Resource Management*. Pearson.
2. David A. Decenzo, Stephen P. Robbins, Susan L. Verhulst, *Human Resource Management*’, (2015), Wiley India Private Limited.

### **Reference Books**

1. Bohlendar and Snell, Principles of *Human Resource Management*, (2013) Cengage Learning.
2. K. Aswathappa, Human Resource Management (2013), McGraw Hill Education (India) Private Limited.
3. Chhabra, T.N. *Essentials of Human Resource Management*. (2014) Sun India Publication New Delhi.
4. Robert L. Mathis and John Jackson, Human Resource Management (2011), South-Western Publisher.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons)**

### **CS-2202 Information System Management**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** The objective of the course is to acquaint the students about the concept of information system in business organizations, and also the management control systems.

### **Course Contents**

#### **Unit I**

**Hours: 11**

**Introduction:** Definition, Purpose, Objectives, and Role of MIS in Business Organization, pre-requisites for effective MIS, MIS Applications in Business.

**Information in Decision Making:** Meaning and importance, Sources and Types of Information, information requirements with particular reference to Management Levels, Relevance of Information in Decision Making, Strategic Business objectives of information system.

#### **Unit II**

**Hours: 11**

**Cost Benefit Analysis:** Quantitative and Qualitative Aspects, Assessing Information needs of the Organization.



**System Development:** Concept of System, Types of Systems – Open, Closed, Deterministic, Probabilistic, etc., System Approaches - System Development Life Cycle (SDLC), Prototyping, End User Development, Waterfall and Spiral method, System Analysis, Design and Implementation.

### **Unit III**

**Hours: 11**

**Types of information system:** Transaction Processing System, Expert System, Decision Support System, Executive Information system and Knowledge Management System.

**Information Technology:** Recent Developments in the Field of Information Technology, Impact of IT on Organisation, Multimedia Approach to Information Processing, Centralised and Distributed Processing.

### **Unit IV**

**Hours: 11**

**Emerging Concepts and Issues in Information Systems:** ERP - An overview, Characteristics, and Role of ERP in Business Organization, Customer Relationship Management, Business Intelligence, Introduction to Database, Data Warehousing, Data Mining and its Applications, MIS and Information Security Challenges (Introductory aspects only).

### **Text Books**

3. Laudon and Laudon, Management Information Systems, Pearson Education, 2014.
4. Javadekar, W.S., “Management Information Systems”, Tata McGraw Hill Publication, 2014.

### **Reference Books**

5. O’Brien, James A., “Management Information System”, Tata McGraw Hill, 2014.
6. Davis, B. Gordon, “Management Information System”, Tata McGraw Hill Publication, 2012.
7. Goyal D.P., “Management Information Systems”, Macmillan Publication, 2014.
8. M Azam, “Management Information System”, Tata McGraw Hill, 2012.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons.)**

### **BCOM-2210 Research Methodology**

**L-4, T-0,**

**Credits: 04**

**Max Marks: 75**

**Objectives:** The objective of this paper is to understand the various aspects of research, identify the various tools available to a researcher. Research Methodology can help the business manager in decision making.

## Course Contents

### Unit I

**Hours: 9**

**Introduction:** Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

### Unit II

**Hours: 9**

**Research Process:** An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method, Existing Data Based Research, Longitudinal Studies, Panel Studies, Questionnaire Design.

### Unit III

**Hours: 13**

**Measurement:** Definition; Designing and writing items; Uni-dimensional and Multidimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurstone, Likert and Semantic Differential scaling, Paired Comparison.

**Sampling** –Steps, Types, Sample Size Decision; Secondary data sources.

**Hypothesis Testing:** Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests.

### Unit IV

**Hours: 13**

**Report Preparation:** Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification.

**Computerized Data Analysis:** An overview, features, and role of Computerized Data Analysis (Advanced Excel / SPSS or any other popular software) (Introductory aspects only).

### Text Books

1. Beri, G.C., (2013), Marketing Research, McGraw Hill Education.
2. Cooper, Donald R. and Schindler, Pamela S. (2014), Business Research Methods, Tata McGraw Hill.
3. Research Methodology for Facult(2016), Centre for Education Growth and Research Publication.

## **Reference Books**

1. Nargundkar, Rajendra, (2011), Marketing Research: Text and Cases, McGraw Hill Education.
2. Kumar, Ranjit, (2014), Research Methodology: A step by step guide for Beginners. Pearson Educaion.
3. Levin, Richard and Rubin, DS, (2013), Statistics for Management, Pearson Education.
4. Malhotra, Naresh, (2010), Marketing Research, Pearson education.

**Note: Latest edition of text books may be used.**

## **SYLLABUS FOR BACHELOR OF COMMERCE (Hons.)**

### **BCOM-2252 Research Methodology - Lab**

**L-0, T/P-2**

**Credits: 02**

**Max Marks: 60**

Lab would be based on the BCOM 2210. The objective of this lab is to understand the various aspects of research, identification and use of various Software tools available to a researcher. Research tools can help the business manager in decision making (By using any popular Software (Advanced Excel / SPSS or any other analytical software).

## BCOM 3101- Income Tax Law and Practices

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** To equip students with basic principles and provision of Income Tax Act 1961.

### Unit I

**Hours: - 5**

#### Preliminary

Meaning of India, Previous year and assessment year, Person, Assessee, Books of Account and Document, Income, Revenue receipts and capital receipts, Diversion of Income, Application of Income, Concept of mutuality, Relatives, Agricultural Income.

### Unit II

**Hours: - 6**

#### Fully exempt incomes, Residential status, Tax incidence, Indian income versus foreign income

Incomes fully exempt under Section 10, Residential status of an assessee, Scope of total income, Indian income and foreign income.

### Unit III

**Hours: - 22**

#### Computation of income under different heads and other allied provisions

1. Salaries.
2. Income from House Property.
3. Profits and Gains of Business or Profession (Sections 2(13), 145, 28, 30, 31, 32, 43(1), 43(6), 32AC, 33AB, 35ABB, 35AC, 35AD, 35CCA, 35CCC, 35CCD, 36(1), 145A, 37, 40(a), 40(b), 40A(1), 40A(2), 40A(3), 40A(7), 40A(9), 43B, 44 to 44DA only).
4. Capital Gains (simple problems only).
5. Income from Other Sources (**excluding** Sections 56(2) (vii-a), 56(2) (vii-b)).

Clubbing Provisions, Set-off of losses (Sections 70, 72); Carry forward of losses (Sections 71B, 72, 73, 73A, 74, 74A only); Deemed Income (Sections 68, 69, 69A, 69B, 69C, 69D, 115BBE).

## Unit IV

Hours: -11

### **Deductions, Rebates, Reliefs, DTAA, Computation of Tax Liability, Advance Tax, TDS, Tax Returns**

1. Deductions to be made in computing total income (Sections 80C, 80CCC, 80CCG, 80CCD, 80CCE, 80D, 80DD, 80DDB, 80EE, 80G, 80GG, 80GGA, 80GGB, 80GGC, 80QQB, 80RRB, 80TTA, 80U only).
2. Rebates and Reliefs under Sections 87, 87A, 89.
3. Double Taxation Avoidance Agreement (DTAA)-Meaning, Sections 90, 90A, 91, Tie Breaker Rule.
4. Computation of Income tax liability of an individual including marginal relief.
5. Provisions of advance tax, TDS (in respect of salary only)

Income Tax Returns: Meaning, types of returns, who are required to file a tax return, due dates of filing of returns, mode of filing of returns (**Procedure for online filing- ITR also**).

### **Text Books**

1. Vinod K. Singhania, Monica Singhania, Students Guide to Income Tax, Taxmann Publications Pvt. Ltd., New Delhi.
2. Girish Ahuja & Ravi Gupta, Systematic Approach to tax laws, Bharat Law House, New Delhi.

### **Reference Books**

1. T.N. Manoharan & G.R. Hari, Direct Tax Laws, Snow White Publications Pvt. Ltd., Mumbai.
2. Master Guide to Income Tax Act, Taxmann Publications Pvt. Ltd., New Delhi.
3. Girish Ahuja & Ravi Gupta, Practical Approach to Income Tax, Problems and Solutions, Bharat Law House, Delhi.
4. Vinod Singhania, Kapil Singhania, Direct Taxes, Law & Practice, Taxmann Publications Pvt. Ltd., New Delhi.
5. Bare Act, Income Tax Act, 1961.

**Note: Latest edition of text books may be used.**

## **BCOM 3103- Financial Modelling**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** This course is designed to help the students learn the application of Financial Management & Market concepts in MS-Excel by way of creating various kinds of financial models/templates.

### **Course Contents**

## **Unit I**

**Hours: 11**

**Excel as a tool in Financial Modelling:** Basic Excel in brief; conditional formatting, formulas and macros; what if analysis, pivot table, pivot chart, scenario, goal seek, problem solver tool, data analysis pack.

## **Unit II**

**Hours: 11**

**Financial Modelling Basic Concepts:** Introduction, advanced functions of MS-Excel as a tool in financial modelling; components of a financial model, building the template, filling in the historical data, forecasting of financial statement.

## **Unit III**

**Hours: 11**

**Financial Analysis:** Various approaches to valuation, financial ratios and company analysis, market based methods – EPS and multiples, Fundamentals EV/EBITDA, EV/Sales, building cases and sensitivity analysis; probabilistic analysis - best & worst case.

## **Unit IV**

**Hours: 11**

**Other Modelling Techniques:** Time value of money; capital budgeting models; cost of capital calculation; forecasting methods – moving average, exponential smoothing, trend analysis.

### **Text Books**

1. Proctor, Scott (2010), Building Financial Models with Microsoft Excel: A Guide for Business Professionals, Edition, Wiley.
2. Day, Alastair (2012), Mastering Financial Modelling in Microsoft Excel: A practitioner's guide to applied corporate finance, FT Publishing International.

### **Reference Books**

1. Soubeiga Eric (2013), Mastering Financial Modeling: A Professional's Guide to Building Financial Models in Excel, McGraw-Hill Professional.
2. Sengupta Chandan (2011), Financial Analysis and Modeling Using Excel and VBA, Wiley.
3. Tjia John, (2009), Building Financial Models, McGraw-Hill Professional.
4. Bodhanwala, J., Rujbeh, (2010), Understanding and Analyzing Balance sheet using Excel Worksheets, Prentice Hall International.

**Note: Latest edition of text books may be used.**

## **BCOM 3105 – Goods and Services Tax (GST)**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objective:** The Objective of the course is to acquaint the student about the introduction of GST in India and the replacement of all Indirect Taxes with GST to make India Level playing field with outside world.

### **Unit-I**

**Indirect Taxes** – Meaning and Types of Indirect Taxes, Central Excise Duty - features, nature, scope, salient features of central excise Duty Act; Procedure for excise registration and documents needed; CENVAT MODVAT provisions; Exemptions to small scale industries; Introduction to custom duties; its types, calculation and related issues.

**Hours: 14**

### **Unit-II**

**VAT** – Introduction, meaning, features, merits and demerits, tax calculation, difference from sales tax, value addition with example; Different forms for VAT; VAT refund; Importance of CST Act 1956 Various Provisions; Different categories; CST Calculations; Introduction to Services Tax Act 2007; Types of Services covered; relevant provisions; Rates of Service Tax and its calculation.

**Hours: 14**

### **Unit-III**

**Goods and Service Tax (GST)** - Constitutional Amendment, Features of GST, Importance and benefits; Difference between GST and other Taxes; Migration to GST; Registration of dealers under GST, Exempted List; Rate Structure under GST; Procedure for obtaining registration certificate, concept of IGST; CGST; SGST and its calculation with working examples.

**Hours: 14**

### **Unit-IV**

**Implementation of GST:** GST Council, its members; composition; its role; GST Infrastructure; Impact of GST on Business; Salient features of GST Model. How to file refund under GST, Transfer of Input Tax credit and its related issues; Penalties and appeals under GST; Future of GST in India.

**Hours: 14**

### **Text Books**

5. Mehrotra H.C., Agrawal V. P., (2016), Indirect Taxes, Sahitya Bhawan Publication.
6. B. Viswanathan, (2016), Goods and Services Tax in India, New Century Publications.

### **Reference Books**

9. Singhaia Vinod K. & Singhanian Monica, (2016), Students Guide to Indirect Tax Laws, Taxman Publications.
10. Datey V S. (2017), All about GST – A Complete guide to model GST Law, 5/e, Taxman Publications.
11. Gupta K Atul, (2016), GST- Concept and Roadmap, 1/e, LexisNexis Publisher.
12. Ahuja Girish & Gupta Ravi, (2016), Practical Approach to Direct & Indirect Taxes, (Income Tax, Excise, Customs, CST, VAT, Service Tax, & Wealth Tax 34/e, CCH India

## **BCOM 3107: Digital Marketing**

**L-4 T/P-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** This course aims at creating an understanding of the concepts and techniques of internet and digital marketing so as to exploit the opportunities of this medium to support the organization's marketing activities

### **Course Contents**

#### **Unit I**

**Hours: -10**

Role of Communications in Marketing, Advertising Vs Digital Advertising, Sales Promotions, Integrated Marketing Communications. Evolution of internet as a medium for communication.

Introduction to Digital Marketing: Digital Marketing meaning scope and importance, Internet versus traditional marketing communication, internet microenvironment; Use of Business to Consumer and Business to Business Internet Marketing; Internet marketing strategy.

#### **Unit II**

**Hours: -12**

Use of Internet in Relationship Marketing ( e-CRM) Approaches to Implementing e-CRM; Product Life Cycle Management with internet, Online buyer behavior and Models; The Marketing Mix (7- Ps) in online context. Managing the Online Customer Experience: Planning website design, Understanding site user



requirement, site design and structure, developing and testing content, Integrated Internet Marketing Communications (IIMC); Objectives and Measurement of Interactive marketing communication, Service quality.

### **Unit III**

**Hours: -12**

Digital Promotion Techniques: Email Marketing, Opt-in-e-mail-Permission Marketing, Social Media Marketing, Online PR, Interactive Advertising, Online Partnerships, Viral Marketing Search Engine Marketing, Mobile Marketing, Blogs. Search Engine Marketing (SEM): Search Engines, Search Engine Optimization, Website Optimization, Content Marketing, Designing content for social media marketing, Campaign management.

### **Unit IV**

**Hours: -10**

Web Analytics: Creating a performance system, defining the performance metrics framework, Organic and paid search advertising and analytics, Electronic word-of-mouth analytics, Social media analytics Tools and techniques for Measurement, Website Maintenance Process, tools for web analytics, tools for social media analytics.

### **Text Books**

1. Chaffey, D., Ellis-Chadwick, F., Johnston, K. and Mayer, R. (2009) Internet Marketing: Strategy, Implementation and Practice, Third Edition, Pearson Education, New Delhi.
2. Strauss, Judy and Frost, Raymond (2009), E-Marketing, 5th Edition, PHI Learning Pvt. Ltd., New Delhi.

### **Reference Books**

1. Roberts, M.L. (2009) Internet Marketing, 1st Indian Edition, Cengage Learning, New Delhi.
2. Hanson, W. and Kalyanam, (2010), e-Commerce and Web Marketing 1st Edition, Cengage Learning, New Delhi.

## **BCOM 002- Summer Training Report & Viva Voce**

*L-0 T-0*

*Credit-6*

**Max Marks: 100**

Each student shall undergo practical training of eight weeks during the vacations after fourth semester in an approved business / industrial / service organization and submit at least two copies of the Summer Training

Report to the Director / Principal of the Institution before the commencement of the end-term Examination. The Summer Training Report shall Carry 100 marks. It shall be evaluated for 50 marks by an External Examiner to be appointed by the University and for the rest of the 50 marks by an Internal Examiner to be appointed by the Director / Principal of the Institution.

### **BCOM 3151 - Financial Modelling Lab**

*L-0 T/P-4*

*Credits-2*

*Max Marks: 60*

Lab would be based on the Paper 3107. The objective of this lab is to understand the various applications of Financial Management & Market concepts in MS-Excel by way of creating various kinds of financial models/templates.

### **BCOM 3113- Investment Management**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** The objective of the course is to familiarise students with various theories and concepts of investment in equity and bond market.

**Note:** *Minimum two case studies to be discussed in the Semester*

## **COURSE CONTENT**

### **Unit I**

**Hours: 8**

**Investment:** meaning, nature and process; Investment alternatives, concept and Measurement of Investment risk and return, Identification of Investment Opportunity.

## **Unit II**

**Hours: 11**

**Trading of Securities:** Stock Exchange, Functions, trading system, Regulation and listing of securities.

## **Unit III**

**Hours: 11**

**Valuation of Securities:** equity, bonds and convertible securities.

## **Unit IV**

**Hours: 14**

**Investment Analysis:** Fundamental analysis; company analysis; industry analysis and economy analysis; Technical analysis; Dow Theory, Charting techniques, Volume indicators; Efficient market hypothesis.

### **Text Books:**

1. Chandra, Prasanna, (2012), Investment Analysis and Portfolio Management, McGraw Hill Education (India) Private Limited.
2. Pandian, P., (2012), Security Analysis and Portfolio Management, Vikas publication.

### **Reference Books:**

1. Spangler Timothy (2010), Investment Management: Law and Practice, OUP Oxford.
2. Desai, Jay M. and Joshi Nisarg, A. (2015), Investment Management (Security Analysis and Portfolio Management), Dreamtech Press.
3. Reilly Frank K. and Brown Keith C. (2012), Analysis of Investments and Management of Portfolios, Cengage Learning India Pvt.Ltd.
4. Khatri, Dhanesh Kumar (2012), Investment management and Security Analysis, Trinity Press Pvt Ltd .

**Note: Latest edition of text books may be used.**

## **BCOM 3115- Financial Markets and Institutions**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** To familiarise the students with components of Indian financial system and major institutions.

## **COURSE CONTENT**

## **UNIT – I**

**Hours: 10**

**Financial System:** components, features, financial system and economic development.

## **Unit-II**

**Hours: 11**

**Financial Markets:** Money market – functions, organization and instruments, recent developments in Indian money market; Capital Markets: functions, organization and instruments, primary and secondary, financial market instruments.

## **Unit-III**

**Hours: 12**

**Financial Institutions:** Indian banking industry- RBI, commercial banking, features, instruments, recent developments; Development Financial institutions (DFIs):overview and role in Indian economy; Life and non-life insurance organizations in India; Mutual Funds; Non-banking financial companies (NBFCs).

## **Unit-IV**

**Hours: 11**

**Financial Services:** Merchant banking, underwriting, Housing finance, leasing, venture capital, hire purchase, factoring.

### **Text Books:**

1. Khan, M.Y., (2013), Indian Financial System, McGraw Hill Education (India) Private Limited.
2. N. K. Gupta (Author), Monika Chopra (2013), Financial Markets, Institutions & Services, Ane Books Pvt. Ltd.

### **Reference Books:**

1. Meir Kohn (2013), Financial Institutions and Markets, Oxford University Press.
2. Bhole, L.M., and Mahakud, Jitendra (2009), Financial Institutions and Markets, Tata McGraw-Hill Publishing Company.
3. Frederic S Mishkin (Author), Stanley Eakins (2014), Financial Markets and Institutions, Prentice Hall.
4. Pathak Bharati (2014), Indian Financial System, Dorling Kindersley.

**Note: Latest edition of text books may be used.**

## **BCOM 3117- Services Marketing**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

Objective of this course is to make students familiarize with marketing strategies related to service industry.

### **Course Contents**

#### **Unit I**

**Hours: 11**

**Introduction to Services Marketing:** Services V/S Goods, Meaning and Nature of Services, Characteristics of services, Growing Importance of Services Sector; Classification of Services and its marketing implications; Services Marketing Process

#### **Unit II**

**Hours: 11**

**GAPS Model:** GAPS Model of service quality, Types of GAPS, Consumer Behavior in Services; Role of customers, Customer Expectations and Perceptions of services, The Zone of tolerance; Service Quality (SERVQUAL Model), Customer Satisfaction, Service failures & Service Recovery.

#### **Unit III**

**Hours: 11**

**Services Marketing Mix:** Traditional & expanded mix for services, Service Design – New services development process, Service Blueprinting; Servicescape, People – Role of employees & customers, Distribution of services – Channels, Pricing of services; Integrated Services Communication Mix and promotion of services.

#### **Unit IV**

**Hours: 11**

**Applications of Services Marketing in Select Industries:** Hospitality Services, Airlines, Tourism Services, Health Care and Wellness: Banking and Insurance Services; Management Consultancy. – *(Select cases and minor projects using various concepts of services marketing)*

### Text Books

3. Zeithaml V. A., Bitner M. J. and Pandit, A. (2013), Services Marketing, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Shanker, Ravi, Services Marketing: The Indian Experience, Excel Books, New Delhi

### Reference Books

5. Lovelock C. H., Wirtz, J. and Chatterjee, J. (2010), Service Marketing: People, Technology, Strategy, 6th Edition, Pearson Education, New Delhi.
6. 2. Nargundkar, Rajendra, (2010), Services Marketing Text and Cases, 3rd Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi.

**Note: Latest edition of text books may be used.**

## BCOM 3119- Training and Development

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** This Course aims at educating students on important of training needs and issue of human resource development in organization. The persons involved in updating management skills pose issues of design and delivery and review of training requirements, which also stands the objective of the given course.

### Course Contents

#### Unit I

**Hours: 10**

**The Training Context:** Nature and Scope of Training, Objectives of Training, Training Challenges, Forces Influencing Working and Learning, Role of Training in Organizations, Systematic Approach to Training.

Strategic Training: Models of Training- Faculty, Customer, Matrix, Corporate University and Business

Embedded Model, Snapshots of Training Practices: Training Facts and Figures, Training Investment Leaders etc.

#### Unit II

**Hours: 08**

**Training Needs Analysis:** The Process and Approaches of TNA, Organizational Analysis, Requirements Analysis, Task, Knowledge, Skill, and Ability Analysis, Person Analysis, Team Work for Conducting Training Needs Analysis, TNA and Training Process Design, Output Of TNA, Focus on Small Business.

#### Unit III

**Hours: 14**

**Training Design, Delivery & Evaluation:** Introduction: Training Design, Considerations in Designing Effective Training Programs: Selecting and Preparing the Training Site, Selecting Trainers, Program Design: Learning Environment, Pre-training Communication, Facilitation of Training with Focus on Trainee (Motivation of Trainee, Reinforcement, Goal setting).

**Transfer of Training:** Conditions of Transfer, Facilitation of Transfer with Focus on Organization Intervention (Supervisor Support, Peer Support, Trainer Support, Reward Systems, Climate etc.)

Training Methods, Implementation and Evaluation of Training Programme, Training Aids.

#### **Unit IV**

**Hours: 12**

**Employee Development, Career Management and Future of T & D:** Approaches to Employee Development, The Development Planning Process, Companies Strategies to Provide Development, Types of MDP's, EDP's/Seminars and Conferences, Symposia.

Career Management: Traditional Career vs. Protean Career, Models of Career Development, Problems in Career Development.

#### **Text Books**

1. Goldstein, I.L. & Ford, J.K. (2009). Training in Organizations, Cengage Learning.
2. Blanchard, P. N. & Thacker, W. J. (2008). Effective Training: Systems, Strategies and Practices, Pearson

#### **Reference Books**

1. Raymond Noe, A. (2008). Employees Training and Development, McGraw Hill Publication.
- 2 O'Connor, Browner & Delaney (2003). Training for Organizations, Thompson Learning Press (now Cengage Learning).
3. Lynton Rolf, P. & Pareek, Udai (2000). Training for Organisational Transformation, Sage Publication.
4. Leatherman, D. (2007). The Training Trilogy: Conducting Needs Assessments, Designing Programs, Training Skills, HRD Press.

**Note: Latest edition of text books may be used.**

## BCOM 3121- Industrial Relations and Labour Laws

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** The management of employees, both individually and collectively, remains a central feature of organizational life. This course is an attempt to understand the conceptual and practical aspects of employee relations at the macro and micro levels.

### Course Contents

#### Unit I

**Hours: 11**

**Introduction to Industrial Relations:** concept of Industrial Relations, background to Industrial Relations, Evolution of Industrial Relations in India, Dynamic Context of Industrial Relations: Globalization and the National Economy, Responses to Competitive Pressures, Actors in Employee Relations: Management, Unions and the State. Role of Trade Union in Industrial Relations.

#### Unit II

**Hours: 11**

**Industrial Relations Laws: Trade Union (TU) Act, 1926:** Objective, Central TU Organizations in India, Definitions, Registration of TU's, Certificate of Registration, Minimum Requirement about Registration of a TU, Cancellation of Registration, Appeal, Features of Registered TU, Rights & Liabilities of Registered TU, General Funds, Separate Funds for Political purposes, Immunity from Punishment for Criminal Conspiracy & Civil Suits, Right to Inspect books of TU, Right to Minor's membership of TU. **Industrial Disputes (ID) Act, 1947-I:** Definition, Objective, Types of ID's, Authority, Prohibition of Strikes & Lock-outs, ID Resolution Mechanism, Settlement without State Intervention viz. Collective Bargaining and Voluntary Arbitration, Settlement under the Influence of State, Adjudication in India, Tripartite Bodies at State Level, **The Minimum Wages Act 1948:** Definitions, Fixation & Revision of Min. Wages, Procedure for fixing & revising Min. wages, Safeguard on payment of Min. wages, Rates of Overtime, Wages for worker who works less than normal working day, Wages for two or more classes of work, Min. Time Rate Wage for Piece Rate Work, Amount of Compensation, Malicious or Vexatious Application. **The Payment of Gratuity Act, 1972:** Objective of the Act, Payment of Gratuity viz. Compulsory Insurance of Employer's Liability for Gratuity and Recovery of Gratuity, Cognizance of Offence, Protection of Gratuity against Attachment.

#### Unit III

**Hours: 11**



**Introduction to Labour Legislation: Labour Laws:** Concept, Origin, Objectives and Classification, International Labour Organization: International Labour Organization, The State: Our Constitution. **The Indian IR framework:** The role of the state in Indian IR Regulative and Participative bodies, Indian Constitution and Labour Legislations, Labour Policy, Contemporary Issues in Industrial Relations: Industrial Relations in the emerging scenario, The Future Trends.

#### **Unit IV**

**Hours: 11**

**Laws on Working Conditions: The Factories Act, 1948:** Health, safety and welfare - hours of work - holidays and leave with pay - employment of women and children inspection and regulation. **The Mines Act, 1952:** Definition, Section 3 (a) (b), Inspectors & Certifying Surgeons, Committees, Mining Operations and Management of Mines, Provisions as to Health & Safety, Hours & Limitation of Employment, Leave with Wages. **Child Labour (Prohibition and Regulation Act, 1986):** Objective of the Act, Constitutional Provision, Prohibition of Employment of Children in certain Occupation and Process, Regulation, Judicial View. **The Employees Provident Fund (EPF) Act 1952:** Exempted Establishments, Employee Family Pension Scheme, Employees' Deposit Linked Insurance Scheme, Mode of Recovery of Money due from Employers, Protection against Attachment, Priority of Payment of Contribution over other Debts, Employer not to Reduce Wages etc., Liability in Case of Transfer of Establishment.

#### **Text Books**

1. Subba Rao P - Human Resource Management and Industrial Relations
2. Srivastava, S.C. - Industrial Relations and Labour Laws (English) 6th Revised Edition, Vikas Publishing
3. S.N. Mishra: An Introduction of Labour and Industrial Law.

#### **Reference Books**

1. Monga, M. L. 1983. Industrial Relations and Labour Laws In India, Deep & Deep, Delhi, India.
2. V.V. Giri : Labour Problems in Indian Industry
3. G.C. Hallen : Dynamics of Social Security in India
4. The Indian Factories Act, 1948
5. The Indian Mines Act, 1952
6. The E.P.F. Act, 1952
7. The Maternity Benefit Act, 1961
8. The Payment of Bonus Act, 1965.

9. The Payment of Gratuity Act, 1972.

**Note: Latest edition of text books may be used.**

## **BCOM-3202 PROJECT MANAGEMENT**

**L-4, T-0**

**Credits –4**

**Max Marks: 75**

**Objectives:** The basic objective of this course is to familiarize the students with the various aspects of Projects and key guidelines relevant to project planning, analysis, financing, selection, implementation and review.

### **Course Contents**

#### **UNIT-I**

**Hours: 11**

**Introduction:** Projects, Project Management, Objectives and Importance of Project Management, Tools and Techniques for Project Management, Project Team, Roles and Responsibilities of Project Manager, Determinants of Project Success.

**Project Life Cycle:** Phases of Project Life Cycle, Classification of Projects.

**Project Organizational Structure:** Forms of Organizational Structure - Functional Organization, Project Organization, Matrix Organization.

#### **UNIT-II**

**Hours: 11**

**Technical Analysis:** Factors Considered in Technical Analysis, Factors Affecting Selection of Locations, Need for Considering Alternatives, Technology Selection, Sources of Technology, Appropriate Technology.

**Market Analysis:** Conduct of Market Survey, Characterization of Market, Market Planning (Introductory aspects only).

**Network Techniques:** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (Simple problems only).

#### **UNIT-III**

**Hours: 11**

**Financial Estimates and Projections:** Feasibility Study, Types of Feasibility Study, Steps of Feasibility Study, Importance and Steps of Financial Feasibility, Components of Cost of Project and Its Estimation (Introductory aspects only).

#### **UNIT-IV**

**Hours: 11**

**Project Evaluation and Control:** Project Monitoring and Controlling, Project Evaluation, Post Project Evaluation (Post Audit), Abandonment Analysis.

**Social Cost Benefit Analysis:** Social Cost, Social Benefit.

**Risk Analysis:** Process of Risk Management, Sources of Risk in Project Management, Managing Risk.

**Emerging Concepts and Issues in Project Management:** Role of Information Technology in Project Management, Future of Project Management.

### ***Text Books***

3. Chandra, Prasanna, "Projects: Planning, Analysis, Financing, Implementation and Review", Tata McGraw Hill Publishing Company Limited, 2014.
4. Nagarajan, K., "Project Management", New Age International (P) limited, Publishers, 2015.

### **Reference Books**

1. R. Panneerselvam. R, Senthilkumar. P., "Project Management", PHI Learning, (P) limited, Publishers, 2013.
2. Maheshwari, S.N., "Financial and Management Accounting", Sultan Chand & Sons, 2012.
3. Jeffrey K. Pinto, "Project Management: Achieving Competitive Advantage", Pearson Education, 2012.
4. Desai, Vasant, "Project Management", Himalaya Publishing House, 2013.

**Note: Latest edition of text books may be used.**

## **BCOM-3206 Sales and Distribution Management**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objective:** The course aims to impart the knowledge and skills needed to manage the sales force and distribution functions in a business organization so as to help gain a competitive advantage.

### **Course Contents:**

#### **Unit I**

**Hours: 11**

**Introduction to Sales Management:** Nature, Scope and Importance of Sales Management, Background of Sales Management, Role and Competencies of Sales Managers, Sales Strategies, Emerging Trends in Sales management in context to Indian Market.

**Personal Selling Process:** Importance and challenges, Types of Selling, Transactional and Relationship Selling, Sales Forecasting Methods.

#### **Unit II**

**Hours: 11**

**Sales Force Recruitment and Selection Process:** Sales Force Training, Importance and Role of Training Programmes, Motivation and Compensation of Sales Personnel, Sales Territories and Sales Quotas.

**Role and Importance of Sales Personnel:** Sales Budgets, Sales Audits, Legal and Ethical Issues in Sales Management, Role of Information Technology in Sales Management.

#### **Unit III**

**Hours: 11**

**Distribution Planning and Control:** Functions of Intermediaries; Types and Role of Channel Intermediaries in India for Consumer and Industrial products: Wholesale and Retail Structure, Channel Strategy and Design; Selection, Motivation and Evaluation of Intermediaries; Managing Channel Dynamics, Relationships and Channel Conflict; Ethical and Legal Issues in Sales and Distribution Management in Indian context.

#### **Unit IV**

**Hours: 11**

**Distribution System and Logistics:** Physical Distribution System –Objectives and Decision Areas; Customer Service Goals; Logistics Planning; An overview of Transportation, Warehousing and Inventory Decisions; Efficient Supply Chain Management (SCM); Integration of Sales and Distribution Strategy.

### **Text Books**

5. Still. K.R., Cundiff. E.W & Govoni. N.A.P (2014). Sales Management. Pearson Education, New Delhi.
6. Sahu, P. (2012), Salesmanship and Sales Management, Vikas Publishing House
7. Rosenbloom, Bert (2014) Marketing Channels: A Management View, Cengage Learning, New Delhi.

### **Reference Books**

9. Jobber , David and Lancaster, Geoffery (2012), Selling and Sales Management, Pearson Education, New Delhi
10. Tanner Jr., J.F., Honeycutt Jr., E.D. and Erffmeyer, R.C. (2014), Sales Management:, Pearson Education, New Delhi
11. Panda, T.K. and Sahadev, S (2012) Sales and Distribution Management, Oxford University Press, New Delhi.
12. Havaladar, K K. and Cavale, VM. (2012), Sales and Distribution Management: Text and Cases, Tata McGraw Hill, New Delhi.

**Note: Latest edition of text books may be used.**

## **BCOM 3204 - Entrepreneurship Development**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** It provides exposure to the students to the entrepreneurial cultural and industrial growth so as to prepare them to set up and manage their own small units.

**Note:** *Minimum two case studies to be discussed in the Semester*

### **Course Contents**

#### **Unit I**

**Hours: 12**

**The foundations of Entrepreneurship:** Introduction, The benefits of Entrepreneurship; The potential drawbacks of Entrepreneurship, Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Entrepreneurship and Economic Development; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programmes; Entrepreneurial Training; Traits/Qualities of an Entrepreneurs; Manager Vs. Entrepreneur; The cultural diversity of Entrepreneurship; The power of small business.

## **Unit II**

**Hours: 10**

**Launching Entrepreneurial ventures:** Creativity and innovation, Methods to initiate ventures. Legal challenges in Entrepreneurship ventures; the search for Entrepreneurial capital.

## **Unit III**

**Hours: 12**

**Formulation of the entrepreneurial plan:** Entrepreneurial Opportunity Search and Identification; the assessment functions with opportunities; the marketing aspects of new ventures; Financial statements in new ventures; Business plan preparation for new ventures.

Class Exercise- Building your own Business Plan.

## **Unit IV**

**Hours: 10**

**Strategic Perspectives in Entrepreneurship:** Strategic Growth in Entrepreneurship. The valuation challenge in Entrepreneurship; The final harvest of a new venture.

**Institutions Supporting Small Business Enterprises:** Central level institutions, State level institutions and other agencies. Industry Associations.

## **Text Books**

1. Hisrich, Robert and Peters, Michael, (2012), Entrepreneurship, McGraw Hill Education.
2. Charantimani, (2014), Entrepreneurship Development and Small Business Enterprise, Pearson Education.

## **Reference Books**

1. Balaraju, Theduri, (2012), Entrepreneurship Development: An Analytical Study, Akansha Publishing House.
2. David, Otes, (2014), A Guide to Entrepreneurship, Jaico Books Publishing House, Delhi.
3. Kaulgud, Aruna, (2012), Entrepreneurship Management, Vikas Publishing House, Delhi.
4. Chhabra, T.N. (2014), Entrepreneurship Development, Sun India.

**Note: Latest edition of text books may be used.**

## **BBA 3208: Business Policy & Strategy**

**L-4 T-0**

**Credits-4**

**Max Marks: 75**

**Objectives:** The course aims to acquaint the students with the nature, scope and dimensions of Business Policy and Strategy Management Process.

### **Course Contents**

#### **Unit I**

**Hours: -10**

**Introduction:** Nature, Scope and Importance of Business Policy; Evolution; Forecasting, Long-Range Planning, Strategic Planning and Strategic Management.

**Strategic Management Process:** Formulation Phase – Vision, Mission, Environmental Scanning, Objectives and Strategy; Implementation phase – Strategic Activities, Evaluation and Control.

#### **Unit II**

**Hours: -12**

**Environmental Analysis:** Need, Characteristics and Categorization of Environmental Factors; Approaches to the Environmental Scanning Process – Structural Analysis of Competitive Environment; ETOP a Diagnosis Tool.

**Analysis of Internal Resources:** Strengths and Weakness; Resource Audit; Strategic Advantage Analysis; Value-Chain Approach to Internal Analysis; Methods of Analysis and Diagnosing Corporate Capabilities – Functional Area Profile and Resource Deployment Matrix, Strategic Advantage Profile; SWOT analysis. McKinsey's 7s Framework.

#### **Unit III**

**Hours: -12**

**Formulation of Corporate Strategies:** Approaches to Strategy formation; Major Strategy options – Stability, Growth and Expansion: Concentration, Integration, Diversification, Internationalization, Cooperation and Digitalization, Retrenchment, Combination Strategies.

#### **Unit IV**

**Hours: -10**

**Choice of Business Strategies:** BCG Model; Stop-Light Strategy Model; Directional Policy Matrix (DPM) Model, Product/Market Evolution – Matrix and Profit Impact of Market Strategy (PIMS) Model.

**Major Issues involved in the Implementation of strategy:** Organizational Cultural and Behaviour factors, Organization Structure; Role of Leadership, Resource Allocation.

### **Text Books**

1. Kazmi, Azhar, (2014), Strategic Management and Business Policy, McGraw Hill Education.
2. Ghosh, P. K., (2012), Strategic Planning and Management, Sultan Chand & Sons, New Delhi.

### **Reference Books**

1. Hill, Charls WL and Jones Gareth R. (2011), An Integrated Approach to Strategic Management, Cengage Learning.
2. Walker, Gordon, (2012), Modern Competitive Strategy, McGraw Hill Education.
3. Weelen, (2012), Concepts in Strategic Management and Business Policy, Pearson Education.
4. Fred, David, (2011), Strategic Management: Concepts and Cases, Prentice hall of India

### **BCOM 003- Research Project and Viva Voce**

*L-0 T-0*

*Credits-6*

*Max Marks: 100*

During the sixth semester each student shall undertake a project to be pursued by him / her under the supervision of an Internal Supervisor to be appointed by the Director / Principal. The project should preferably be based on primary data. Both the subject and the name of the Supervisor will be approved by the Director / Principal of the Institution. The Project Report in duplicate along with one soft copy in a CD/DVD will be submitted at least three weeks prior to the commencement of the End Term Examination of the Sixth Semester. Project Report shall carry 100 marks. It shall be evaluated for 50 marks by an External Examiner to be appointed by the University and for the rest of the 50 marks by an Internal Examiner to be appointed by the Director / Principal of the Institution.

## **BCOM 3212- Introduction to Derivatives**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** This course is designed to help the students in understanding the concepts of equity derivatives, products and their applications as a risk management tool using different trading strategies on stock exchanges.

### **Course Contents**

#### **UNIT I**

**Hours: 11**

**Basics of Derivatives:** Introduction, Meaning of derivatives, types, history, economic significance, Applications of derivatives, Difference between Exchange Traded and OTC Derivatives, Hedgers, Arbitrageurs and Speculators, Derivatives as a risk management tool, Introduction to SWAP.

#### **UNIT II**

**Hours: 11**

**Trading Futures on Stock Exchanges:** Forward contracts, Trading Futures- Pay-off of futures, Theoretical models for future pricing.

#### **UNIT III**

**Hours: 11**

**Trading Options:** Option payouts, Option strategies, Determination of option prices, Factors affecting option prices, Futures and options trading system, Clearing and settlement - Clearing entities, Clearing mechanism, Settlement procedure.

#### **UNIT IV**

**Hours: 11**

**Regulatory Framework and Accounting:** Securities Contracts (Regulation) Act, 1956, Securities and Exchange Board of India Act, 1992, Regulation for Derivatives trading, Guidelines of SEBI and RBI, Recent Developments in derivatives market.

### **Text Books**



1. Chance Don M. (2013), An Introduction to Derivatives and Risk Management, Cengage Learning.
2. Hull C. John, (2013), Options, Futures and Other Derivatives, Pearson Educations.

### **Reference Books**

1. Chance Don M. and Roberts Brooks (2015), Introduction to Derivatives and Risk Management, Cengage Learning.
2. Ross Andrew A. (2015), Introduction to Derivative Markets, CreateSpace Independent Publishing Platform.
3. Choudhry Moorad (2012), An Introduction to Credit Derivatives, Butterworth-Heinemann Ltd.
4. Jarrow Robert A. and Chatterjea Arkadev (2013), Introduction to Derivative Securities Financial Markets, and Risk Management, W. W. Norton & Company.

**Note: Latest edition of text books may be used.**

## **BCOM 3214- Principles of Insurance**

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** To make students conversant with the basic concepts and fundamentals of General and Life Insurance for enabling them to be aware of various types of insurance in Life & Non life sector including practices involved.

### **COURSE CONTENT**

#### **UNIT I**

**Hours: 10**

Concept of Risk, Types of Risk, Risk Management Transfer and Pooling of Risks, Concept of Insurable Risk.

#### **UNIT II**

**Hours: 12**

Concept of Insurance, Relevance of Insurance to the Emerging Socio-Economic Needs of all the Sections of Society including Industrial Sector, Types of Insurance Organisations, Insurance Business, Intermediaries in Insurance Business.

#### **UNIT III**

**Hours: 10**

Formation of Insurance Contract, Life, Fire, Marine and Motor Insurance Contracts, Principles of Insurance: Utmost Good Faith, Indemnity, Insurable Interest.

#### UNIT IV

**Hours: 12**

Classification of Insurance : Life, Non-Life ( general), Health, Pension, Social Security and Retirement Benefits.

#### Text Books

1. Murthy. A., (2012), Principles and Practices of Insurance, Margham Publications.
2. William, F. Gephart, (2013), Principles of Insurance, Hardpress Publishing.

#### Reference Books

1. Gulati, Neelam C. (2012), Banking and Insurance: Principles and Practices, Excel Books.
2. Rastogi, Sachin. (2014), Insurance Law And Principles, Lexis Nexis India.
3. Murthy, K S N and Sarma, K V S. (2014), Modern Law of Insurance, Lexis Nexis India.
4. Mathew, M.J. (2012), Insurance Principles & Practices, Neha Publishers & Distributors.

**Note: Latest edition of text books may be used.**

### BCOM 3216- Advertising and Brand Management

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** To familiarize students with advertising and brand management principles.

#### COURSE CONTENTS

##### Unit I

**Hours: 11**

Definition, Nature and evolution of advertising, its functions and role, criticism, social, economic and legal aspects of advertising, Place of advertising in Marketing Mix, Indian advertising industry, copy writing.

##### Unit II

**Hours: 11**

**Advertising media:** different types of media, function, merits and demerits of media, selection of media and its vehicles; Advertising budget: Objectives, preparation and methods of advertising budget; advertising agency: function, selection and compensation.

##### Unit III:

**Hours: 11**

**Brand-concept:** Nature and Importance of Brand; Types of brands , Strategic Brand Management Process;, Brand Identity perspectives, Concepts and Measures of Brand Equity,

Brand Loyalty, Measures of Loyalty, Branding strategies – product ,line , range and umbrella branding.

## Unit IV

**Hours: 11**

**Brand Positioning:** Concepts and Definitions, 3 Cs of positioning, Brand positioning and differentiation strategies, Repositioning, Celebrity Endorsements, Brand Extension; Managing brands over time, Brand reinforcement, brand revitalization, managing global brands, Branding in different sectors.

### Text Books

1. Belch, G. E., Belch, M. A. and Purani Keyoor (2013), Advertising and Promotion, McGraw Hill Education.
2. Jethwaney Jaishri, Jain Shruti (2012), Advertising Management, Oxford University.

### Reference Books

1. Kelley Larry, Sheehan Kim, Jegenheimer Donald W. (2015), Advertising Media Planning, Routledge.
2. Moriarty Sandra, Mitchell Nancy D., Wells William D, (2014), Advertising & IMC: Principles and Practice, Pearson Education.
3. O'Guinn Thomas C., Allen Chris T., Semenik Richard J. (2011), Advertising and Integrated Brand Promotion, South-Western.
4. Larry Percy, Richard Rosenbaum-Elliott (Author) (2012), Strategic Advertising Management, Oxford University Press.

**Note: Latest edition of text books may be used.**

## BACHELOR OF COMMERCE (Hons.)

### BCOM 3218- Customer Relationship Management

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** The objective of this course is to enable the students to understand the importance of satisfying the customer in today's competitive world.

### COURSE CONTENTS

#### Unit I

**Hours: 9**

**Introduction to CRM:** Definition and concepts of CRM, Components of CRM, Understanding the goal of CRM and Customer Touch Points.

## **Unit II**

**Hours: 13**

**CRM Process:** Introduction and Objectives of a CRM Process; an Insight into CRM and e- CRM/online CRM, The CRM cycle i.e. Assessment Phase; Planning Phase; The Executive Phase; Modules in CRM, 4C's (Elements) of CRM Process, CRM Process for Marketing Organization, CRM Affiliation in Retailing Sector.

## **Unit III**

**Hours: 9**

**Developing CRM Strategy:** Role of CRM in business strategy, Managing Customer communications, ECRM- Meaning and Features, Differences between CRM and ECRM.

## **Unit IV**

**Hours: 13**

**CRM Implementation:** Choosing the right CRM Solution; Framework for Implementing CRM: a Step-by-Step Process: Five Phases of CRM Projects; Development of Customizations; Beta Test and Data Import; Train and Retain; Roll out and System Hand-off; Support.

## **Text Books**

1. Ed Peelen, and Beltman Rob (2013), Customer Relationship Management, Pearson Education India.
2. Francis Buttle, (2015), Customer Relationship Management, Routledge.

## **Reference Books**

1. Anton Jon, Petouhoff Natalie L., and Kalia Shalini (2013), Customer Relationship Management, Pearson Education.
2. Paul Greenberg, (2010), CRM at the Speed of Light, TMH.
3. Bhasin, Jaspreet Kaur (2012), Customer Relationship Management, Dreamtech Press.
4. Kumar V. and Reinartz Werner (2012), Customer Relationship Management, Springer.

**Note: Latest edition of text books may be used.**

## BCOM 3220- Compensation Management

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objective:** The objective of this paper is to enable the students to design and administer a compensation system that rewards employees fairly while stimulating them to provide goods and services that satisfy customer demands and permitting the organisation to operate profitably.

### COURSE CONTENTS

#### Unit –I

**Hours: 11**

**Compensation Management:** Concept, principles and practices; Compensation & Organizational strategy; Monetary & Non-Monetary Rewards, Intrinsic Rewards Cafeteria Style Compensation; Foundations of Compensation: Job evaluation – Job grading and Job design; Theories of Compensation; Compensation in a knowledge based world.

#### Unit –II

**Hours: 11**

**Compensation Strategy and Policy:** Developing Strategic Compensation alternatives; Issues in compensation management; Executive Compensation; Components of Compensation: D.A. Incentives Plans; Profit Sharing Schemes; Fringe, benefits & retirement benefits; Tax Efficient Compensation Package, VRS; Internal and External Equity in Reward Management.

#### Unit –III

**Hours: 11**

**Payroll Accounting:** Tax planning; Tax Implications of Employee Compensation Package to the Employer; Team compensation; Role of pay commissions; International compensation management; components & approaches.

#### Unit – IV

**Hours: 11**

**Compensation Laws:** Payment of Minimum Wages Act. and Workmen's Compensation Act.

#### Text Books:

1. Armstrong, Michael (2012) Reward Management Practice, Improving Performance Through Reward, Kogan Page.

2. Milkovich George T., Newman Jerry and Gerhart Barry (2013), Compensation, McGraw-Hill Higher Education.

### Reference Books:

1. Henderson, Richard I., (2013), Compensation Management in a Knowledge Based world, Cram101.
  2. Martocchio Joseph J. (2015), Strategic Compensation: A Human Resource Management Approach, Pearson.
  3. Biswas Bashker D. (2012), Compensation and Benefit Design, Pearson.
  4. Goel Dewakar (2012), Performance Appraisal and Compensation Management, Prentice Hall India.
- Note: Latest edition of text books may be used.**

## BACHELOR OF COMMERCE (Hons.)

### BCOM 3222- Organizational Development

*L-4 T/P-0*

*Credits-4*

*Max Marks: 75*

**Objectives:** For the organization to survive and remain effective with the changing environment, it must develop effective strategies for renewal. The course aims at acquainting the students with theory and practice of planned change, organizational renewal and development.

### Course Contents

#### Unit I

**Hours: 10**

**Introduction to Organizational Development:** Definition, Nature and Characteristics of Organization Development, Managing the Organization Development Process, Theories of Planned Change, Goals, Values and Assumptions of OD, Role and Competencies of the OD practitioner.

#### Unit II

**Hours: 12**

**The Diagnostic Process and Introduction to OD Interventions:** Diagnosis at the Organization,

Group and Individual Level, Data Collection Process, Diagnostic Methods, Challenges in Diagnosis, Diagnostic Information Feedback: Characteristics of Effective Feedback, Survey Feedback.

Characteristics of Effective Interventions, Designing Interventions, The Intervention Process.

#### Unit III

**Hours: 12**

**Human Process and HRM Intervention:** Sensitivity Training, Process Consultation, Third-Party Interventions, Team Building, Organization Confrontation Meeting, Intergroup Relations Interventions, Large Group Interventions: Grid OD; System 4 Management; Role Playing, Employee Empowerment, Performance Management Systems, Employee Wellness Interventions, Career Planning, Goal Setting, MBO.

#### **Unit IV**

**Hours: 10**

**Techno Structural and Strategic Interventions:** Restructuring Organizations, Job Enrichment, Socio-technical Systems, TQM and Quality Circles, Culture Change, Self –Designing Organizations, Learning Organizations, Challenges and Future for the Organization, Future trends in OD, Ethical Issues in Organizational Development.

#### **Text Books**

1. Cummings, T.G. & Worley, C.G. (2009). Organizational Development and Change. Cengage Learning.
2. French, W., Cecil, H. Bell & Jr. (2007). Organizational Development. Pearson

#### **Reference Books**

1. Brown, D.R. & Harvey, D. (2006). An Experiential Approach to Organization Development. Perason Education.
2. Jones, G. R. (2008). Organizational Design and Change. Pearson Education.
3. Srivastava, B. (2009). Organizational Design and Development- Concepts and Applications. Biztantra
4. Edward.D.H. (2007). The Road to Organic Growth”, Tata McGraw Hill.

## Scheme for MBA (MANAGEMENT AND COMMERCE)

MBA			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA101A	Management Concepts and Applications	3	0	0	3
2	BA102A	Managerial Economics	4	0	0	4
3	BA103A	Accounting for Managers	3	0	0	3
4	BA123A	Organizational Behavior	3	0	0	3
5	BA121A	Production and Operations Management	3	0	0	3
6	MA-106A	Quantitative Analysis	6	0	0	6
7	CS-111A	IT for Managers	3	0	0	3
8	EN472A	Advanced Business Communication	3	0	0	3
<b>PRACTICAL</b>						
1	CS-151A	IT LAB	0	0	2	1
2	PD-193A	PDP	0	1	0	1
3	BA-264A	Managerial Skills	0	0	2	1
4	PD191A	Hobby Club	0	1	0	1
5	BA-001A	Minor Project	2	0	0	2
<b>Total</b>			<b>30</b>	<b>2</b>	<b>4</b>	<b>34</b>

MBA			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA 107A	Financial Management	3	0	0	3
2	BA 111A	Marketing Management	3	0	0	3
3	BA131A	Business Legislation	3	0	0	3
4	CS121A	MIS and Data Management	3	0	0	3
5	BA271A	Human Resource Management	3	0	0	3
6	BA133A	Business Research Method	3	0	0	3
7	BA 135A	Corporate Governance and CSR	3	0	0	3
8	BA134A	Supply Chain Management	3	0	0	3
<b>PRACTICAL</b>						
1	PD-196A	PERSONALITY SKILLS	0	1	0	1
<b>Total</b>			<b>24</b>	<b>1</b>	<b>0</b>	<b>25</b>



MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-201A	Strategic Management	3	0	0	3
2	BA-202A	Operations Research	3	0	0	3
3	BA-120A	International Business	3	0	0	3
4		Specialization Elective 1 (Major)	3	0	0	3
5		Specialization Elective 2 (Major)	3	0	0	3
6		Specialization Elective 3 (Major)	3	0	0	3
7		Specialization Elective 1 (Major)	3	0	0	3
8		Specialization Elective 2 (Major)	3	0	0	3
9		Specializations Elective 3 (Major)	3	0	0	3
<b>PRACTICAL</b>						
1	PD 393A	Advance Professional Skills	0	1	0	1
2	BA-264A	Managerial Skills	0	0	2	1
3	BA-252A	Summer Training	0	0	8	4
4	PDA291A	Extra/Co-Curricular Activities	0	1	0	1
		<b>Total</b>	<b>27</b>	<b>2</b>	<b>10</b>	<b>34</b>

MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EN-214A	Managerial Communication	3	0	0	3
2	BA212A	E-Commerce	3	0	0	3
3		Specialization Elective 1 (Major)	3	0	0	3
4		Specialization Elective 2 (Major)	3	0	0	3
5		Specialization Elective 3 (Major)	3	0	0	3
6		Specialization Elective 1 (Major)	3	0	0	3
7		Specialization Elective 2 (Major)	3	0	0	3
8		Specialization Elective 3 (Major)	3	0	0	3
<b>PRACTICAL</b>						
1	PD392A	Problem Solving Skills	0	1	0	1
2	BA264A	Managerial Skills	0	0	2	1
3	BA-256A	Dissertation	0	0	16	8
4	PDA291A	Extra/Co-Curricular Activities	0	1	0	1
		<b>Total</b>	<b>24</b>	<b>2</b>	<b>18</b>	<b>35</b>

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS (HUMAN RESOURCE MANGEMENT):**

**Third Semester**

MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA305A	Performance Management	3	0	0	3
2	BA306A	Training and Development	3	0	0	3
3	BA307A	Organizational Change and Development	3	0	0	3
4	BA308A	Compensation Management	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**Fourth Semester**

MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA405A	Talent Management	3	0	0	3
2	BA406A	Industrial Relations and Labor Legislations	3	0	0	3
3	BA407A	Strategic Human Resource Management	3	0	0	3
4	BA408A	Cross Cultural Human Resource Management	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS (FINANCE):**

**Third Semester**

MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA309A	Management of Financial Services and Institutions	3	0	0	3
2	BA310A	Project Management and Infrastructure Finance	3	0	0	3
3	BA311A	Strategic Cost Management and Control	3	0	0	3
4	BA312A	Multinational Financial Management	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**Fourth Semester**

MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA409A	Taxation Laws and Planning	3	0	0	3
2	BA410A	Management of Banking and Insurance	3	0	0	3
3	BA411A	Security Analysis and Portfolio Management	3	0	0	3
4	BA412A	Financial Derivatives	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS (INTERNATIONAL BUSINESS):**

**Third Semester**

MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA317A	Foreign Exchange Management	3	0	0	3
2	BA318A	International Marketing	3	0	0	3
3	BA319A	Multinational Banking	3	0	0	3
4	BA320A	International Trade Theory and Practice	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**Fourth Semester**

MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA417A	Global Strategic Management	3	0	0	3
2	BA418A	International Financial Management	3	0	0	3
3	BA419A	International Logistics	3	0	0	3
4	BA420A	International Accounting	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**SPECIALISATION OFFERED IN 3<sup>RD</sup> AND 4<sup>TH</sup> SEMESTERS (MARKETING):**

**Third Semester**

MBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA321A	Brand Management	3	0	0	3
2	BA322A	Integrated Marketing Communication	3	0	0	3
3	BA323A	Service Marketing	3	0	0	3
4	BA324A	Consumer Behavior	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**Fourth Semester**

MBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA421A	Customer Relationship Management	3	0	0	3
2	BA422A	Advertising Management	3	0	0	3
3	BA423A	Retail Management	3	0	0	3
4	BA424A	Sales & Distribution Management	3	0	0	3
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**Course No: MBA101    Subject: MANAGEMENT CONCEPT AND APPLICATION    Credit: 03**

### **Objectives**

The course aims at providing fundamental knowledge and exposure to the concepts, theories and practices in the field of management

### **Outcomes:**

At the completion of the course the students will be able to integrate management principles into management practices. It will also help them to evaluate the global context for taking managerial actions of planning, organizing and controlling.

### **UNIT-1**

Management – Meaning, Nature, Management practices from past to present, Different levels of management, Managerial Skills, Roles & Functions, Manager and Business environment.

### **UNIT-2**

Planning- Objective of planning, Planning process, Types of planning, Types of plans, Management by Objectives, Decision-making- Types, Process & Techniques, Effective decision making.

### **UNIT-3**

Organizing & Staffing- Meaning of organization, Types of organization, Organization structure, Span of management, Line and staff relationship, Departmentation, Delegation, Centralization and Decentralization of authority, Meaning of staffing – Nature & Importance

### **UNIT-4**

Directing & Controlling- Principle of directing, Essence of coordination, Basic control process, Different control techniques, Management by exception

### **UNIT-5**

International Perspective: Contemporary issues and international perspective of management, Benchmarking, TQM, 5S

### **Reference Books:**

1. Koontz Harold & Weihrich Heinz – Essentials of management (Tata McGraw Hill, 5<sup>th</sup> Edition, 2008)
2. Robbins & Coulter - Management (Prentice Hall of India, 9th Edition)
3. Robbins S.P. and Decenzo David A. - Fundamentals of Management: Essential. Concepts and Applications Pearson Education, 6th Edition.

1. L. M. Prasad- Principles and Practices of Management, Sulatn Chand & Sons, 7<sup>th</sup> edition, 2007.

MBA-201	STRATEGIC MANAGEMENT & ANALYSIS
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## OBJECTIVES

To develop a holistic perspective of an organization and to enable the students to analyze the strategic situation facing the organization, to access strategic options available to the organization and to implement the strategic choices made by it.

**UNIT I. INTRODUCTION:** Concept of Strategy & Strategic Management; Strategic Management Model, Benefits; Levels of Strategy, Role of Board of Directors/CEO, **Strategy Formulation-** The Business Mission & Vision, **The External Assessment-** Social, Economic, Political, Governmental, Legal. Technological. Competitive Environment; Competitive Analysis- Porter's Five force Model, The Internal Assessment; Industry Analysis- The External Factor Evaluation (EFE) Matrix, The Competitive Profile Matrix (CPM).

**UNIT II. THE INTERNAL ASSESSMENT:** The Nature of an Internal Audit, The Resource-Based View (RBV), Integrating Strategy and Culture, Functional Assessment- Marketing, Finance/Accounting, Production, Research & Development; Value Chain Analysis, The Internal Factor Evaluation (IFE) Matrix.

**UNIT III. STRATEGIES IN ACTION :**Long-Term Objectives; The Balanced Scorecard; Types of Strategies- Integration Strategies, Intensive Strategies, Diversification Strategies, Defensive Strategies, Michael Porter's Five Generic Strategies; Means for Achieving Strategies.

**UNIT IV. STRATEGY ANALYSIS AND CHOICE:** The Process of Generating and Selecting Strategies, A Comprehensive Strategy-Formulation Framework- The Input Stage, The Matching Stage- The SWOT Matrix, SPACE Matrix, BCG) Matrix, IE Matrix 188 & The Grand Strategy Matrix ; The Decision Stage- The Quantitative Strategic Planning Matrix (QSPM).

**UNIT V. STRATEGY IMPLEMENTATION & EVALUATION:** Implementing Strategies: Management and Operations Issues- Resource Allocation, Structure, Restructuring, Reengineering, and E-Engineering, Managing Change etc.; Functional Issues- Strategies: Marketing, Finance/ Accounting, R&D, and MIS Issues; Strategy Review, Evaluation, and Control- Overview, Global Issues.

#### REFERENCE BOOKS

1. David R. Fred, "Strategic Management- Concept & Cases", 13<sup>th</sup> Ed. Pearson Education, Inc., Prentice Hall.
2. Michael Hitt, R. Duane Ireland, Robert E. Hoskisson, "Strategic Mgt. Competitiveness & Globalisation", South - Western Thomson Learning.
3. Kazmi, Azhar, Business Policy and Strategic Management, Tata McGraw Hill Publishing Company Ltd. New Delhi
4. V.S.P. Rao, "Strategic Management", Excel Books, New Delhi.

<b>MBA-203</b>	<b>FINANCIAL MARKETS</b>
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#### OBJECTIVE

To give the students an insight into the principles, operational policies and practices of the prominent Financial Markets and Institutions, their structure and functioning in the changing economic scenario, and to make critical appraisal of the working of the specific financial institutions of India.

**UNIT I.INTRODUCTION:**Meaning of financial markets, Types of Markets: Equity, Debt, Derivatives, Commodities; meaning and features of Private Public companies, Types of investment avenues; Government Securities Market: Indian debt market,Primary market; Secondary market-NDS; NDS-OM; CCILWholesaledebt market (WDM) segment of NSE



**UNIT II.PRIMARY MARKET:** Initial Public Offer (IPO); Book Building through Online IPO; Eligibility to issue securities; Pricing of Issues; Fixed versus Book Building issues; allotment of Shares; Basis of Allotment; Private Placement

**UNIT III. SECONDARY MARKET:** Role and functions of Securities and Exchange Board of India (SEBI); Depositories; Stock exchanges; Intermediaries in the Indian stock market; Listing Membership; Trading Clearing and settlement and risk management; Investor protection fund (IPF); and Do's and Don'ts for investors, Equity and debt investment

**UNIT IV.DERIVATIVES:** Types of derivatives; Products, Participants and functions; Trading mechanism; Membership; Contract specification; Clearing & Settlement; Open interest; Implied interest rate; Implied volatility; Debt derivatives.

**UNIT V. CONSUMER OPINION & LEARNING:** Diffusion Of Innovations; Diffusion Process; Reaching The Consumer; Gaining Consumer's Attention; Shaping Consumer's Opinion; Opinions Change; Product's And Advertising's Role In Shaping Consumer Opinion; Cognitive Learning; Retrieval Of Information; Company's Role In Helping Consumers To Remember.

#### REFERENCE BOOKS

1. Blackwell, Roger, Miniard, Paul and Engel, James, "Consumer Behaviour", Thomson Learning, New Delhi
2. Solomon, Michael R, "Consumer Behaviour – Buying Having and Being", Pearson Education; New Delhi
3. Schiffman, Leon G. and Kanuk, Leslie Lazar, "Consumer Behaviour", Pearson Education; New Delhi
4. Loudon, David J. and DellaBitta, Albert, "Consumer Behaviour" Tata McGraw Hill, New Delhi.

**OBJECTIVES**

The objective of this paper is to impart knowledge about various stages and concepts of the research processes and their application in decision making.

**UNIT I. INTRODUCTION:** Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Process, Criteria of Good Research. Constructs, Research Problem, Variables; Research Questions and Hypothesis.

**UNIT II. RESEARCH DESIGN** – concept and types – exploratory, descriptive, diagnostic and experimental; sampling design; techniques, factors influencing sample size, measurement – concept, measurement scales – types and construction of scales and reliability and validity aspects in measurement.

**UNIT III. METHODS OF DATA COLLECTION** – questionnaire/schedule; questionnaire designing, interview and observational methods; data processing- editing, coding, content analysis and tabulation, Type I and Type II errors, Null Hypothesis- Alternative Hypothesis.

**UNIT IV. STATISTICAL TOOLS**-Descriptive Statistics: Measurement Scales, Sources of error in measurement. Measures of central Tendency (Mean, median, Mode), Measures of dispersion (range, mean deviation, standard deviation) Graphical representation of Data. .

Inferential statistics: Correlations, Concept of Variance. Other methods of Correlation (Concept and application only)- Partial and Multiple correlation, Regression and Multiple Regression equations (concept and applications) b. Sampling Distribution,

**UNIT V. ANALYSIS & REPORT WRITING**- Testing the Significance of difference between means (z and 't' test); ANOVA and ANCOVA- concept and applications only; Factor Analysis -concept and applications. Non Parametric Statistics: Sign Test, man- Whitney u Test, Chi Square test- steps, Characteristics and applications.

**Writing Research Report:** Format and style, Major findings, Conclusions and suggestions. Citation of references, Bibliography and Plagiarism.

**REFERENCE BOOKS**

1. Zikmund, Millian G., Business Research Methods , Thomson Learning , Bombay
2. Cooper, Donald R- and Pamela Schindler, Business Research Methods , Tata McGraw Hills, New Delhi

3. Geode, Millian J. & Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi
4. Sekran, Uma, Business Research Method, Miley Education, Singapore
5. Kothari, C.R., Research Methodology

<b>MBA-202</b>	<b>ENTREPRENEURSHIP</b>
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#### **OBJECTIVE**

To provide the basics conceptual framework on entrepreneurship development and management of business enterprise.

**UNIT-I-INTRODUCTION:** Definition of entrepreneur, Schumpeter's views, characteristics and types, difference between manager and entrepreneur, functions of an entrepreneur, entrepreneurial process, Entrepreneurial motivation, Internal and External Factors affecting entrepreneurship, Barriersto entrepreneurship, Intrapreneurship.

**UNIT-II-ENTREPRENEURSHIP DEVELOPMENT:** Meaning of entrepreneurship development, objectives, entrepreneurship development cycle, entrepreneurial developmentmodel, phases of training. **Institutes engaged in EDPs** –NIESBUD, SIDO, SSIDCs etc.

**UNIT-III SMALL AND MEDIUM ENTERPRISES:** Definition, types, characteristics and problems, growth and role of SMEs in India, incentives and subsidies by government for MSME; Industrial sickness – Causes, Prevention and Remedies; Technological up-gradation.

**UNIT-IVPROJECT FINANCING:** Capital structure, sources of funds, Venturecapital, financial institutions – SIDBI, IFCI; Family entrepreneurship, Women entrepreneurship, Internationalentrepreneurship, Social entrepreneurship, Agripreneurship.

**UNIT-VFUNCTIONAL PLANS:**Marketing research for the new venture, steps in preparing marketing plan, contingency planning, designing organizational structure, Job design, manpower planning, **Legal issues:** Intellectual property rights, patents, trademarks, copy rights, trade secrets, licensing, franchising

#### REFERENCE BOOKS

1. Holt. (1998), Entrepreneurship: New Venture Creation, Prentice-Hall, New Delhi.
2. Charantimath, P.(2009),Entrepreneurship Development Small Business Enterprises , Pearson Education, New Delhi.
3. Sahai, S. and Lall, M., (2008), Entrepreneurship, Excel Books, New Delhi.
4. Drucker, Peter F.(2009), Innovation & Entrepreneurship, Elsevier India Pvt. Ltd.

<b>MBA-204</b>	<b>CORPORATE SOCIAL RESPONSIBILITY AND GOVERNANCE</b>
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#### OBJECTIVE

The objective of the course is to share the concepts and knowledge related to the changes of the economic processes and its implications on the organizations. The expected impact of the course is to improve the awareness of the students for their professional choices.

**UNIT I. INTRODUCTION:** Meaning & Definition of CSR, History & evolution of CSR. Concept of Charity, Corporate philanthropy, Corporate Citizenship, CSR-an overlapping concept. Concept of sustainability & Stakeholder Management. CSR through triple bottom line and Sustainable Business; relation between CSR and Corporate governance; environmental aspect of CSR; Chronological evolution of CSR in India; models of CSR in India, Carroll's model; drivers of CSR; major codes on CSR; CSR Initiatives in India.

**UNIT II.** CSR-Legislation in India & the world. Section 135 of Companies Act 2013 regarding CSR activities. Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and Computation of Net Profit's, Implementation Process of CSR in India.

**UNIT III.** The Drivers of CSR in India, Market based pressure and incentives, civil society pressure, the regulatory environment in India, Counter trends of CSR. Performance in major business and programs. Voluntarism Judicial activism.

**UNIT IV. Corporate Governance:** Definition—Historical perspective of corporate governance and Issues in corporate governance—Theoretical basis of corporate governance—mechanism- corporate governance systems—Indian model of governance –What is good corporate governance—obligations towards society and stake holders. Theories underlying Corporate Governance (Stake holder's theory and Stewardship theory, Agency theory, Separation of ownership and control, corporate Governance Mechanism: Anglo-American Model, German Model, Japanese Model, Indian Model, OECD, emphasis on Corporate governance, Ethics and Governance, Process and Corporate Governance (Transparency Accountability and Empowerment).

**UNIT V.** Ethical decision making: Decision making (Normal Dilemmas and Problems): Application of Ethical theories in Business (i) Utilitarianism (J.Bentham and J.S. Mill), (ii) Deontology (I. Kant) Virtue Ethics (Aristotle). Economic Justice: Distributive Justice, John Rawls Libertarian Justice (Robert Nozick) Ethical Issues in Functional Areas of Business.

**Marketing:** Characteristics of Free and Perfect competitive market, Monopoly oligopoly, Ethics in Advertising (Truth in Advertising). **Finance:** Fairness and Efficiency in Financial Market, Insider Trading, Green Mail, Golden parachute. **HR:** Workers Right and Duties: Work place safeties, sexual harassment, whistle Blowing.

#### REFERENCE BOOKS

1. Corporate Social Responsibility: An Ethical Approach - Mark S. Schwartz
2. The World Guide to CSR - Wayne Visser and Nick Tolhurst
3. Innovative CSR by Lelouche, Idowu and Filho
4. Corporate Social Responsibility in India - Sanjay K Agarwal
5. Good Governance Issues and Sustainable Development: The Indian - Ed. R.N. Ghosh, Rony
6. The Quest for Sustainable Business - Wayne Visser; *Cochius; Greenleaf Publishing; 2011* Corporate Governance, Mallin, Oxford

## OBJECTIVE

The objective of the course is to acquaint the students with the overview of business related project management.

**UNIT I. Project Management:** Introduction, Need for Project Management, Project Management Knowledge Areas and Processes, The Project Life Cycle, Phases of Project Management Life Cycle, Project Management Processes, Impact of Delays in Project Completions, Essentials of Project Management, Project Management Principles.

**UNIT II. Project Identification and Selection:** Introduction, Project Identification Process, Project Initiation, Pre-Feasibility Study, Feasibility Studies, Project Break-even point  
Project Planning: Introduction, Project Planning, Need of Project Planning, Responsibility and Team Work, Project Planning Process, Work Breakdown Structure (WBS)

**UNIT III. Resources Considerations in Projects:** Introduction, Resource Allocation, Scheduling, Project Cost Estimate and Budgets, Cost Forecasts

**Project Risk Management:** Introduction of Risk and risk Management, Role of Risk Management in Overall Project Management, Steps in Risk Management, Risk identification, Risk Analysis, Reducing Risks

**UNIT IV. Project Performance Measurement and Evaluation:** Performance Measurement, Productivity, Project Performance Evaluation, Benefits and Challenges of Performance Measurement and Evaluation, Controlling the Projects

**UNIT V. Project Close-out, Termination and Follow-up:** Project completion and handover, Project Close-out, Steps for Closing the Project, Project Termination, Project Follow-up

## REFERENCE BOOKS

1. Greg Horine, Project Management Absolute Beginner's Guide, Pearson Education.
2. Gupta, Rajeev M, Project management PHI.
3. Harvey Maylor, Project Management, 3rd Ed., Person, Education, Delhi.
4. Jeffrey K Pinto, Project Management: Achieving Competitive Advantage, Pearson Education
5. Kalpesh Ashar, Project Management, Vibrant Publishers,
6. Khanna R B, Project Management, PHI
7. Narendra Singh, Project Management and Control, HPH.
8. Panneerselvam., R. and Senthilkumar, P., Project management, PHI
9. Ramakrishna and Kamaraju, Essentials of Project Mangement

**OBJECTIVE**

The primary concern of this course is to develop in depth understanding of the concepts of performance management which is the most critical function and strong determinant of organizational excellence. This course is designed to develop skills essential for designing PMS.

**UNIT I. Performance Management:** Concept and definitions of PM, characteristics, objectives and significance of PM, Performance Management Model, Imperatives of PM, Benefits of PM, and Determinants of Job Performance, Personality and Job Performance: The Five-Factor Model, Elements of effective PM, and Challenges to PM.

**UNIT II. Performance Management System:** Conditions required for successful institutionalization of PMS, PMS- Generic conceptual Model, Responsibilities in PMS, Objectives of PMS, Functions of PMS, Characteristics of Effective PMS, Competency based PMS, Electronic Performance Management.

**UNIT III. Performance Management Implementation:** Bottlenecks in the implementation of PM, Strategies for effective implementation of PM, Factors Affecting Effective use of PM, Operationalizing change through PM, Concept of High-performance Teams, Organizational culture and PM.

**UNIT IV. Performance Management Linked Reward Systems:** Introduction to Reward Management, Reward Management defined, Objectives of Reward Management, Components of Reward system, Linkage of PM to Reward and Compensation Systems, Implications of PM on Organizational Reward System.

**UNIT V. Role of HR Professionals & Ethics in PM:** Role of HR in Improving Organizational Performance, seven sins of HR Professionals, Seven Rules of Excellence for HR Professionals, Ethics in PM, Ethical Performance Management Defined, Principles of Ethical PM, Objectives and Significance of Ethics in PM, Ethical issues and dilemmas in PM, Developing Code of Ethics in PM, Future Implications of Ethics in PM, Performance Management in MNCs.

**REFERENCE BOOKS**

1. Aguinis, Herman, "Performance Management", Pearson Education
2. Sahu, R.K., "Performance Management System", Excel Books, New Delhi
3. Cardy, Robert L, "Performance Management: Concepts, Skills and Exercises", Prentice Hall of India, New Delhi.
4. Kandula, Srinivas R, "Performance Management", Prentice Hall of India, New Delhi

MBA-209

**COMPENSATION MANAGEMENT**

**OBJECTIVE**

The primary concern of this course is to develop in depth understanding of the concepts and issues related to compensation in corporate sector and impart skills in designing, analysis, and restructuring compensation management system, policies and strategies.

**UNIT I. Compensation:** Introduction to Compensation and Rewards; Objective of Compensation and Rewards; Introduction to Framework of Compensation Policy; Labour market characteristics and pay relatives

**UNIT II. Wage Determination & Wage Differential:** Compensation structure and Differentials; Wage Determination Process, Factors Influencing Wage and Salary Structure and Principles of Wage and Salaries Administration; Theory of Wages: Minimum, Fair and Living Wage; Basic Kinds of Wage Plans; Wage Differentials & Elements of a Good Wage Plans; Institutional Mechanisms for Wage Determination; Wage Fixation

**UNIT III. Job Evaluation:** Nature and Objectives of Job Evaluation; Principles and Procedure of Job Evaluation Programs; Job Evaluation Methods; Rewards and Incentives – Objective, Role Importance and Classification

**UNIT IV. Profit Sharing & Benefits:** Cafeteria Style of Compensation; Compensation policy; Fringe Benefits; Benefit Programs; Concepts of Compensation Survey & Methodology; Planning Compensation for Executives & knowledge Workers

**UNIT V. Tax Planning:** Introduction to Tax Planning; Comparative International Compensation; Downsizing; Voluntary Retirement Scheme; Pay Restructuring in Mergers & Acquisition

**REFERENCE BOOKS**



1. Human Resource Management, by L.M Prasad, Sultan Chand & Sons.
2. Personal & Human Resource Management, by P. Subba Rao, Himalaya Publishing House.
3. Human Resource Management, by K. Aswathappa, Tata McGraw Hill Publishing Company Ltd.
4. Bhawdeepsingh & Prem Kumar- Current Trends in HRD: Challenges & Strategies in a changing scenario.
5. Milkovich, George T and Newman J.M., "Compensation", Tata McGraw Hill
6. Martocchio, J.J., "Strategic Compensation", Pearson Education
7. Armstrong, M and Murlis, H, "Reward Management", Kogan Page, UK
8. Henderson, R.O., "Compensation Management", Pearson Education

<b>MBA-211</b>	<b>ORGANIZATIONAL DESIGN</b>
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#### **OBJECTIVE**

The primary concern of this course is twofold: first, to make the student understand the functioning of business organizations; and, second to introduce the basic concepts needed to design, implement and change the organizational structure of business organizations.

**UNIT I. INTRODUCTION:** Organizations and organizational structure, Business organizations: concept and distinctive features, Organizational structure and the parts of the organization

**UNIT II. THE DESIGN PARAMETERS:** Design of individual positions - unskilled positions, Professional positions, corporate culture and organizational design. Design of the superstructure-Departmental (unit) size, grouping criteria. Design of lateral linkages- Planning and control systems, Liaison (linking) Devices; Decentralization- Five types of decentralization

**UNIT III. ORGANIZATION DESIGN IN PRACTICE:** Contingency Factors-Age and size, Environment,

Technology and organization structure

**UNIT IV. STRUCTURAL CONFIGURATIONS:** Bureaucratic structures, Innovation-oriented (organic) structures, organizing the diversified firm

**UNIT V. ORGANIZATIONAL Development & CHANGE:** Types of change, Planned Change, Resistance to change, Organizational Development and Interventions.

#### REFERENCE BOOKS

1. Cummings, Christopher, "Organization Development and Change", Thomson Learning
2. Chandan, Jit.S., "Organizational Behavior", Vikas publishing House Pvt Ltd
3. French, Wendell, Bell, "Organization Development", New Delhi
4. S .K. Bhatia , " Management of Change and Organization Development , "Deep & Deep Publications
5. Jones, G. (2001): *Organizational Theory. Text and Cases*, 3<sup>rd</sup> ed. Prentice Hall.
6. Mintzberg, H. (1983): *Structure in Fives: Designing Effective Organizations*, 1st ed., Prentice-Hall.

**OBJECTIVE**

The course will enable students to apply the theoretical concepts to the current happenings in the industry, thereby enhancing awareness of the challenges that corporations face while operating in the multinational environment and the HR impact of these challenges.

**UNIT I. Global Perspective & Multiculturalism:** Nature of Globalisation; Drivers of Globalisation; Ripple effects of Globalisation; Culture- nature , effects; Multiculturalism; Managing across cultures.

**UNIT II. IHRM:** IHRM- Features, IHRM compared with Domestic HRM, Strategic IHRM, HRM in Cross-Border Mergers and Acquisitions

**UNIT III. IHRM Functions I:** Recent trends in International Staffing, Emerging trends in Training for Competitive Advantage, Issues in Managing Performance in the Global context

**UNIT IV. IHRM Functions II:** Issues in International Compensation, Repatriation and Inpatriation, International Industrial Relations

**UNIT V. Future of IHRM:** Developing and Retaining ‘A’ Players, Workforce Rationalizing, Gender Diversity, Maintaining Competitiveness, Building service-Oriented Organization, Technology Savvy, Organizational Redesign

**REFERENCE BOOKS**

1. International Human Resource Management-P.Subba Rao, Himalya Publishing House
2. International Human Resource Management-S.K.Bhatia, Deep and Deep Publications
3. International Business and Globalisation – John D. Daniels, Jeffrey A. Krug
4. Executive Skills for Global Managers – UpinderDhar and S. Ravishankar
5. Global Business – Avadhani – Himalaya Publication

MBA-210

STRATEGIC HUMAN RESOURCE MANAGEMENT

**OBJECTIVE**

The primary concern of this course is to develop in depth understanding of the strategic role performed by HR in business organizations and to gain insight of the alignment between different HR systems and organizational outcomes.

**UNIT I. INTRODUCTION** – Definition of SHRM and its components, Evolution of SHRM, Objectives of SHRM, Features of SHRM, Difference between Traditional HRM and SHRM, Benefits of a strategic Approach to HRM, Barriers to SHRM. Define -Strategy, Strategic Management and Strategic Management Process.

**UNIT II. MODELS OF SHRM:** Business Oriented Model, Strategic Fit Model, SLAP Model (Strategic labour allocation process). **Levels of Strategy:** Corporate- Level Strategy, Business- Level Strategy and Functional- Level Strategy. **Strategic Management and HRM:** High Involvement Management Model, High Commitment Management model, High Performance Management Model. **Integrating HR with Strategic Management:** Drawing inputs from environment, identifying competitive advantages, formulating strategies, identifying HR strategies, Implementing strategies and Assessment.

**UNIT III. HR DIMENSIONS:** Human Resource Planning and strategic management.

**UNIT IV. IMPLEMENTATION OF SHRM:** Staffing, Training and Development, Performance Management and Feedback.

**UNIT V. GLOBAL PERSPECTIVE:** Global Human Resource Management, Global HRM vs Domestic HRM, Strategic HR Issues in Global Assignments

**REFERENCE BOOKS**

1. Agarwala, Tanuja, "Strategic Human Resource Management", Oxford University Press, New Delhi
2. Mello, Jeffrey A., "Strategic Human Resource Management", Thomson Learning Inc.
3. Greer, Charles, "Strategic Human Resource Management", Pearson Education

<b>MBA-212</b>	<b>CROSS CULTURAL MANAGEMENT</b>
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**OBJECTIVE**

The course seeks to develop a diagnostic and conceptual understanding of the cultural and related behavioral variables in the management of global organization. The primary objective is to develop the notions and frameworks

in developing and understanding the diverse nature, behavior patterns and issues involved in multivariate values and culture systems.

**UNIT I. INTRODUCTION:** Concept of Culture for a Business Context; Brief wrap up of organizational culture & its dimensions; Cultural Background of business stake-holders [managers, employees, shareholders, suppliers, customers and others] – An Analytical frame work

**UNIT II. CULTURE AND GLOBAL MANAGEMENT:** Global Business Scenario and Role of Culture- A Frame work for Analysis; Elements & Processes of Communication across Cultures; Communication Strategy for/ of an Indian MNC and Foreign MNC & High Performance Winning Teams and Cultures; Culture Implications for Team Building

**UNIT III. CROSS CULTURE:** Negotiation ,The Negotiation Process, Decision Making Process, Strategy Formulation & Implementation, Structure & Culture in an Organization Context

**UNIT IV. GLOBAL HUMAN RESOURCE MANAGEMENT:** Staffing and Training for Global Operations– Expatriate - Developing a Global Management Cadre.. Motivating and Leading; Developing the values and behaviours necessary to build high-performance organization personnel [individuals and teams included] – Retention strategies.

**UNIT V. CORPORATE CULTURE:** Diagnosing Organizational Cultures, Designing the Strategy for a Culture Change, Successful Implementation of Culture Change, Measurement of Ongoing Improvement

#### **REFERENCE BOOKS**

1. Holt, David H, "International Management–Text and Cases", Dry Den Press, Thomson Learning, Bombay
2. Peter, J., Dolling, Danice, E. Welch, "International Human Resource Management", Thomson Learning – Excel Books
3. Cullen, "Multinational Management", Thomson Learning Bombay
4. Cashby Franklin, Revitalize Your Corporate Culture: Phi, Delhi
5. Deresky Helen, International Management: Managing Across Borders and Cultures, Phi, Delhi
6. EsennDrlarry, Rchildress John, The Secret Of A Winning Culture: Phi, Delhi

**OBJECTIVE**

- To introduce the fund-based financial services provided by financial companies, their salient features and importance, and their present position in the Indian financial sector.
- To introduce the fee-based financial services provided by financial companies, their salient features and importance, and their present position in the Indian financial sector.

**UNIT I. MUTUAL FUNDS :**Meaning and importance of Financial Services; Meaning, Nature and organization of a mutual fund, types of schemes, calculation of NAV, advantages of investing in a mutual fund; Mutual Funds in India – growth, performance, problems, prospects, regulatory framework.

**UNIT II. HIRE PURCHASE FINANCE & HOUSING FINANCE:** Hire Purchase Finance - meaning, concepts of hire purchase finance, installment credit and consumer credit; sources of finance in India, difference between Hire purchase finance and housing finance.

**Housing Finance** – Need, nature of housing finance, fixed and floating rate home loans; sources of housing finance in India, growth of housing finance in India; Role of National Housing Bank; concept of mortgage and reverse mortgage; housing loans and mortgage loans, types of mortgage loans.

**UNIT III.MERCHANT BANKING:**Merchant Banking – Meaning, nature and functions; merchant banking in India, role in issue management; classification and regulations for merchant bankers by SEBI.

**Stock Broking & Depository Services:**Stock Broking – meaning, types of stockbrokers, sub-brokers; stock broking in India, **e-broking** – meaning, Indian experience

**UNIT IV.DEPOSITORY SERVICES:** meaning, role of depositories and their services, Advantages of depository system; Functioning of depository system; Depositories in India – NSDL & CDSL; Depository participants (DPs) and their role Custodial services - meaning; obligations and responsibilities of custodians; code of conduct.

**UNIT V. MARKETING OF FINANCIAL SERVICES:** Marketing of Financial Services: Definition of marketing; four pillars of marketing (customer orientation, profit, total company effort, social responsibility); selling versus marketing. **Segmentation** – Concept, basis, strategies; Target market selection and market positioning strategies; Pricing Strategy - Role of price in marketing of financial services; pricing strategies; pricing decisions.

**Marketing Mix for Financial Services:** 7 Ps - Product, People, Process, Promotion, Price, Place and Physical evidence (Case study discussions on marketing mix for banks, insurance companies, mutual funds, stock broking firms etc)

#### REFERENCE BOOKS

1. Agarwal O. P. (2005): Environment and Management of Financial Services, Mumbai, Himalaya
2. Batra G. S. (1999): Financial Services: New Innovations, New Delhi, Deep & Deep
3. Bhole L. M. & Mahakud J. (2009): Financial Institutions and Markets: Structure, Growth & Innovations, New Delhi, Tata-McGraw Hill, 5e
4. Khan M. Y. (2004): Financial Services, New Delhi, Tata McGraw-Hill
5. Mantravadi P. (2001): Financial Services, Hyderabad, ICFAI
6. Pezzullo M. N. (1998): Marketing of Financial Services, New Delhi, Macmillan.

<b>MBA-215</b>	<b>SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT</b>
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#### OBJECTIVE

- To provide a theoretical and practical background in the field of investments.
- Designing and managing the bond as well as equity portfolios in the real world.
- Valuing equity and debt instruments.
- Managing the mutual funds.
- Measuring the portfolio performances.

**UNIT I. Investment** – A Conceptual Framework: Investment process, risks of investment and the common mistakes made in investment management

**Investment Environment:** Features and composition of money market and capital market, money market, capital market instruments and financial derivatives

**Risk and Return:** Concepts of risk and return, how risk is measured in terms of standard deviation and variance, the relationship between risk and return

**UNIT II. Fundamental Analysis:** Economy analysis, industry analysis and company analysis, weaknesses of fundamental analysis

**Technical Analysis:** Tools of technical analysis, important chart formations or price patterns and technical indicators

**Efficient Market Hypothesis:** Concept of 'Efficient Market' and its implications for security analysis and portfolio management.

**UNIT III. Behavioral Finance:** Meaning of Behavioral finance, deals with when, how and why psychology influences investment decisions

**Valuation of bonds and shares:** Elements of investment, bond features and prices, call provisions on corporate bonds, convertible bonds and valuation of bonds

**Portfolio Management** – Risks and Returns: Concept of portfolio and portfolio management, concept of risk, types of portfolio management



**UNIT IV. Markowitz Portfolio Selection Model:** Concept of portfolio analysis and diversification of risk. Also discusses Markowitz Model and Efficient Frontier

**Capital Asset Pricing Model (CAPM):** Deals with the assumptions of CAPM and the inputs required for applying CAPM and the limitations of this Model

**Sharpe-The Single Index Model:** Measurement of return on an individual stock, measurement of portfolio return and measurement of individual stock risk

**UNIT V. Factor Models and Arbitrage Pricing Theory:** Arbitrage Pricing Theory and its principles, Comparison of Arbitrage Pricing Theory with the Capital Asset Pricing Model.

**International Portfolio Investments:** Investment avenues for foreign portfolio investors, risks and returns associated with such investment.

**Mutual Fund Operations:** Mutual funds as a key financial intermediary, mobilizing savings and investing them in capital markets.

#### REFERENCE BOOKS

1. Investment Analysis and Portfolio Management by Prasanna Chandra, Tata McGraw Hill.
2. Investment Analysis and Portfolio Management by Railley and Brown, Cengage Learning.
3. Investments by Bodie, Kane, Marcus and Mohanty, Tata McGraw Hill.
4. Security Analysis and Portfolio Management by Fisher and Jordan, Prentice Hall India

<b>MBA-217</b>	<b>BANKING OPERATIONS MANAGEMENT</b>
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#### OBJECTIVE

To enable the students to get acquainted with banking procedures and operations necessary for running business enterprise.

**UNIT I. EVOLUTION OF BANKING:** Bank nationalization: Justification and Impact. Banker - Customer Relationship : Definition and Meaning of “Banker” and “Customer”- Permitted activities of Commercial Banks in India - General and Special Features of their relationship, their rights and duties. Credit creation by commercial banks.

**UNIT II. OPERATIONAL ASPECT OF COMMERCIAL BANKS IN INDIA.** Types of customer a/c, Cheques, Endorsement, Presentment, Dishonour, Rights and liabilities of Paying and collecting Banker, Employment of funds by Commercial Banks, Types of securities, mode of creating charge, Bank guarantees,

**UNIT III. BANKING INSTRUMENTS:** Definitions of Negotiable Instruments [NI] - Different Types of NIs and Other Instruments - Parties to NIs - Crossing - Endorsements - Payment and Collection of Cheques - Forged Instruments - Bouncing of Cheques and their implications - Regulatory Environment for commercial bank in Indian core banking, Customers’ passbook – nature and importance.

**UNIT IV. BANKING ANCILLARY SERVICES,** Ombudsman and Customer Services - Fraud Detection and Control, Asset–liability management in commercial Banks.

**UNIT V. BASEL NORMS:** Introduction of Basel norms, Basel I norms, Basel II norms, Basel III norms, Tier 1 capital, Tier 2 capital, capital conservation buffer, Provisioning for NPA.

**REFERENCE BOOKS**

1. Banking Law & Practice, by P.N. Varshney.
2. Banking Operations Management by BimalJaiswal
3. Banking Theory & Practice by M.L.Jhinghan
4. Practice & Law of Banking, by H.R. Suneja.
5. Practice & Law of Banking, by H.C. Agrawal.
6. Commercial Banking Vol. I & II, by Indian Institute of Bankers

<b>MBA-214</b>	<b>INTERNATIONAL FINANCE</b>
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**OBJECTIVE**

To make the students understand financial management in global context and to explain the foreign exchange market-major players, basic concepts, international monetary system and contemporary practices.

**UNIT I. INTERNATIONAL MONETARY AND FINANCIAL SYSTEM:** Meaning of International Finance, Importance of International Finance; Bretton Woods Conference and afterwards, IMF and the World Bank; European Monetary System – Meaning and Scope.

**UNIT II. INTERNATIONAL CAPITAL AND MONEY MARKET INSTRUMENTS:** GDRs, ADRs, IDRs, Euro Bonds, Euro Loans, Repos, CPs, Floating Rate Instruments, Loan Syndication and Euro Deposits.

**UNIT III. FOREIGN EXCHANGE MARKETS:** Determining Exchange Rates; Fixed and Flexible Exchange Rate System; Exchange Rate Theories; Participants in the Foreign Exchange Market; Foreign Exchange Markets – Cash and Spot Markets; Exchange Rate Quotes; LERMS; Factors Affecting Exchange Rates – Spot Rates, Forward Exchange Rates, Forward Exchange Contracts; Foreign Exchange Dealings and Currency Possession; Information and Communication; Foreign Exchange Trades..

**UNIT IV. FOREIGN EXCHANGE RISK:** Translation Exposure and Economic Exposure; Management of Exposures – Internal Techniques, Netting, Marketing, Leading and Lagging, Pricing Policy, Assets and Liability Management and Techniques

**UNIT V. BALANCE OF PAYMENTS AND INTERNATIONAL LINKAGES:** Balance of payments and its Components; International Flow of Goods, Services and Capital; Coping with Current Account Deficit. **International Financial Market and Instruments:** International Capital and Money Markets; Money and Capital Market Instruments; Salient Features of different International Markets; Arbitrage Opportunities; Integration of Markets; Role of Financial Intermediaries.

#### **REFERENCE BOOKS**

1. Eun C.S. & Resnick, B.G. (2007). International Financial Management, USA: McGraw-Hill.
2. Stonehill, A.I., Michael, H. & Moffet (1993). International Financial Management, United Nations: United Nations Library on Transnational Corporations.
3. Madura, J. (2008). International Financial Management. USA: Cengage Learning,
4. Sharan, V. (2008). International Financial Management. New Delhi: PHI Learning Pvt. Ltd.
5. Siddaiah, T. (2009). International Financial Management. Noida: Pearson Education India.
6. Kevin (2009). Fundamentals of International Financial Management. New Delhi: PHI Learning Pvt. Ltd.
7. Srinivasan, S.P. (2005). International Financial Management. Delhi: Dreamtech Press

**OBJECTIVE**

The purpose of the course is to prepare the students to understand the advance topic of financial management in strategic management and get expertise in strategic planning & decision making and to familiarize various Techniques and Models of Strategic Financial Management.

**UNIT I. FINANCIAL POLICY AND STRATEGIC PLANNING:** Strategic Planning Process – Objectives and Goals – Major types of Strategies and Policies – Corporate Planning – Process of Financial Planning – Types of Financial Plan – Financial Models – Tools or Techniques of Financial Modeling – Uses and Limitations of Financial Modeling – Applications of Financial Models – Types of Financial Models – Process of Financial Model Development.

**UNIT II. DECISION SUPPORT MODELS:** Modeling for Decision Support, Modeling Process, Marakon Model, Alkan Model, McKinsey Model.

**Working Capital Management:** Working Capital Leverage, Cash Budget Simulation, Discriminant Analysis, Cash Budget Models.

**Investments Decisions under Risk and Uncertainty:** Techniques of Investment Decision – Risk Adjusted Discount Rate, Certainty Equivalent Factor, Statistical Method, Sensitivity Analysis and Simulation Method – Corporate Strategy and High Technology Investments.

**UNIT III. CORPORATE RISK MANAGEMENT:** Sources of Risk, Approach to Risk Management, Process of Risk Management, Techniques of Risk Management

**Strategic Cost Management:** Value chain analysis, Activity based Costing, Life cycle Costing- Product & project.

**UNIT IV. EXPANSION AND FINANCIAL RESTRUCTURING:** Corporate Restructuring - Mergers and Acquisitions – reasons for Merger, Benefits and Cost of Merger – Takeovers – Business Alliances – Managing an Acquisition – Divestitures – Ownership Restructuring – Privatization – Dynamics of Restructuring – BuyBack of Shares – Leveraged Buy-outs (LBOs) – Divestiture – Demergers.

**UNIT V. FINANCING STRATEGY-INNOVATIVE SOURCES OF FINANCE:** Asset Backed Securities - Hybrid Securities namely Convertible and Non-Convertible Debentures, Deep Discount Bonds, Secured Premium Notes, Convertible Preference Shares – Option Financing, Warrants, Convertibles and Exchangeable Commercial Paper.

**REFERENCE BOOKS**

1. Bhalla V. K. - Financial Management & Policy
2. Chandra, Prasanna, FINANCIAL MANAGEMENT, Tata McGraw Hill, Delhi. 2007
3. RajniSofat&PreetiHiro, STRATEGIC FINANCIAL MANAGEMENT, PHI, Delhi, 2011
4. Ravi M. Mohan - Financial Management Taxmann, New Delhi
5. Weaver & Weston, STRATEGIC CORPORATE FINANCE, Cengage Learning, Delhi, 2001

<b>MBA-218</b>	<b>FINANCIAL DERIVATIVES</b>
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#### **OBJECTIVE**

- To make the students aware about various financial derivatives available and to evaluate how these financial derivatives are used to minimize risk and formulate option trading strategies and its execution.

**UNIT I. Introduction:** Meaning and Purpose of Derivatives; Forward Contracts, Future Contracts, Options, Swaps and other Derivatives; Type of Trader; Trading Future Contracts; Specification of the Future Contracts; Operation of Margins, Settlement and Regulations; Role of Derivatives in Hedging, Speculation & Arbitrage

**UNIT II. Option Contracts:** Option Terminology, Comparison between Futures and Options, Types of Options; Options Trading; Margins; Valuation of Options; Binomial Option; Pricing Model; Black-Scholes Model, Exchange Traded Options, Over – the Counter Options, Quotes Trading, Margins, Clearing, Regulation and Taxations; Warrants and Convertibles.

**UNIT III. Futures:** Hedgers and Speculators; Future Contracts; Future Market – Clearing House Margins, Trading Future Positions and Taxation; Future Prices and Spot Prices; Forwards Prices Vs Future Prices; Future Vs Options. **SWAPS:** Mechanics of Interest Rate Swaps, Valuation of Interest Rate Swaps, Currency Swaps and its Valuation, Credit Risk and Swaps.

**UNIT IV. Managing Market Risk:** Hedging Schemes: Delta Hedging, Theta Gamma Relationship in Delta Theta and Gamma; Vega and Rho; Portfolio Insurance.

**UNIT V. Financial Risk:** Credit Vs Market, Default Risk, Foreign Exchange Risk, Interest Rate Risk, Purchasing Power Risk; Systematic and Non-systematic Risk.

## REFERENCE BOOKS

1. Gupta S. L. (2010). Financial Derivatives. New Delhi: Prentice Hall of India Limited.
2. Arditti, F.D. (1996). Derivatives: A Comprehensive Resource for Options, Futures,
3. Interest Rate Swaps and Mortgage Securities, Washington, D.C.: Island Press.
4. Johnson, P.M. (1999). Derivatives: A Manager's Guide to the World's Most Powerful
5. Financial Instruments. USA: McGraw-Hill Professional

<b>MBA- 219</b>	<b>INTERNATIONAL BUSINESS ENVIRONMENT</b>
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## OBJECTIVE

The purpose of this paper is to enable the students learn nature, scope and structure of International Business, and understand the influence of various environmental factors on international business operations.

**Unit I:INTRODUCTION TO INTERNATIONAL BUSINESS:** Importance, nature and scope of International business; Modes of entry into International Business; Internationalization process and managerial implications; Multinational Corporations and their involvement in International Business: Issues in foreign investments, technology transfer, pricing and regulations; International collaborative arrangements and strategic alliances.

**Unit II:INTERNATIONAL BUSINESS ENVIRONMENT:** Economic, Political, Cultural and Legal environments in International Business. Framework for analyzing international business environment. Balance of Payment Account: Concept and significance of balance of payments account; Current and capital account components and accounting system; Balance of payment deficits and correction policies.

**Unit III:GLOBAL TRADING AND INVESTMENT ENVIRONMENT:** World trade in goods and services – Major trends and developments; World trade and protectionism – Tariff and non-tariff barriers; Foreign investments-Pattern, Structure and effects; Movements in foreign exchange and interest rates and their impact on trade and investment flows.

**Unit IV:INTERNATIONAL ECONOMIC INSTITUTIONS AND AGREEMENTS:** WTO, WTO and Developing Countries, IMF, World Bank, UNCTAD, International commodity trading and agreements.

**Unit V:REGIONAL ECONOMIC GROUPINGS IN PRACTICE:** Levels of Regional Economic Integration; Regionalism vs. Multilateralism; Important Regional Economic Groupings in the World. Contemporary Issues in International Business: Labour and Environmental Issues.

## **REFERENCE BOOKS**

1. Bennet, Roger, International Business, Financial Times, Pitman Publishing, London.
2. Bhattacharya, B., Going International: Response Strategies of the Indian Sector, Wheeler Publishing, New Delhi.
3. Czinkota, Michael R., et. al., International Business, the Dryden Press, Fortworth. Department of Commerce, University of Delhi 22
4. Danoes, John D. and Radebaugh, Lee H., International Business: Environment and Operations, Addison Wesley, Readings.

**OBJECTIVE**

The objective of this paper is to acquaint the students with the concepts and tools of supply chain management and logistics as relevant for an international firm.

**UNIT I. BASIC FRAMEWORK:** Concept of supply chain management (SCM); SCM and trade Logistics; Business view of SCM; Push and pull of SCM; Decision phases; Impellers and drivers in SCM Process views of SCM, planning and operations.

Integrated SCM: Concept, span and process of integrated SCM; Competitive strategy and strategic fit; Demand forecasting; Methods of demand forecasting.; Risk management in demand forecasting; Supply chain metrics (KPIs), performance measurement and continuous improvement; Supply chain modeling; Challenges to achieving and maintaining strategic fit

**UNIT II. MANAGING RELATIONSHIP:** Role of Relationship marketing in SCM; managing relationships with suppliers and customers; Role of on-line sales and supply chain. Designing strategic distribution network. Factors influencing distribution network.

Supply Chain and Information Management Systems: Purchasing Process- Strategic role of purchasing in the supply chain and total customer satisfaction; Types of purchases; Purchasing cycle; Supplier selection and evaluation; Vendor development. Importance of information management; Distribution and sharing of information; Information technology as a platform for effective and efficient supply chain management; Functional application of TRADITIONAL ERP, SPECIAL ERP, MR, DRP, PDM, EIP, CPFR, WMS, TMS, RFID, GPS, GIS; Re-engineering the supply chain: Future directions. Section B: Trade Logistics

**UNIT III. LOGISTIC SYSTEM:** Concept, objectives and scope of logistics; System elements; Inbound and Out bound logistics. Reverse inventory. Value added role of logistics. Logistics interface with manufacturer and marketing. Packing, Marking, Just in time concept; Third party logistic outsourcing– challenges and future directions.

**UNIT IV. TRANSPORTATION:** Importance of effective transportation system; Service choices and their characteristics; inter-modal services; Transport cost characteristics and rate fixation; In-company management vs. out –sourcing; Implementation and continuous improvement; Carrier selection determinants and decision. Structure of Shipping: World sea borne trade; international shipping - characteristics and structure; Liner and tramp operations; Liner freighting; Chartering-Types, principles and practices; Charter, party agreement; Development in sea transportation-Unitization, containersation, inter and multimodal transport; CFC and ICD; Indian shipping – growth, policy and problems; Ports and port trust. International Air transport: International set up for air transport: Freight rates; India's exports and imports by air – Problems and prospects. Carriage of Goods by sea, sea and combined transport; international conventions and Indian law; Maritime frauds and unethical practices–causes and protection; Role and types of cargo intermediaries.



**UNIT V. WAREHOUSING AND INVENTORY MANAGEMENT:** Warehousing and marketing strategy; Objectives and functions of warehousing; Warehouse strategies; Material handling equipment and material mobility Warehousing evaluation and requirements. Inventory management-inventory categories, EOQ, LT, ICC; Inventory levels; Material planning and sourcing of procurement; Methods of cost reduction.

#### **REFERENCE BOOKS**

- 1Ballau, R.H., Business Logistics Management, Prentice Hall, Englewood Cliffs.
2. Bes, J., Chartering Practices.
3. Bes, J., Dictionary of Shipping and chartering Practices.
4. Christopher, M., Logistics and Supply Chain Management, Prentice Hall.
5. ICAO Journal, New York., various issues.
6. Indian Shipping and Transport, Mumbai, Various issues.



**OBJECTIVE**

The paper aims at acquainting the students with the theoretical foundations of international trade and enabling them to learn the pattern, structure and policy framework of India's foreign trade.

**UNIT I. THEORETICAL FOUNDATIONS OF INTERNATIONAL TRADE:** Reasons for international trade: Mercantilist and neo-mercantilist view; Theories of international trade: Absolute and comparative advantage theories: Modern theories of trade; Gains from trade; Foreign trade multiplier; Terms of trade.

**UNIT II. DIRECT INVESTMENT:** FDI in the world economy, The Political Economy of FDI, Cost and Benefit of FDI to Host and Home Countries, Government Policy Instruments and FDI; Foreign debt situation.

**UNIT III. INSTRUMENTS OF COMMERCIAL POLICY:** Tariffs quotas and other measures and their effects; Arguments for and against protection; Trade regulations and WTO; Trade policy and developing countries. Regional Economic Integration: Levels of Regional Economic Integration; Free trade area, customs union, economic union, and common market; Trade creation and diversion effects, NAFTA, EU, SAARC, ASEAN.

**UNIT IV. FACTOR MOVEMENTS AND INTERNATIONAL TRADE IN SERVICES:** Capital flows-Types and theories of foreign investments, Barriers to foreign investments; Labour migration; Theory of international trade in services.

**UNIT V. POLICY FRAMEWORK AND PROMOTIONAL MEASURES:** India's foreign trade and investment policy; Policy making body and mechanism; Export promotion measures and infrastructure support – export and trading, houses, export promotion schemes and incentives; Institutional arrangements for export promotion; Export processing/special economic zones, 100% EOUs.

**REFERENCE BOOKS**

1. Economic Survey, Govt. of India.
2. Export-import Policy and Other Documents, Govt. of India.
3. Hazari, R. Bharat, Micro Economic Foundations of International Trade, Croom Helm, London and Sydney.
4. Letiche, John M., International Economics: Policies and Theoretical Foundations, Academic Press, New York.

MBA-225

**CONSUMER BEHAVIOR**

**OBJECTIVE**

The subject explores the mysterious world of the consumer's psyche and guidelines to the students to understand what makes consumers to purchase particular product or avail a particular service.

**UNIT I. INTRODUCTION:** Consumer Behavior And Consumer Research; Importance Of Consumer Behavior, Evolution Of Consumer Behavior; Consumer Decision Process Model; Variables Affecting The Decision Process; Types Of Decision Process; Factors Influencing The Extent Of Problem Solving.

**PURCHASE PROCESS:** Purchase Processes; Need Recognition; Internal And External Search; Pre-Purchase Evaluation; Different Types Of Purchase Situations.

**UNIT II. CONSUMPTION EXPERIENCES:** Consumption Experiences; Importance Of Customer Satisfaction; Factors Affecting Satisfaction Level; Demographics And Consumer Behavior; Economic Resources And Consumer Behaviour.

**MOTIVATING FACTORS:** Personality And Consumer Behaviour; Personal Values; Lifestyle Motivational Conflict And Need Priorities; Motivational Intensity; Motivating Consumer; Attitude Theories Perception.

**UNIT III. CULTURAL EFFECTS:** Culture And Its Effect On Consumer Behaviour; Changing Values And Its Effect On Consumer Behaviour Changing Values And Its Effect On Marketing; Determinates Of Social Class; Social Class And Consumer Behaviour; Role Behaviour; Importance Of Families And Households On Consumer Behavior; Role Behaviour And It Influence On The Decision Process; Family Life Cycles; Changing Roles Of Women; Children And Household Consumer Behaviour.

**UNIT IV. GROUP INFLUENCES:** Group And Personal Influences On Individuals; Reference Group And Its Influence On Individual; Transmission Of Influence Through Dyadic Exchanges; Word Of Mouth And Opinion Leaders In Advertising And Marketing Strategy.

**UNIT V. CONSUMER OPINION & LEARNING:** Diffusion Of Innovations; Diffusion Process; Reaching The Consumer; Gaining Consumer's Attention; Shaping Consumer's Opinion; Opinions Change; Product's And Advertising's Role In Shaping Consumer Opinion; Cognitive Learning; Retrieval Of Information; Company's Role In Helping Consumers To Remember.

#### REFERENCE BOOKS

1. Blackwell, Roger, Miniard, Paul and Engel, James, "Consumer Behaviour", Thomson Learning, New Delhi
2. Solomon, Michael R, "Consumer Behaviour – Buying Having and Being", Pearson Education; New Delhi
3. Schiffman, Leon G. and Kanuk, Leslie Lazar, "Consumer Behaviour", Pearson Education; New Delhi
4. Loudon, David J. and DellaBitta, Albert, "Consumer Behaviour" Tata McGraw Hill, New Delhi.

<b>MBA-227</b>	<b>INTEGRATED MARKETING COMMUNICATION</b>
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#### OBJECTIVE

The objective is to introduce the students to the integrated role of promotion techniques with the special emphasis on advertising.

**UNIT I. INTRODUCTION:** An Introduction to Integrated Marketing Communication (IMC): Meaning and role of IMC in Marketing process, Evolution of IMC, Reasons for growing importance of IMC. Introduction to IMC tools – Advertising, Direct Marketing, Internet Marketing, Sales Promotion, Publicity/ Public Relations and Personal Selling. IMC Planning Process & Model. The role of advertising agencies and other marketing organizations providing marketing services and perspective on consumer behavior.

**UNIT II. UNDERSTANDING COMMUNICATION PROCESS:** Source, Message and channel factors, Communication response hierarchy- AIDA model, Hierarchy of effect model, Innovation adoption model, information processing model, The standard learning Hierarchy, Attribution Hierarchy, and low involvement hierarchy Consumer involvement- The Elaboration Likelihood (ELM) model, The Foots, Cone and Belding (FCB) Model

**UNIT III. PLANNING FOR MARKETING COMMUNICATION (MARCOM):** Establishing Objectives and Budgeting for Promotional Programmes-Setting communication objectives, DAGMAR approach for setting ad objectives. Budgeting for MARCOM-Factors influencing budget, Theoretical approach to budgeting viz. Marginal analysis and Sales response curve, Method to determine MARCOM budget.

**UNIT IV. DEVELOPING THE INTEGRATED MARKETING COMMUNICATION PROGRAMME:** Creative strategies in advertising, sales promotion, publicity etc.; Creative strategy in Implementation and Evaluation- Types of appeals and execution styles. Media planning and selection decisions- steps involved and information needed for media planning

**UNIT V. MEASURING EFFECTIVENESS AND CONTROL OF PROMOTIONAL PROGRAMMES** Media Planning and Strategy , Evaluation of Broadcast Media, Evaluation of Print Media, Direct Marketing, The Internet and Interactive Media, Sales Promotion, Public Relations, Publicity, and Corporate Advertising, Personal Selling, Measuring the Effectiveness of the Promotional Program, Evaluating the Social, Ethical, and Economic Aspects of Advertising and Promotion.

#### **REFERENCE BOOKS**

1. Belch, George and Belch, Michael, "Advertising and Promotion", Tata McGraw Hill, New Delhi
2. Duncan, Tom, "Principles of Advertising and IMC", Tata McGraw Hill, New Delhi
3. Jethwaney, Jaishree and Jain, Shruti, "Advertising Management", Oxford University Press, New Delhi
4. Clow, Kenneth and Baack, Donald, "Integrated Advertising Promotion and Marketing Communication", Pearson Education, New Delhi.

<b>MBA-229</b>	<b>PRODUCT &amp; BRAND MANAGEMENT</b>
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#### **OBJECTIVES**

The objective of this paper is to understand concepts & processes involved in new product development & on brand building and also to understand how to establish, implement, measure and manage brand.

**UNIT I. INTRODUCTION TO PRODUCT & BRAND:** Levels Of Product;Product Life Cycle, Product Portfolio;Product Management &New Product Development; Branding Concepts; Branding Challenges And Opportunities; Strategic Brand Management Process;Brand Equity Concepts.

**UNIT II. IDENTIFYING & ESTABLISHING BRAND:** Customer Based Brand Equity; Building A Strong Brand And Its Implications; Identifying And Establishing Brand Positioning, Brand Mantra, Internal Branding, Brand Audit.

**UNIT III. PLANNING & IMPLEMENTING BRAND MARKETING PROGRAMS:** Choosing Brand Elements To Build Brand Equity; Designing Marketing Programs To Build Brand Equity; Integrating Marketing Communication To Build Brand Equity, Leveraging Secondary Brand Knowledge To Build Brand Equity.

**UNIT IV. MEASURING & INTERPRETING BRAND PERFORMANCE:** Developing a brand equity measurement and management system; Measuring Sources of Brand Equity: Capturing Customer Mind-Set; Measuring Outcomes of Brand Equity: Capturing Market Performance.

**UNIT V. GROWING & SUSTAINING BRAND EQUITY:** Designing & Implementing Brand Strategies- Brand Architecture, Brand Hierarchy, Designing a Brand Strategy, Cause Marketing tool to build Brand Equity; New Products & Brand Extensions.

**Managing Brand:** Managing Brands over Time: Managing Brands over Geographic Boundaries and Market Segments.

#### **REFERENCE BOOKS**

1. Strategic Brand Management, 3rd ed. by Keller, Kevin Lane, Prentice Hall. 2008
2. Strategic Brand Management, Kapferer, J.-N. (1997). London: Kogan Page Limited
3. Building Brand Value : Five Steps of Building Powerful Brands, M. G.Parameswaran, 2006, New Delhi: Tata McGraw Hill
4. Brand Management, , H. V. Verma, 2004, New Delhi: Excel Books
5. Managing Indian Brands-Concepts and Strategies, S Ramesh Kumar, 2001, Vikas Publications.

MBA- 226

## INTERNATIONAL MARKETING

### OBJECTIVE

The course seeks to develop international marketing skills on a sound theoretical and conceptual foundation. It provides an insight into global marketing environment and the managerial decision making in the context of contemporary dynamics of the global markets.

**Unit-I INTRODUCTION:** Nature of international marketing; domestic vs. international and global marketing; benefits, tasks and challenges of international marketing; organizational structure for international marketing; international marketing environment; screening international marketing opportunities; techniques of foreign market selection.

**Unit-II INTERNATIONAL MARKETING RESEARCH & STRATEGIES:** International marketing research and information system; foreign market entry modes; global marketing operations and strategies;

**Unit-III INTERNATIONAL PRODUCT STRATEGIES:** International product, branding decision, PLC, pricing strategies; environmental factors affecting international prices; international dumping; financing international marketing transactions, consideration (factor) affecting, product strategy, product adoption & standardization, new product development.

**Unit-IV INTERNATIONAL PRICING STRATEGIES:** International direct marketing; international promotion mix; push and pull strategies; aspects of international sales management;

**Unit-V INTERNATIONAL DISTRIBUTION & PROMOTION STRATEGIES :** Global media strategy; (challenges of international advertising; the structure of international distribution systems; channel selection decisions; managing



channel conflicts; aspects of international supply chain management), operations and control; managing risk in international marketing.

#### **REFERENCE BOOKS**

1. Onkvisit Sak and John J. Shaw, International Marketing – Analysis and Strategy, PHI, New Delhi
2. Doole Isobel and Robin Lawe, International Marketing Strategy, Thomson Learning,
3. Keegan Warren J., Global Marketing Management, Pearson Education, Delhi
4. Joshi, Rakesh Mohan, International Marketing, Oxford University Press, New Delhi
5. Rajgopal, International Marketing, Vikas, New Delhi

<b>MBA-228</b>	<b>STRATEGIC MARKETING MANAGEMENT</b>
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#### **OBJECTIVE**

To understand the service product and key elements of services marketing mix. Another objective deals with managing the service delivery process and the implementation of services marketing.

**UNIT I. STRATEGY FORMULATION** –Vision, Mission, Objectives and Goals of business and their relationship with Strategic Marketing Management. Considerations for formulation of marketing strategies for all components of Product, Price, Promotion and Distribution.

**UNIT II. STRATEGIC MARKETING MANAGEMENT**– Objectives & concept of Strategic Marketing Management - Strategy Definition

**UNIT III. STRATEGIC MARKETING ANALYSIS**– SWOT Analysis, GAP Analysis – Competitive Analysis – Porter's 5 forces Model of competition, BCG Matrix, GE 9 Cell Model as basic foundation of Strategic Marketing, McKinsey's 7s framework for analyzing and improving organizational effectiveness.

**UNIT IV. MARKETING STRATEGY IMPLEMENTATION**– Integration of Marketing Strategies and their application to different business sectors – FMCG, Industrial, & Services. Constraints in marketing strategy implementation.

**UNIT V. SPECIFIC STRATEGY INITIATIVES**– New product development and introduction strategies, Planned or unplanned strategy withdrawals / obsolescence, Contingency / alternative strategic planning, Brand Strategies in FMCG markets, Rural and export marketing strategies, Marketing strategies for IT and ITES industries.**Marketing Strategy Evaluation** – Marketing Audits & their scope – Measurement of Marketing Performance and its feedback to next year's marketing strategy formulation.

#### **REFERENCE BOOKS**

1. Marketing Management: Analysis, Planning & Control: - Phillip Kotlar
2. Business Policy & Strategic Management – AzarKazmi
3. Strategic Marketing-David W.Cravens ,Nigelf.Piercy
4. Marketing Strategy, TMH Ed. - Boyd Walker, Mullins Larrech

**MBA-230**

**SERVICE MARKETING**

**OBJECTIVE**

To understand the service product and key elements of services marketing mix. Another objective deals with managing the service delivery process and the implementation of services marketing.

**UNIT I. INTRODUCTION:** Introduction to services marketing; Implication to marketers, role of services marketing; consumer behavior in service encounters; customer interaction, purchase process, positioning services in competitive markets.

**UNIT II. SERVICE PRODUCT AND PRICING:** Creating & pricing the service product; identifying and classifying supplementary services, planning and branding service products, new service development; setting pricing objectives and foundations for setting prices, pricing strategies.

**UNIT III. DISTRIBUTING SERVICES AND PROMOTION:** Distributing & promotion services: options for service delivery, place and time decisions, delivery in cyberspace, role of intermediaries, Distribution strategies. Designing and managing service processes: service process redesign, Promotion strategies, challenges in promoting services.

**UNIT IV. DEMAND AND CAPACITY:** Balancing demand and capacity: fluctuations in demand, capacity constrain, service environment, managing relationship and building loyalty: customer-firm relationship, analyzing and managing customer base:

**UNIT V. CUSTOMER SERVICING:** Customer feedback and service recovery: customer complaining behavior, principles and responses to effective service recovery, service quality and the gap model, measuring and improving service quality defining, measuring and improving service productivity.

**REFERENCE BOOKS**

1. Lovelock, Christopher, Wirtz, Jochen and Chatterjee Jayanta, "Services Marketing – People Technology, Strategy" Pearson Education, New Delhi

2. Rao, K. Rama Mohana, "Services Marketing", Pearson Education, New Delhi
  3. Hoffman and Bateson, "Essentials of Service Marketing", Thomson Asia Ptc. Ltd., New Delhi
  4. Rampal, M.K. and Gupta, S.L., "Services Marketing", Galgotia Publication, New Delhi
- Harsh Verma, "Service Marketing", Tata Mcgraw.

# DEPARTMENT OF MECHANICAL ENGINEERING

## SCHEME FOR B. TECH. (ODD SEMESTER)

B. TECH. MECHANICAL ENGINEERING			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101 B	Applied Mathematics –I	3	1	0	4
2	PH-103 B	Applied Physics	3	1	0	4
3	CS-105 B	Computer Programming	3	0	0	3
4	EN-107 B	Communication Skills-I	3	0	0	3
5	CE-109 B	Environmental Science and Ecology	2	0	0	2
6	EL-111 B	Basics of Electrical and Electronics Engg	3	1	0	4
7	CH-113 B	Applied Chemistry	3	1	0	4
8	PH-151 B	Applied Physics Lab	0	0	2	1
9	EN-153 B	Communication Skills Lab-I	0	0	2	1
10	CS-155 B	Computer Programming Lab	0	0	2	1
11	EL-157 B	Basics of Electrical and Electronics Engg Lab	0	0	2	1
12	ME-159 B	Workshop Practice-I	0	0	4	2
13	CH-161 B	Applied Chemistry Lab	0	0	2	1
14	ME-163 B	Computer Based Engineering Graphics	0	0	4	2
Total			20	4	18	33

**SCHEME FOR B. TECH. (EVEN SEMESTER)**

<b>B. TECH. MECHNICAL ENGINEERING</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	MA-102B	Advanced Mathematics and Numerical methods	3	1	0	4
2	EN-104 B	Communication Skills-II	3	0	0	3
3	BA-106 B	Engineering Economics and Industrial Management	3	0	0	3
4	EC-108 B	Digital Electronics	3	1	0	4
5	ME-108 B	Engineering Mechanics	3	1	0	4
6	CS-110 B	Data Structures and Algorithm	3	0	0	3
7	CE-110 B	Surveying	3	0	0	3
8	EL-111 B	Basics of Electrical and Electronics Engg.	3	1	0	4
9	EC-112 B	Electrical Engineering Materials and Semi-Conductor Devices	3	0	0	3
10	ME- 112 B	Machine Drawing	0	0	4	2
11	CS-114 B	Data Base Management systems	3	0	0	3
12	MA-150 B	Applied Numerical Methods Lab	0	0	2	1
13	PD-152 B	Co-curricular Activities / Hobby club	0	0	4	2
14	EC-154 B	Digital Electronics Lab	0	0	2	1
15	CS-156 B	Data Structures and Algorithm Lab	0	0	2	1
16	EL-157 B	Basics of Electrical and Electronics Engg Lab	0	0	2	1
17	EC-158 B	Electrical Engineering Materials and Semi-Conductor Devices Lab	0	0	2	1
18	ME-159 B	Workshop Practice-I	0	0	4	2
19	CS-160 B	Data Base Management systems Lab	0	0	2	1
20	CE- 162 B	Surveying Lab	0	0	2	1
<b>Total</b>			<b>30</b>	<b>4</b>	<b>26</b>	<b>47</b>

### SCHEME FOR B. TECH.

B. TECH. MECHNICAL ENGINEERING			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-201B	Strength Of Material-I	3	1	0	4
2	ME-203B	Fluid Mechanics	3	1	0	4
3	ME-205B	Kinematics of Machine	3	1	0	4
4	ME-207B	Manufacturing Technology	3	0	0	3
5	ME-209B	Thermodynamics	3	1	0	4
6	ME-211B	Operation management	3	1	0	4
7	ME-251B	Strength Of Material-I Lab	0	0	2	1
8	ME-253B	Fluid Mechanics lab	0	0	2	1
9	ME-255B	Kinematics of Machine Lab	0	0	2	1
10	ME-257B	Manufacturing Technology Lab	0	0	2	1
Total			18	5	8	27

B. TECH. MECHNICAL ENGINEERING			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-202B	Dynamics of Machine	3	1	0	4
2	ME-204B	Production Engineering	3	0	0	3
3	ME-206B	Energy Conversion	3	1	0	4
4	ME-208B	Fluid Machinery	3	1	0	4
5	ME-210B	CAD	3	0	0	3
6	ME-212B	Strength Of Material-II	3	1	0	4

7	ME-252B	Dynamics of Machine Lab	0	0	2	1
8	ME-254B	Production Engineering Lab	0	0	2	1
9	ME-256B	Energy Conversion Lab	0	0	2	1
10	ME-258B	Fluid Machinery Lab	0	0	2	1
11	ME-260B	CAD Lab	0	0	2	1
		<b>Total</b>	<b>18</b>	<b>4</b>	<b>10</b>	<b>27</b>

### SCHEME FOR B. TECH.

B. TECH. MECHANICAL ENGINEERING			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-301B	Heat Transfer	3	1	0	4
2	ME-303B	Material Science	3	0	0	3
3	ME-305B	Measurement Instrumentation & control systems	3	0	0	3
4	ME-307B	Machine Design I	3	1	0	4
5	ME-309B	Optimization Technique	3	1	0	4
6	ME-311B	Power plant Engineering	3	1	0	4
7	ME-351B	Heat Transfer Lab	0	0	2	1
8	ME-353B	Measurement Instrumentation & control systems lab	0	0	2	1
9	ME-357B	Material Science lab	0	0	2	1
		<b>Total</b>	<b>18</b>	<b>4</b>	<b>6</b>	<b>25</b>

B. TECH. MECHANICAL ENGINEERING			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-302B	Computer Integrated Manufacturing	3	0	0	3
2	MES-304B	PLC for Automation	4	0	0	4



3	MES-306B	IoT for Smart Manufacturing	4	0	0	4
4	MES-308B	Python for Automation	4	0	0	4
5	MES-310B	Industry 4.0	3	0	0	3
6	ME-352B	Computer Integrated Manufacturing Lab	0	0	2	1
7	MES-354B	Automation Lab	0	0	2	1
8	MES-356B	IoT for Smart manufacturing Lab	0	0	2	1
9	MES-358B	Python Lab	0	0	2	1
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>

### SCHEME FOR B. TECH.

B. TECH. MECHANICAL ENGINEERING			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MER-401B	Sensors and Transducers	4	0	0	4
2	MER-403B	Industrial Robots	4	0	0	4
3	MER-405B	Simulation	4	0	0	4
4	MER-407B	Automatic Material Handling	3	0	0	3
5	MER-451B	Sensors and Transducers Lab	0	0	2	1
6	MER-455B	Simulation Lab	0	0	2	1
7	ME-400B	Seminar	0	0	2	1
8	ME-496B	Project Work	0	0	8	4
		<b>Total</b>	<b>15</b>	<b>0</b>	<b>14</b>	<b>22</b>

B. TECH. MECHANICAL ENGINEERING			Semester			VIII
SN	Course Code	Course Name	Periods			Credits

			<b>L</b>	<b>T</b>	<b>P</b>	
1	ME 483	Internship	0	0	32	16
2	ME 484	Seminar based on Internship	0	4	0	4
		<b>Total</b>	<b>0</b>	<b>4</b>	<b>32</b>	<b>20</b>

### SCHEME FOR M. TECH.

<b>B. TECH. MECHANICAL ENGINEERING</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	ME-P501B	Advanced Mechanics of Solids	3	1	0	4
2	ME-P502B	Vibration Engineering	3	1	0	4
3	ME-P503B	Instrumentation and Automatic Control	3	1	0	4
4	ME-P505B	Statistical quality control	3	0	0	3
5	ME-P511B	Simulation Lab	0	0	4	2
6	ME-P513B	Seminar-1	0	0	2	1
		<b>Total</b>	<b>12</b>	<b>3</b>	<b>6</b>	<b>18</b>

<b>B. TECH. MECHANICAL ENGINEERING</b>			<b>Semester</b>			<b>II</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>

			L	T	P	
1	ME-P506B	Properties and Selection of Engineering Material	3	1	0	4
2	MA-501A	Numerical Techniques	3	1	0	4
3	ME-P504B	Metal Cutting Technology	3	1	0	4
4		Elective-I	3	0	0	3
5	ME-P512B	Mechanical Engineering Lab	0	0	2	1
6	ME-P514B	Seminar-II	0	0	2	1
7	ME-P516B	Teaching Practice –I	0	0	2	1
		Total	12	3	6	18

### SCHEME FOR M. TECH.

B. TECH. MECHANICAL ENGINEERING			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-P601B	CAD CAM for Manufacturing	3	1	0	4
2	ME-P603B	Mechanics of Metal Forming	3	1	0	4
3	ME-P605B	Automation in Manufacturing	3	1	0	4
4		Elective-II	3	0	0	3
5	ME-P609B	Planning and Control of Production Engineering	3	1	0	4
6	ME-P611B	Seminar-III	0	0	2	1
7	ME-P613B	Mechanical Engineering Lab	0	0	2	1
8	ME-P616B	Teaching practice –II	0	0	2	1

		<b>Total</b>	<b>15</b>	<b>4</b>	<b>6</b>	<b>22</b>
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<b>B. TECH. MECHANICAL ENGINEERING</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	ME-P612B	Seminar-IV	0	0	4	2
2	ME-P614B	Dissertation	0	0	54	27
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>58</b>	<b>29</b>

#### SCHEME FOR B. TECH. (ODD SEMESTER)

<b>B. TECH. AUTOMOBILES ENGINEERING</b>			<b>Semester</b>			<b>I</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	MA-101 B	Applied Mathematics –I	3	1	0	4
2	PH-103 B	Applied Physics	3	1	0	4
3	CS-105 B	Computer Programming	3	0	0	3
4	EN-107 B	Communication Skills-I	3	0	0	3
5	CE-109 B	Environmental Science and Ecology	2	0	0	2
6	EL-111 B	Basics of Electrical and Electronics Engg	3	1	0	4
7	CH-113 B	Applied Chemistry	3	1	0	4
8	PH-151 B	Applied Physics Lab	0	0	2	1
9	EN-153 B	Communication Skills Lab-I	0	0	2	1
10	CS-155 B	Computer Programming Lab	0	0	2	1

11	EL-157 B	Basics of Electrical and Electronics Engg Lab	0	0	2	1
12	ME-159 B	Workshop Practice-I	0	0	4	2
13	CH-161 B	Applied Chemistry Lab	0	0	2	1
14	ME-163 B	Computer Based Engineering Graphics	0	0	4	2
		<b>Total</b>	<b>20</b>	<b>4</b>	<b>18</b>	<b>33</b>

### SCHEME FOR B. TECH. (EVEN SEMESTER)

B. TECH. AUTOMOBILES ENGINEERING			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102B	Advanced Mathematics and Numerical methods	3	1	0	4
2	EN-104 B	Communication Skills-II	3	0	0	3
3	BA-106 B	Engineering Economics and Industrial Management	3	0	0	3
4	EC-108 B	Digital Electronics	3	1	0	4
5	ME-108 B	Engineering Mechanics	3	1	0	4
6	CS-110 B	Data Structures and Algorithm	3	0	0	3

7	CE-110 B	Surveying	3	0	0	3
8	EL-111 B	Basics of Electrical and Electronics Engg.	3	1	0	4
9	EC-112 B	Electrical Engineering Materials and Semi-Conductor Devices	3	0	0	3
10	ME- 112 B	Machine Drawing	0	0	4	2
11	CS-114 B	Data Base Management systems	3	1	0	4
12	MA-150 B	Applied Numerical Methods Lab	0	0	2	1
13	PD-152 B	Co-curricular Activities / Hobby club	0	0	2	1
14	EC-154 B	Digital Electronics Lab	0	0	2	1
15	CS-156 B	Data Structures and Algorithm Lab	0	0	2	1
16	EL-157 B	Basics of Electrical and Electronics Engg Lab	0	0	2	1
17	EC-158 B	Electrical Engineering Materials and Semi-Conductor Devices Lab	0	0	2	1
18	ME-159 B	Workshop Practice-I	0	0	4	2
19	CS-160 B	Data Base Management systems Lab	0	0	2	1
20	CE- 162 B	Surveying Lab	0	0	2	1
		Total	30	5	24	47

### SCHEME FOR B. TECH.

B. TECH. AUTOMOBILES ENGINEERING			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-201B	Strength Of Material-I	3	1	0	4
2	ME-203B	Fluid Mechanics	3	1	0	4
3	ME-205B	Kinematics of Machine	3	1	0	4
4	ME-207B	Manufacturing Technology	3	0	0	3
5	ME-209B	Thermodynamics	3	1	0	4

6	ME-211B	Operation management	3	0	0	3
7	ME-251B	Strength Of Material-I Lab	0	0	2	1
8	ME-253B	Fluid Mechanics lab	0	0	2	1
9	ME-255B	Kinematics of Machine Lab	0	0	2	1
10	ME-257B	Manufacturing Technology Lab	0	0	2	1
		<b>Total</b>	<b>18</b>	<b>4</b>	<b>8</b>	<b>26</b>

<b>B. TECH.</b>			<b>Semester</b>			<b>IV</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	ME-202B	Dynamics of Machine	3	1	0	4
2	ME-204B	Production Engineering	3	0	0	3
3	ME-206B	Energy Conversion	3	1	0	4
4	ME-208B	Fluid Machinery	3	1	0	4
5	ME-210B	CAD	3	0	0	3
6	ME-212B	Strength Of Material-II	3	1	0	4
7	ME-252B	Dynamics of Machine Lab	0	0	2	1
8	ME-254B	Production Engineering Lab	0	0	2	1
9	ME-256B	Energy Conversion Lab	0	0	2	1
10	ME-258B	Fluid Machinery Lab	0	0	2	1
11	ME-260B	CAD Lab	0	0	2	1
		<b>Total</b>	<b>18</b>	<b>4</b>	<b>10</b>	<b>27</b>

### SCHEME FOR B. TECH.

<b>B. TECH. AUTOMOBILES ENGINEERING</b>			<b>Semester</b>			<b>V</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	ME-301B	Heat Transfer	3	1	0	4
2	ME-303B	Material Science	3	0	0	3
3	ME-305B	Measurement Instrumentation & control systems	3	0	0	3

4	ME-307B	Machine Design I	3	1	0	4
5	ME-309B	Optimization Technique	3	1	0	4
6	ME-311B	Power plant Engineering	3	1	0	4
7	ME-351B	Heat Transfer Lab	0	0	2	1
8	ME-353B	Measurement Instrumentation & control systems lab	0	0	2	1
9	ME-357B	Material Science lab	0	0	2	1
		<b>Total</b>	<b>18</b>	<b>4</b>	<b>6</b>	<b>25</b>

<b>B. TECH. AUTOMOBILES ENGINEERING</b>			<b>Semester</b>			<b>VI</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	MEA-302B	Introduction to Electric Vehicle Technology	3	0	0	3
2	MEA-304B	Automotive Engines	4	0	0	4
3	MEA-306B	Motor Vehicle Technology	3	0	0	3
4	MEA-308B	Automotive Maintenance and Service	3	0	0	3
5	MEA-310B	Design of Auto components	3	1	0	4
6	MEA-352B	Introduction to Electric Vehicle Technology` Lab	0	0	2	1
7	MEA-354B	Automotive EnginesLab	0	0	2	1
8	MEA-356B	Motor Vehicle Technology lab	0	0	2	1
9	ME-358B	Automotive Maintenance and Service Lab	0	0	2	1
		<b>Total</b>	<b>16</b>	<b>1</b>	<b>8</b>	<b>21</b>

### SCHEME FOR B. TECH.

<b>B. TECH. AUTOMOBILES ENGINEERING</b>			<b>Semester</b>			<b>VII</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	



1	ME-401B	Mechanical Vibrations	3	1	0	4
2	MEA-403B	Auto Electrical equipments	4	0	0	4
3	MEA-405B	Automotive Air Conditioning	4	0	0	4
4	MEA-407B	Future transportation fuels and emission controls.	3	0	0	3
5	MEA-455B	Automotive Air Conditioning Lab	0	0	2	1
6	MEA-459B	STC Lab	0	0	2	1
7	ME-400B	Seminar	0	0	2	1
8	ME-496B	Project Work	0	0	8	4
		<b>Total</b>	<b>14</b>	<b>1</b>	<b>14</b>	<b>22</b>

<b>B. TECH. AUTOMOBILES ENGINEERING</b>			<b>Semester</b>			<b>VIII</b>
<b>SN</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Periods</b>			<b>Credits</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	ME 483	Internship	0	0	32	16
2	ME 484	Seminar based on Internship	0	0	8	4
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>20</b>

**MA-101B**

**APPLIED MATHEMATICS-I**

**L-T-P Credits**

**4-0-0 4**

**Unit-1: MATRICES AND ITS APPLICATIONS:** Elementary transformations; inverse of the matrix using elementary transformation; normal form of a matrix; rank of a matrix; solution of simultaneous linear equations; linear dependence and independence of vectors; linear and orthogonal transformations; eigenvalues, eigen vectors and properties; Cayley-Hamilton theorem and its applications; diagonalization of matrices.

**Unit-2:INFINITE SERIES:** Convergence and divergence; comparison test;D'Alembert's ratio test;Cauchy's root test;Raabe's test; logarithmic test;Gausstest;Cauchy's integral test;Leibnitz's alternate series test; absolutely convergent; conditionally convergent.

**Unit-3:CALCULUS OF SINGLE VARIABLE:** Successive Differentiation and Leibnitz theorem Taylor's series and Maclaurin's series; asymptotes; curvature.

**Unit-4: CALCULUS OF SEVERAL VARIABLES:**Functions of two or more variables; partial derivatives; total differential and differentiability; derivative of composite and implicit functions;Jacobians. Homogeneous functions and Euler's theorem;Taylor's series for functions of two variables; maxima-minima of function of two and three variables, Lagrange's method of undetermined multipliers; differentiation under integral sign.

**Unit-5: MULTIPLE INTEGRATIONS:** Double integral; change of order of integration; double integral in polar co-ordinates. Triple integration; change of variable. Application of double integral to find area enclosed by plane curves and volume of solids of revolution; volume of solid; beta & gamma functions and relationship between them.

#### **TEXT BOOK:**

Grewal, B.S., "Higher Engineering Mathematics", 41<sup>st</sup> Edition, 2010, Khanna Publishers.

#### **REFERENCE BOOKS**

1. Kreyszig, E., "Advance Engineering Mathematics", 10<sup>th</sup> Edition, 2011, Wiley India Publishers, New Delhi

2. Weir, M. D., Hass, J. and Giordano, F. R., "Thomas Calculus", 11<sup>th</sup> Edition, 2012, Pearson Education.

3. Jain, R.K. and Iyengar, S.R.K., " Advance Engineering Mathematics" ,3<sup>rd</sup> Edition, 2002,

Narosa Publishing House New Delhi.

4. Dass, H.K., " Higher Engineering Mathematics", 10<sup>th</sup> Edition, 2008, S. Chand & Company

Ltd.

5 " Higher Engineering Mathematics" by H.C Taneja

PH-103 B	APPLIED PHYSICS	L-T-P	Credits
		4-0-0	4

### Unit-1: Wave Optics-I

**Interference:** Interference of light and its necessary conditions, path & Phase difference for reflected & transmitted rays, Interference in thin films (parallel and wedge shaped film), Newton's rings.

**Diffraction:** Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

### Unit-2: Wave Optics-II

**Polarization:** Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate (Quarter & Half).

**Laser:** Spontaneous and stimulated emission of radiation, population inversion, construction and working of Ruby, He-Ne lasers and laser applications.

**Fiber Optics:** Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Single and Multi Mode Fibers

### Unit-3: Dielectric

**Dielectric Properties:** Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability). Displacement vector (D), Magnetic susceptibility, Relation between D, E And P, ClaussiusMussoti Equation, Important applications of dielectric material.

### Unit-4: Magnetic & Superconducting properties of matter

#### Magnetic

**Properties:** Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Applications of Magnetism.

**Superconductors:** Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type I and Type II superconductors. Applications of Superconductors.

### Unit-5: Relativistic Mechanics

Inertial & non-inertial frames, Michelson- Morley experiment, Einstein's postulates, Lorentz transformation equations, Length contraction & Time dilation, Addition of velocities; Variation of mass with velocity, Mass energy equivalence

### TEXT BOOK

4. BrijLal and Subramanyam, "A Text Book of Optics" S. Chand & Co.
5. Modern Physics for Engineers – S.P.Taneja (R. Chand)
6. Engineering Physics – SatyaPrakash (PragatiPrakashan).

## REFERENCE BOOKS

1. Sears, F.W., "Electricity and Magnetism", Narosa
2. Arthur Beiser, "Perspectives of Modern Physics", Tata McGraw Hill
3. Ajoy Ghatak 'Optics' Tata McGraw-Hill Education, 2005.
4. David Halliday, Robert Resnick and Jearl Walker, "Fundamentals of physics", 4th edition.
5. David J. Griffiths, 'Introduction to electrodynamics' 3<sup>rd</sup> edition, Prentice Hall.

<b>CS-105B</b>	<b>COMPUTER PROGRAMMING</b>	<b>L-T-P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

**Unit-1: INTRODUCTION TO COMPUTER SYSTEM:** Computer Fundamentals: Definition, Block Diagram along with Computer components, Characteristics & classification of computers, hardware & software, types of software, Introduction to Compiler, Assembler, and Interpreter, Operating System, Definition, functions, data representation – bits and bytes and operations of data, radix number system – decimal, binary, octal, hexadecimal numbers and their inter conversions, representation of information inside the computers.

**Unit-2: BASICS OF PROGRAMMING AND OVERVIEW OF C PROGRAMMING:** Programming Fundamental, Problem definition, Algorithm, Flow charts and their symbols Types of programming languages, Translators, Introduction to C, Structure of C program, C character set, Identifier and Keywords, Data types, constants, variables, Declaration, expressions, statements, Symbolic constants, type conversion, Types of operators, Input and output functions in C, header files, common programming errors, Control Statements, Sequencing, Selection, Condition and iteration.

**Unit-3: COMPOSITE DATA TYPES:** Declaring, Referencing and initializing arrays, array subscript, using for loop for sequential access, multi-dimensional array, String basics string library functions, assignment and substring, concatenation, string comparison. Declaration and Initialization of structure, structure within structure, Array of structure

**Unit-4: FUNCTIONS AND POINTERS:** Definition of function, function prototype, Purpose of main function, passing parameters, Scope of function, recursion, Call by value and reference, Types of storage classes, Scope of variable: Global and local, static variables, Recursion.. Pointer variables, initializing pointers, pointer operators, pointer expressions, pointers and arrays, pointer and functions,

**Unit-5: DYNAMIC MEMORY ALLOCATION AND FILE PROCESSING:** C's dynamic allocation functions.Streams and file types, opening and closing a data file, input and output operations, text mode versus binary mode, formatted input output operations with files, random access to files.

#### **Reference Books :-**

1. Programming in C by Schaum Series, McGraw Hills Publishers, New Delhi.
2. Let Us C by YashwantKanetkar; BPB Publication, New Delhi.
3. Exploring C by YashwantKanetkar; BPB Publications, New Delhi.
4. Application Programming in C by RS Salaria, Khanna Book Publishing Co. (P) Ltd., New Delhi.
5. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.
6. Programming with C Language by C Balaguruswami, Tata McGraw Hill, New Delhi.
7. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi

ENA-107B	COMMUNICATION SKILLS-1	L T P	Cr
		3-0-0	3

**UNIT 1: Communication and its elements:** An introduction to the need of communication competency; Role of vocabulary in effective communication; Word formation; A set of selected 50 synonyms, antonyms, homonyms & homophones; suffixes & prefixes

**UNIT 2: Listening and Reading Skills:** Listening comprehension & reading comprehension; Listening to recorded speeches, TV News and other audio materials to test listening comprehension with given exercises.

**UNIT 3: Writing Skills:** Ad Creation; Slogan making; Picture composition; Expanding hints, proverbs; Movie review.

**UNIT 4: Letter writing:** Types of letter writing; Structure & Lay out; Leave application; Letter of enquiry & response with respect to educational & official matters; Informal letter expressing or discussing social or educational issues.

**UNIT5: Spoken Skills:** Introduction to oral communication; Importance of Pronunciation; Importance of phonetics; Usage of Phonetics; Types of Conversation; Strategies for effective conversation for social and official interaction; Developing conversation on topics of current importance. Soft Skills Non-verbal Importance of Body Language and its usage to communicate better.

CE-109B	ENVIRONMETAL SCIENCE AND ECOLOGY	L T P	Cr
		2 -0 -0	2

**Unit-1:THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

**Unit-2:NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**Unit-3:ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

**Unit-4:BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

**Unit-5:ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management –floods, earthquake, cyclone and landslides.

#### TEXT BOOK

Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition, New Age International Publishers, 2004

#### REFERENCE BOOKS

5. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.

6. Bharucha Erach, "The Biodiversity of India", 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
7. Brunner R. C., "Hazardous Waste Incineration", 1st Edition McGraw Hill Inc., 1989.
8. Clark R.S., "Marine Pollution", 1st Edition Clanderson Press Oxford, 1989

EL-111B	BASICS OF ELECTRICAL & ELECTRONICS ENGG.	L T P	Cr
		2-0-0	2

**Unit-1:DC NETWORK THEOREMS:** Ohm's law; Voltage and current sources; Series parallel Circuits; Network Terminology; Kirchoff's laws; Network Simplification by using Loop method and Nodal method; Superposition Theorem; Thevenin's theorem; Norton's theorem, Maximum Power Transfer theorem; Star to Delta and Delta to Star transformation.

**Unit-2:SINGLE PHASE &THREE PHASE AC CIRCUITS:** AC Terminology; Derivation of RMS and maximum value of alternating current and voltage; Form factor and peak factor; Behavior of pure R, L & C components in ac circuits; single phase series R-L, R-C, R-L-C circuit; Introduction to resonance; Merits & Demerits of three phase system over single phase system; Three phases interconnection using star and Delta arrangement; Measurement of power using 2-wattmeter method.

**Unit-3:BASICS OF ELECTRICAL MACHINES:** Construction and operation of dc machines (both dc generator and motor); emf equation of dc generator; starting and speed control of dc motor; Necessity of starters in dc motors; Transformers- basic principle, its emf equation, operation of ideal & non-ideal transformer with Phasor diagrams, power losses, efficiency; introduction to auto-transformer.

**Unit-4:DIODES & TRANSISTORS:** Depletion layer; Barrier potential; Forward and reverse biasing of pn junction diode; switching Characteristics of p-n junction diode; zener diode; basic theory of operation of PNP and NPN transistor-VI characteristics; CB; CE and CC configuration; different biasing techniques.

**Unit-5:FIELD EFFECT TRANSISTOR AND THYRISTOR FAMILY:** Introduction of FET ; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction; theory of operation; MOSFET parameters; application, different biasing techniques of FET. Introductory idea of multistage and feedback amplifiers; Introduction to Thyristor Family (SCR).

#### TEXT BOOK

1. Gupta, J.B. "Electrical Technology", 2nd Edition, Katson Publication, 2007
2. Boylestad and Nashelsky, "Electronic Devices and Circuits", 4th Edition, Pearson Education, 1999.

#### REFERENCE BOOKS

1. Leonard S. Bobrow, "Fundamentals of Electrical Engineering", 2nd Edition, Oxford University Press, 2005



2. Kothari and Nagarath, “Basic Electrical Engg.”, 2nd Edition, Tata McGraw Hill
3. Malvino, “Electronic Principles”, 5th Edition, Tata McGraw Hill, 2004.
4. Millman and Halkias, “Electronic Devices and Circuits”, 2nd Edition, Tata McGraw Hill, 2000.

CH-113 B	APPLIED CHEMISTRY	L T P 3-1-0	Cr 4
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**Unit-1: Phase Rule:** Terminology, Definition of phase rule, Derivation of phase rule equation, One component system ( $H_2O$  system and  $CO_2$  system ), two components system, Simple eutectic system ( Pb – Ag), Pattinson’s Process, congruent system ( Zn – Mg ), incongruent system (Na-K system), Merits and demerits of phase rule.

**Unit-2: Thermodynamics:** Second law of thermodynamics, entropy change for reversible & irreversible processes, entropy change for ideal gas, variation of free energy with temperature & pressure, Gibbs-Helmholtz equation, Clapeyron- Clausius equation & it’s integrated form

**Unit-3: Corrosion and its prevention:** Definition, Types of corrosion: Dry, wet corrosion (rusting of iron), galvanic corrosion, differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, sacrificial protection and barrier protection), Soil Corrosion.

**Unit-4: Lubrication and Lubricants:** Introduction, mechanism of lubrication, Classification of lubricants, (Solid, semi-solid, liquid , emulsion & synthetic lubricants), Properties of lubricants (Flash & Fire point, Saponification number, Iodine value , Viscosity and Viscosity index Aniline point, Cloud point and pour point, corrosive tendency, decomposition stability).

**Unit-5: Qualitative aspects of water:** Sources of water, hardness of water and its Determination, (EDTA method), alkalinity of water and its determination, Related numerical problems, scale and sludge formation, Boiler corrosion & caustic embrittlement.

Desalination: RO method & electrodialysis. Softening of water: Zeolite method. Ion exchange method: Demineralized and mixed bed demineralize method.

<b>PH-151B</b>	<b>APPLIED PHYSICS LAB</b>	<b>L-T-P</b>	<b>Credits</b>
		<b>0-0-2</b>	<b>1</b>

#### **LIST OF EXPERIMENTS**

12. To find the wavelength of sodium light by Newton's rings experiment.
13. To find the wavelength of various colors of white light with the help of a plane transmission diffraction grating.
14. To find the refractive index of a prism by using spectrometer.
15. To determine the Cauchy's constant (A & B) of a prism by using spectrometer.
16. To find the resolving power of a telescope.
17. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
18. To find the specific rotation of sugar solution by using a Polarimeter.
19. To find the frequency of A.C. mains by using electric vibrator.
20. To find the wavelength of sodium light by Fresnel's bi-prism experiment.
21. To verify inverse square law.
22. To determine the capacity of a capacitor (unknown) by using flashing & quenching method.

#### **TEXT BOOK**

1. Worshnop, B. L. and Flint, H. T. "Advanced Practical Physics", KPH

#### **REFERENCE BOOKS**

1. Gupta, S. L. & Kumar, V. "Practical Physics", PragatiPrakashan
2. Chauhan & Singh, "Advanced Practical Physics Vol. I & II", PragatiPrakashan.

3. Advanced Practical Physics; Worsnop and Flint, Methuen & Co., London,

<b>EN-153 B</b>	<b>COMMUNICATION SKILLS LAB-1</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF EXPERIMENTS**

11. English Edge Self Learning Basics – Each module should be cleared systematically and star the intermediate as time permits as time permits. Students are free to go at their pace with the module even away from the campus.
12. Conversation ability to converse in given situations
13. Listening comprehension (Speeches, Dialogues, Narrations)
14. Discussion on the various topics- Group Discussion
15. Oral presentation of views / ideas based on the given picture/ hint
16. Role Play to develop a co-ordination between action and dialogue.
17. JAM
18. Extempore Speeches
19. Turncoat Speeches
20. Building a Story from a given beginning/ starting line.

<b>CS-155B</b>	<b>COMPUTER PROGRAMMING LAB</b>	<b>L-T-P 0-0-2</b>	<b>CR 1</b>
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**LIST OF EXPERIMENTS**

**SEQUENTIAL CONTROL STATEMENTS**

- 1 Write a program to Print HELLO
- 2 Write a program to add two numbers
- 3 Write a program to calculate simple interest
- 4 Write a program to calculate average of three numbers
- 5 Write a program to swap two numbers
- 6 Write a program to illustrate mixed data types
- 7 Write a program to calculate area and circumference of circle
- 8 Write a program to evaluate a polynomial expression
- 9 Write a program to add digits of a four digit number
- 10 Write a program to check whether the person is eligible for voting or not

## **CONDITIONAL CONTROL STATEMENTS**

- 11 Write a program to find greatest of two numbers
- 12 Write a program to find out which type of triangle it is
- 13 Write a program to find out greatest of three numbers
- 14 Write a program to evaluate performance of the student
- 15 Write a program to make a basic calculator

## **LOOP CONTROL STATEMENTS**

- 16 Write a program to print fibonacci upto the given limit
- 17 Write a program to find the sum of digits of a number
- 18 Write a program to find factorial of a number
- 19 Write a program to print table of any number

## **ARRAYS AND STRINGS**

- 20 Write a program to enter the elements in a one dimensional array
- 21 Write a program to find the sum and average of five numbers
- 22 Write a program to sort the array elements
- 23 Write a program to enter the marks of 50 students and calculate the average
- 24 Write a program to add 2 matrix
- 25 Write a program to multiply 2 matrices
- 26 Write a program to calculate the length of string
- 27 Write a program to concatenate 2 strings
- 28 Write a program to reverse the string
- 29 Write a program to count the numbers of characters in a string
- 30 Write a program that converts lower case characters to upper case
- 31 Write a program without using predefined functions to check whether the string is palindrome or not

## **FUNCTIONS**

- 32 Write a program using function to find the largest of three numbers
- 33 Write a program using function to swap two numbers using call by value
- 34 Write a program using function to swap two numbers using call by reference
- 35 Write a program using function to sum the digits of a number
- 36 Write a program to calculate factorial of a number using recursive function
- 37 Write a program to print first n fibonacci using recursive function

#### **POINTERS**

- 38 Write a program to illustrate the concept of chain of pointers
- 39 Write a program to calculate the area and perimeter of circle using pointers
- 40 Write a program to find largest of three numbers

#### **STRUCTURES**

- 41 Write a program to read an employee record using structure and print it
- 42 Write a program to prepare salary chart of employee using array of structures

<b>EL-157B</b>	<b>BASICS OF ELECTRICAL &amp; ELECTRONICS ENGG. LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

#### **LIST OF PRACTICALS**

1. To verify KCL and KVL in a given DC circuit.
2. To verify Thevenin's and Norton's Theorems.
3. To verify maximum power transfer theorem in D.C Circuit.
4. To verify Reciprocity and Superposition theorems on Dc circuit.
5. To study frequency response of a series & parallel R-L-C circuit and determine its resonant frequency.
6. To perform direct load test of a transformer and plot its efficiency Vs load characteristic.
- 7.. To study V-I characteristics of diode; and its use as a capacitance.
8. Study of the characteristics of transistor in Common Base configuration.
9. Study of the characteristics of transistor in Common Emitter configuration.
10. Study of V-I characteristics of a photo-voltaic cell.

#### **REFERENCE BOOKS**

4. Theraja, B.L. "Electrical Technology Vol I & II", S. Chand Publications, 2005
5. Kothari and Nagarith, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill, 2002

6. Del Torro Vincent, “Electrical Engineering Fundamentals”, 2nd Edition, Prentice Hall of India, 1994.
7. Cathey, J.J. and Naser, S.A. “Basic Electrical Engg.”, 2nd Edition, Schaum

<b>ME-159 B</b>	<b>WORKSHOP PRACTICE – I</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>2</b>

### **1.MACHINE SHOP**

Step turning & Taper turning Operation

Exercise 1.To obtain required diameters (steps) on a cylindrical work piece with the given lengths.

Shoulder Turning

Exercise 2.To obtain required diameters on a cylindrical work piece with the given dimensions.

### **2. CARPENTARY SHOP. Dove Tail Lap Joint**

Exercise 3.To make a dovetail lap joint Cross Half Lap Joint

Exercise 4.To make a Cross Half Lap Joint

### **3. SHEET METAL SHOP**

Exercise 5. To make a funnel using G.I Sheet as per dimensions provided.

Exercise 6.To make a Square box using G.I Sheet as per the dimension.

### **4. WELDING SHOP**

Exercise 7. To make a single v-butt joint, using the given mild steel pieces of and by arc welding.

Exercise 8 To make a T- joint using the given mild steel pieces and by arc welding.

## **5. FOUNDRY SHOP**

### **MOULD FOR A SOLID**

Exercise 9 To prepare a sand mould, using the given Single piece pattern.

Exercise 10.To prepare a sand mould, using the given Split piece pattern.

<b>CH-161 B</b>	<b>APPLIED CHEMISTRY LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF PRACTICALS**

- (xi) Determination of  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  hardness of water using EDTA solution
- (xii) Determination of alkalinity of water sample using phenolphthalein & methyl orange.
- (xiii) To find out the melting point & eutectic point for a two component system by using method of cooling curve.
- (xiv) Determination of viscosity of lubricating oil by Redwood Viscosity ( No. 1).
- (xv) To Prepare Phenol – formaldehyde and Urea formaldehyde resin.
- (xvi) To find out saponification value of given oil.
- (xvii) To determine TDS of Water samples of different sources.
- (xviii) To determine of concentration of given  $\text{KMnO}_4$  solution using spectrophotometer.
- (xix) To determine the strength of HCl solution by titrating against NaOH Solution conductometrically .



(xx) To determine the  $\text{Na}^+$  and  $\text{K}^+$  ions with the help of flame photometry

ME-163 B	COMPUTER BASED ENGINEERING GRAPHICS	L-T-P	Credits
		0-0-4	2

**Unit-1:Geometrical construction of simple plane figure:** Bisecting the line, draw perpendicular, parallel line, bisect angle, trisect angle, construct equatorial triangle, square, polygon, inscribed circle ,Free hand sketching, prerequisites for freehand sketching, sketching of regular and irregular figures, Drawing scales, Engineering scale, graphical scale, plane scale, diagonal scale, comparative scale, scale of chord .

**Unit-2:Projection of points, lines and plane, Orthographic Projection ,**Principle of projection, method of

projection, orthographic projection, plane of projection, first angle of projection, third angle of projection, reference line A point is situated in the first quadrant, point is situated in the second quadrant, point is situated in the third quadrant, point is situated in the fourth quadrant, projection of line parallel to both the plane, line contained by one or both the plane, line perpendicular to one of the plane, line inclined to one plane and parallel to other, line inclined to both the plane, true length of line, Missing views.

**Unit-3:Orthographic projection of simple solid:** Introduction, types of solid, projection of solid when axis perpendicular to HP, axis perpendicular to VP, axis parallel to both HP and VP, axis inclined to both HP and VP, Missing views.

**Unit-4:Development of Solids and Isometric projection:** Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes, Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems

**Unit-5:Introduction to computer-aided drafting (CAD):** Cartesian and Polar Co-ordinate system, Absolute and Relative Coordinates systems: Basic Commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline : Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror : Display Commands : Zoom, Pan, Redraw, and Regenerate : Simple dimensioning and text, simple exercises.

**Text and Reference books:**

B. Agrawal and CM Agrawal, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited, 2008.

D. A. Jolhe, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited, 2006.

K Venugopal, Engineering Drawing and Graphics, 2nd ed, New Age International, 1994.

MA-102B	ADVANCE MATHEMATICS & APPLIED NUMERICAL METHODS	L-T-P	Credits
		3-1-0	4

#### **OBJECTIVE:**

To acquaint the students with the various concepts and tools of applied mathematics which will be very basic and the very soul and guide of various engineering subject.

**Unit-I: SOLUTION OF NONLINEAR EQUATIONS :** Introduction to numbers and their accuracy; absolute, relative and percentage errors and their analysis; Bisection method ; Regula- falsi method; secant method; Newton- Raphson method.

**Unit-II: SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS & INTERPOLATION :** Gauss elimination method; Gauss-Jordan method; Jacobi's iteration method; Gauss-Seidal iteration method; : Introduction to interpolation; Newton's forward and backward interpolation formulae; Stirling formula; Lagrange interpolation; Newton's divided difference formula.

**Unit-III: NUMERICAL DIFFERENTIATION AND INTEGRATION & SOLUTION OF ORDINARY DIFFERENTIAL EQUATION:** Numerical differentiation formulae: differentiation by using forward interpolation formula; backward interpolation formula; Stirling formula; Newton-Cotes formula for numerical integration: Trapezoidal rule; Simpson's rules. Taylor series method; Euler method; Euler modified method; Rungekutta method.

**Unit-IV: LAPLACE TRANSFORMS AND ITS APPLICATIONS:** Laplace transform (LT) of elementary functions; properties of LT; existence conditions of LT; LT of derivatives; LT of integrals; LT of the function multiplication by t; LT of the function division by t; inverse LT's; LT of convolution of two functions.

**Unit V: FOURIER SERIES:** Euler's formula; conditions for a Fourier expansion; change of interval; Fourier expansion of odd and even function; Fourier expansion of square wave, rectangular wave.

#### TEXT BOOK

Grewal, B. S., "Numerical methods in Engineering and Science", 9<sup>th</sup> Edition, 2010, Khanna publishers. And Higher Engineering Mathematics: B. S. Grewal

#### REFERENCE BOOKS

5. Jain, R.K. and Iyengar, S.R.K., "Numerical Methods for Scientific and Engg. Computations", 5<sup>th</sup> Edition, 2007, New Age International publishers.
6. Sastry, S.S., "Introductory Methods of Numerical Analysis", 3<sup>rd</sup> Edition, 1999, Prentice Hall of India.
7. Advanced Engg Mathematics: Michael D. Greenberg  
Advanced Engineering Mathematics: E. Kreyszig

ENA-104 B	COMMUNICATION SKILLS-II	L T P	Cr
		3-0-0	3

**Unit 1: Vocabulary:-**One word substitution, words often confused, Phrasal verbs & idioms & foreign words & phrases (30 each) and their usage in sentences.

**Unit 2: Applied Grammar:-** Parts of speech – conversion and usage; Rules of concord: grammatical and notional Concord ,Types of sentences, conditional sentences, Sentence correction with respect to Parts of speech, tenses & types of sentences, principle of subject &verb.

**Unit3:- Technical Writing:-**Resume Writing (interview skills), Report writing, Types of report including press report by individual – students.

**Unit 4:-Reading Comprehension:-**Comprehending selected prose & poem, unseen passages and preparing précis, Note making, Frankenstein - Mary Shelley

**Unit 5: Business correspondence:-**Format of Business letter writing, Strategies for effective letter writing; Letter of business enquiry, complaint, adjustment and placing order.

**Prescribed Text book**

4. Technical Communication Principles & Practice (2<sup>nd</sup> Ed.) by Meenakshi Raman &Sangeeta Sharma published by Oxford University
5. The Functional Aspects of Communication Skills by Dr.Prajapati Prasad published by S.K.Kataria& Sons
6. Business Communication by K.Sundar& A Kumara Raj published by Vijay Nicole Imprints Pvt Ltd. Chennai

**SUGGESTED READING:**

1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press
2. Common Errors in English, AbulHashem, Ramesh Publishing House, new Delhi.
3. Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
4. Spoken English for India, R.K. Bansal& J.B. Harrison, Orient Longman, Delhi.
5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.
6. English Phonetics & Phonology, P. Roach, Cambridge University Press, London

BA-106 B	Engineering Economics and Industrial Management	L T P	Cr
		3-0-0	3

## **UNIT 1**

Meaning and definition of Economics, Central Problem of an economy, Demand, Law of Demand, Elasticity of Demand, Meaning of production, production function, law of variable proportion, cost concept, fixed cost, variable cost, average cost, marginal cost and opportunity cost.

## **Unit 2**

Meaning of market and main features of Perfect Competition, Monopoly, Oligopoly and Monopolistic Competition. National Income: GDP and GNP

## **Unit 3**

Definition of management, Nature and scope of management, Functions of management: Planning, Organizing, Staffing, Directing and Controlling

## **Unit 4**

Meaning of marketing management, Concept of marketing, Functions of marketing, Marketing Mix

## **Unit 5**

Meaning, Nature and scope of financial management, Functions of Financial Management, Objectives of FM, Sources of finance: Short term finance, Medium term finance and Long term finance. Stock exchange: NSE, BSE and NIFTY

Reference Books for Economics:

4. P.N. Chopra, Principles of economics, Kalyani Publishers
5. H.L. Ahuja, Modern Economic theory, S. Chand
6. S. K. Mishra, Modern Micro Economics, Pragati Publications

Reference books for management

4. T.N. Chabra, Principles of Management, DhanpatRai Publishers
5. L.M. Prasad, Principles & Practices of management, Sultan Chand & Sons 2005
6. Harold Koontz & O' Doneell Cyril Management, McGraw Hill, 1968.

<b>EC-108 B</b>	<b>DIGITAL ELECTRONICS</b>	<b>L T P</b>	<b>CR</b>
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**OBJECTIVE** Modern world deals with digital conditioning of various signals. Digitally manipulating signals or using digital circuits have a lot of advantages in terms of accuracy etc. This subject introduces concept of basic digital electronics: gates; combinational and sequential circuits and their designing

### **1- INTRODUCTION OF GATES, COMBINATIONAL DESIGN BY USING GATES AND SIMPLIFICATION**

Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess- 3; Gray; EBCDIC; ASCII; Error detection and correction codes; Design using gates; Karnaugh map and QuineMccluskey methods of simplification.

### **2 COMBINATIONAL DESIGN USING MSI DEVICES:**

Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers for display devices.

**3 SEQUENTIAL CIRCUITS:** Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.

**4. DIGITAL LOGIC Families:** Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

### **5. A/D AND D/A CONVERTERS & PLD:**

Sample and hold circuit; weighted resistor and R -2 R ladder D/A Converters; specifications for D/A converters. A/D converters : successive approximation; counting type;ROM; PLA; PAL; FPGA and CPLDs.

### **TEXT BOOK**

Jain, R.P., “Modern Digital Electronics”, 4th Ed.; Tata McGraw Hill, 2003

### **REFERENCE BOOKS**

1. Taub and Schilling, ”Digital Integrated Electronics” Tata McGraw Hill,1997
2. Malvino and Leach; ”Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006
3. Mano, Morris, “Digital Design”, 3rd Edition, Prentice Hall of India,1994
4. Gupta and Singhal, “Digital Electronics”, 2nd Edition, Dhanpat Rai and Sons, 2000.
5. Wakerly, John F, ”Digital Design Principles and Practices”, 4th Edition, Prentice Hall of India,2005

ME - 108 B	ENGINEERING MECHANICS	L T P	Cr
		3 1 0	4

## OBJECTIVE

Engineering Mechanics is one of the core subjects that introduces the student to analysis of forces and motion and prepares the student for studying strength of materials and theory of machines.

- 6 **FORCE SYSTEMS:** Basic concepts of space, time, mass, force, particle and rigid body; scalars and vectors; principle of transmissibility; force classification; Representation of force in vector form; rectangular components of two dimensional force systems; resultant of two dimensional and concurrent force systems; moment about a point; Varignon's theorem; Representation of moment in vector form; couple. Numerical.
- 7 **EQUILIBRIUM:** Equilibrium in two dimensions; Lame's Theorem; system isolation and the free-body-diagram; modeling the action of forces; equilibrium conditions; Numerical.
- 8 **PROPERTIES OF SURFACES/CROSS SECTIONS:** Centre of mass; determining the centre of gravity; centre of gravity of areas including composite sections; moments of inertia; MI of plane figures; parallel axis & perpendicular axis theorem;; MI of composite figures. Numerical.
- 9 **RECTILINEAR AND CURVILINEAR MOTION :** Types of motion ,definitions of displacement , distance, velocity , speed , acceleration Newton's laws of motion , Uniform and non uniform motion equations of motion , motion under gravity. Numerical.
- 10 **PROJECTILES :** Angle of projection , Trajectory , Range of projectile , Duration of flight , Path of projectile , Greatest height attained by a projectile. Numerical.

## TEXT BOOK

Meriam, J. L. "Engineering Mechanics", John Wiley & Sons.

## REFERENCE BOOKS

4. Beer, F.P. and Johnston, E.R. "Mechanics of Materials", Tata McGraw Hill
5. Shames, I.H. "Engineering Mechanics", 4th Edition, Pearson Education, 2003
6. Pytel, A and Kiusalaas, J. Thomsom, "Mechanics of Materials", Brooks & Cole, 2003

## WEB REFERENCES

[www.eCourses.ou.edu](http://www.eCourses.ou.edu)

CS-110B	DATA STRUCTURE AND ALGORITHMS	L T P	Cr
		4 0 0	4

**OBJECTIVE:** To relay the theoretical and practical fundamental knowledge of most commonly used algorithms.

PRE-REQUISITES: Knowledge of basic computer programming

6. **INTRODUCTION TO DATA STRUCTURES AND RUNNING TIME:** Definition of data structures and abstract data types; linear vs. non-linear data structure; primitive vs. non-primitive data structure; static and dynamic implementations; arrays, 1,2-dimensional arrays, insertion & deletion in 1-D array; examples and real life applications. Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion.
7. **STACKS AND QUEUES:** Stacks: definition, array based implementation of stacks;; examples: infix, postfix, prefix representation; conversions, applications; definition of queues, circular queue; array based implementation of queues.
8. **LINKED LISTS:** Lists; different type of linked Lists; implementation of singly linked list, linked list implementation of stacks and queues; implementation of circular linked list; implementation of doubly linked list, applications.
9. **TREES AND GRAPHS:** Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees: searching, insertion & deletion. Definition of undirected and directed graphs; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; graph traversal: breadth first traversal, depth first traversal; implementations and applications.
10. **SORTING AND SEARCHING ALGORITHMS:** Introduction, selection, insertions, bubble sort, efficiency of above algorithms; merge sort, merging of sorted arrays and algorithms; quick sort algorithm analysis, heap sort, searching algorithms: straight sequential search, binary search (recursive & non-recursive algorithms)

#### TEXT BOOK

1. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++ , Prentice Hall of India, 2009.
2. R. S.Salariya, Data Structure and Algorithm, Khanna Publications.



## REFERENCE BOOKS

9. Aho A. V., Hopcroft J. E. and Ullman T. D., —Data Structures and Algorithms, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
10. Horowitz Ellis and Sahni Sartaj, —Fundamentals of Data Structures, Addison-Wesley Pub, 1984.
11. Horowitz, Sahni and Rajasekaran, —Fundamentals of Computer Algorithms 2007.
12. Kruse Robert, —Data Structures and Program Design in C, Prentice Hall of India, 1994
13. Lipschitz Jr. Seymour, —Theory & Problems of Data Structures, Schaum's Outline, Tata McGraw Hill
14. Weiss Mark Allen, —Data Structures and Algorithms Analysis in C, Pearson Education, 2000
15. Cormen T.H. et al., —Introduction to Algorithms, 2nd Edition, Prentice Hall of India, 2001.
16. Dasgupta Sanjay, Christos P. and Vazirani Umesh, —Algorithms, Tata McGraw Hill, 2008

<b>CE-110 B</b>	<b>Surveying</b>	<b>L T P</b>	<b>Cr</b>
		<b>3 0 0</b>	<b>3</b>

1. **FUNDAMENTALS & LINEAR MEASUREMENTS:** Compass and chain traversing: Principles of Surveying; Definition, objects, classification, fundamental; principles, methods of fixing stations. Measurement; Direct measurement, instruments for measuring distance, instruments for making stations, chaining of line. Errors in chaining, tape corrections example. Methods of traversing, instruments for measurement of angles: prismatic and surveyor's compass, bearing of lines, local attraction, examples.

2. **LEVELLING:** Definition of terms used in leveling; types of levels and staff; temporary adjustment of levels; principles of levelling; reduction of levels; booking of staff readings, examples. Contouring: characteristics of contour lines; locating contours, interpolation of contours.

3. **THEODOLITE AND PLANE TABLE SURVEYING:** Traversing; Theodolite: temporary adjustment of theodolite, measurement of angles, repetition and reiteration method. Traverse surveying with theodolite; checks in traversing, adjustment of closed traverse, examples. Plane table: methods of plane table surveying: radiation, intersection, traversing and resection. Two point and three point problems.

4. **TACHEOMETRY:** Uses of tacheometry, principle of tacheometric surveying, instruments used in tacheometry, systems of tacheometric surveying: stadia system' fixed hair method, determination of tacheometric constants, tangential systems, examples.

5. **CURVES:** Classification of Curves, elements of simple circular curve, location of tangent points; Chain & Tape methods, instrumental methods, examples of simple curves, Transition curves; Length & type of transition curves, length of combined curves, examples. Vertical curves: Necessity & types of vertical curves. TEXT BOOK Punmia, B.C., Jain Ashok Kumar, Jain. Arun Kumar., "SURVEY –I", Laxmi Publication Pvt Limited, New Delhi, 2005 REFERENCE BOOKS 1.Kanitkar T.P., "SURVEY –I", Standard Publication, New Delhi, 2008 2.Subramania.R., "Surveying and leveling, second Edition, Oxford University Press, India, 2012 3.Duggal, S.K., "Surveying Volume –I" Tata McGraw Hill, July 2004 4. Bannister., "Surveying", 7th Edition, Pearson Education, 2009 5. William, Irvine., Finlay, MacLennan., "Survey for Construction", McGraw-Hill, 5th Edition, 2006.

EL-111B	BASICS OF ELECTRICAL & ELECTRONICS ENGG.	L T P	Cr
		3-0-0	3

**Unit-1:DC NETWORK THEOREMS:** Ohm's law; Voltage and current sources; Series parallel Circuits; Network Terminology; Kirchoff's laws; Network Simplification by using Loop method and Nodal method; Superposition Theorem; Thevenin's theorem; Norton's theorem, Maximum Power Transfer theorem; Star to Delta and Delta to Star transformation.

**Unit-2:SINGLE PHASE &THREE PHASE AC CIRCUITS:** AC Terminology; Derivation of RMS and maximum value of alternating current and voltage; Form factor and peak factor; Behavior of pure R, L & C components in ac circuits; single phase series R-L, R-C, R-L-C circuit; Introduction to resonance; Merits & Demerits of three phase system over single phase system;Three phases interconnection using star and Delta arrangement;Measurement of power using 2-wattmeter method.

**Unit-3:BASICS OF ELECTRICAL MACHINES:** Construction and operation of dc machines (both dc generator and motor); emf equation of dc generator; starting and speed control of dc motor; Necessity of starters in dc motors; Transformers- basic principle, its emf equation, operation of ideal & non-ideal transformer with Phasor diagrams, power losses, efficiency; introduction to auto-transformer.

**Unit-4:DIODES & TRANSISTORS:** Depletion layer; Barrier potential; Forward and reverse biasing of pn junction diode; switching Characteristics of p-n junction diode; zener diode; basic theory of operation of PNP and NPN transistor-VI characteristics; CB; CE and CC configuration; different biasing techniques.

**Unit-5:FIELD EFFECT TRANSISTOR AND THYRISTOR FAMILY:** Introduction of FET ; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction;theory of operation; MOSFET parameters; application, different biasing techniques of FET. Introductory idea of multistage and feedback amplifiers; Introduction to Thyristor Family (SCR).

#### TEXT BOOK

1. Gupta, J.B. "Electrical Technology", 2nd Edition, Katson Publication, 2007
2. Boylestad and Nashelsky, "Electronic Devices and Circuits", 4th Edition, Pearson Education, 1999.

#### REFERENCE BOOKS

1. Leonard S. Bobrow, "Fundamentals of Electrical Engineering", 2nd Edition, Oxford University Press, 2005
2. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill
3. Malvino, "Electronic Principles", 5th Edition, Tata McGraw Hill, 2004.
4. Millman and Halkias, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2000

<b>ME-112B</b>	<b>Machine Drawing</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>2</b>

Objective: This course makes the student to learn the representation of components and assemblies into various views and vice versa. This will enable the student to learn to conceive an object and go for its production.

### 1. INTRODUCTION

Introduction to Graphic language, Sectional views, Types of sectional views, Hatching, Isometric scale, Isometric drawing of Circles; Conversion of isometric to orthographic and vice versa.

### 2. TOLERANCE AND MACHINE COMPONENTS

Standard abbreviation – Limits , Fits and Tolerance, Surface finish; Gear terminology, types of gear; Draw the gear profile; Springs, Belts & Pulleys, Bearings.

### 3. KEYS AND COTTERS

Various types of keys and cotters, Spigot and socket joint, Gib and cotter joint, Knuckle joint

### 4. JOINTS AND COUPLINGS

Rivets and Riveted Joints, Caulking and fullering of riveted joints, Types of riveted joints, Bolts and nuts, Welded Joint, Flange coupling (Protected and non-protected), muff coupling and half-lap muff Coupling.

### 5. ASSEMBLY DRAWING

Assembly of Lathe Tail stock, Machine vice; Cylinder, Piston, rings and Connecting rod; Steam stop valve, Stuffing box, Drill jigs and Milling fixture, Screw Jack.

Text Books:

1. Machine Drawing - N D Bhatt and V M Panchal, Charotar Publishing House.
2. A Text Book of Machine Drawing - P S Gill Pub.: S K Kataria & Sons.

Reference Books:

1. A Text Book of Machine Drawing Laxmi Narayana and Mathur, M/s. Jain Brothers, New Delhi.
2. Machine drawing by N Sidheshwar, Kannaiah, V S Sastry, TMH., New Delhi.

<b>EC-112-B</b>	<b>ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES</b>	<b>L T P</b>	<b>CR</b>
		<b>3 0 0</b>	<b>3</b>

**OBJECTIVE** The objective of this course is to introduce the student to basic concept of semiconductor device operation based on energy bands and carrier statistics. It also provides the operation of p-n junctions and metal-semiconductor junctions. It extends this knowledge to descriptions of bipolar and field effect transistors, and other microelectronic basic devices. This course is intended for students who plan to study in the area of microelectronics or just have an interest in that area. This course emphasizes the fundamentals of materials and device operation. It is expected that the students taking this course will include ECE and non-EE majors. In this course, one will study semiconductor devices from a fundamental point of view emphasizing a thorough understanding of the mechanisms of device operation. It is expected that students who successfully complete the course will have an understanding of basic semiconductor devices sufficient to design transistors and diodes to particular specifications.

**1 CONDUCTING MATERIALS:** Drift velocity, collision time; Mean free path; mobility; conductivity; relaxation time; factors affecting conductivity of materials; types of thermal conductivity; Wiedemann-Franz law; Super conductivity; applications.

**2. DIELECTRIC MATERIALS:** Behavior of dielectric materials in static electric field; Dipole moments; Polarization; Dielectric constant; Polarizability, Susceptibility; mechanisms of polarization; behavior in alternating field; dielectric loss; loss tangent types of dielectric and insulating materials; electrostriction; Piezo-electricity.

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**MAGNETIC MATERIALS:** Permeability; Magnetic susceptibility; magnetic moment; origin of magnetic dipole moment; angular momentum; Magnetization; Classification of magnetic materials-Para; Dia, ferro, antiferro; and ferri; Langevin's theory of dia; Curie-Weiss law; spontaneous magnetism; domain theory; Magnetosriction; eddy current and hysteresis losses; applications.

7. **SEMICONDUCTORS:** Review of Si and Ge as semi-conducting materials; Continuity Equation; P-N junction; Drift and Diffusion; Diffusion and Transition capacitances of P-N junction; breakdown mechanisms; ZENER diode.

4 **OPTICAL PROPERTIES OF MATERIALS:** Optical properties of metals; semiconductors and insulators; Phosphoresence; Luminiscense; Phosphors for CRO; display material for LCD; LED; solar cells and photo-detectors.

11. **SEMICONDUCTOR DEVICES:** Brief introduction to Planar Technology for device fabrication; BJT; JFET; MOSFETS.

**POWER DEVICES:** Thyristor; IGBT; VMOS; UJT; GTO; their working principles and characteristics.

**TEXT BOOK** Dekker, A.J., —Electrical Engineering Materials, 3rd Ed. Pentice Hall of India; 2009

#### **REFERENCE BOOKS**

1. Boylested and Nashelsky, —Electronic Devices and Circuit Theory, Pearson. Education, 2009
2. DuttaAlok, —Semiconductor Devices and Circuits, Oxford University Press, 2008
3. Streetman and Banerjee, —Solid State Electronic Devices, Pearson, 2010
4. Millman and Halkias, —Electronic Devices and Circuits, McGraw Hill, 1996
5. Gupta, J.B., —Electrical Engineering Materials and Semiconductor Devices, Katsons, 2006

**B.Tech Automobile Engineering (I SEMESTER)**

<b>MA-101B</b>	<b>APPLIED MATHEMATICS-I</b>	<b>L-T-P 4-0-0</b>	<b>Credits 4</b>
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**Unit-1: MATRICES AND ITS APPLICATIONS:** Elementary transformations; inverse of the matrix using elementary transformation; normal form of a matrix; rank of a matrix; solution of simultaneous linear equations; linear dependence and independence of vectors; linear and orthogonal transformations; eigen values, eigen vectors and properties; Cayley-Hamilton theorem and its applications; diagonalization of matrices.

**Unit-2:INFINITE SERIES:** Convergence and divergence; comparison test;D'Alembert's ratio test;Cauchy's root test;Raabe's test; logarithmic test;Gausstest;Cauchy's integral test;Leibnitz's alternate series test; absolutely convergent; conditionally convergent.

**Unit-3:CALCULUS OF SINGLE VARIABLE:** Successive Differentiation and Leibnitz theorem Taylor's series and Maclaurin's series; asymptotes; curvature.

**Unit-4: CALCULUS OF SEVERAL VARIABLES:**Functions of two or more variables; partial derivatives; total differential and differentiability; derivative of composite and implicit functions;Jacobians. Homogeneous

functions and Euler's theorem; Taylor's series for functions of two variables; maxima-minima of function of two and three variables, Lagrange's method of undetermined multipliers; differentiation under integral sign.

**Unit-5: MULTIPLE INTEGRATIONS:** Double integral; change of order of integration; double integral in polar co-ordinates. Triple integration; change of variable. Application of double integral to find area enclosed by plane curves and volume of solids of revolution; volume of solid; beta & gamma functions and relationship between them.

**TEXT BOOK:**

Grewal, B.S., "Higher Engineering Mathematics", 41<sup>st</sup> Edition, 2010, Khanna Publishers.

**REFERENCE BOOKS**

1. Kreyszig, E., "Advance Engineering Mathematics", 10<sup>th</sup> Edition, 2011, Wiley India Publishers, New Delhi
2. Weir, M. D., Hass, J. and Giordano, F. R., "Thomas Calculus", 11<sup>th</sup> Edition, 2012, Pearson Education.
3. Jain, R.K. and Iyengar, S.R.K., "Advance Engineering Mathematics", 3<sup>rd</sup> Edition, 2002, Narosa Publishing House New Delhi.
4. Dass, H.K., "Higher Engineering Mathematics", 10<sup>th</sup> Edition, 2008, S. Chand & Company Ltd.
5. "Higher Engineering Mathematics" by H.C Taneja



PH-103 B	APPLIED PHYSICS	L-T-P	Credits
		4-0-0	4

#### Unit-1: Wave Optics-I

**Interference:** Interference of light and its necessary conditions, path & Phase difference for reflected & transmitted rays, Interference in thin films (parallel and wedge shaped film), Newton's rings.

**Diffraction:** Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

#### Unit-2: Wave Optics-II

**Polarization:** Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate (Quarter & Half).

**Laser:** Spontaneous and stimulated emission of radiation, population inversion, construction and working of Ruby, He-Ne lasers and laser applications.

**Fiber Optics:** Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Single and Multi Mode Fibers

### **Unit-3: Dielectric**

**Dielectric Properties:** Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability). Displacement vector (D), Magnetic susceptibility, Relation between D, E And P, ClaussiusMussoti Equation, Important applications of dielectric material.

### **Unit-4: Magnetic & Superconducting properties of matter**

#### **Magnetic**

**Properties:** Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Applications of Magnetism.

**Superconductors:** Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type I and Type II superconductors. Applications of Superconductors.

### **Unit-5: Relativistic Mechanics**

Inertial & non-inertial frames, Michelson- Morley experiment, Einstein's postulates, Lorentz transformation equations, Length contraction & Time dilation, Addition of velocities; Variation of mass with velocity, Mass energy equivalence

### **TEXT BOOK**

1. BrijLal and Subramanyam, "A Text Book of Optics" S. Chand & Co.
2. Modern Physics for Engineers – S.P.Taneja (R. Chand)
3. Engineering Physics – SatyaPrakash (PragatiPrakashan).

### **REFERENCE BOOKS**

1. Sears, F.W., "Electricity and Magnetism", Narosa
2. Arthur Beiser, "Perspectives of Modern Physics", Tata McGraw Hill
3. AjoyGhatak 'Optics' Tata McGraw-Hill Education, 2005.
4. David Halliday, Robert Resnick and Jearl Walker, "Fundamentals of physics", 4th edition.
5. David J. Griffiths, 'Introduction to electrodynamics' 3<sup>rd</sup> edition, Prentice Hall.

CS-105B	COMPUTER PROGRAMMING	L-T-P	Cr
		3-0-0	3

**Unit-1: INTRODUCTION TO COMPUTER SYSTEM:** Computer Fundamentals: Definition, Block Diagram along with Computer components, Characteristics & classification of computers, hardware & software, types of software, Introduction to Compiler, Assembler, and Interpreter, Operating System, Definition, functions, data representation – bits and bytes and operations of data, radix number system – decimal, binary, octal, hexadecimal numbers and their inter conversions, representation of information inside the computers.

**Unit-2: BASICS OF PROGRAMMING AND OVERVIEW OF C PROGRAMMING:** Programming Fundamental, Problem definition, Algorithm, Flow charts and their symbols Types of programming languages, Translators,

Introduction to C, Structure of C program, C character set, Identifier and Keywords, Data types, constants, variables, Declaration, expressions, statements, Symbolic constants, type conversion, Types of operators, Input and output functions in C, header files, common programming errors, Control Statements, Sequencing, Selection, Condition and iteration.

**Unit-3: COMPOSITE DATA TYPES:** Declaring, Referencing and initializing arrays, array subscript, using for loop for sequential access, multi-dimensional array, String basics string library functions, assignment and substring, concatenation, string comparison. Declaration and Initialization of structure, structure within structure, Array of structure

**Unit-4: FUNCTIONS AND POINTERS:** Definition of function, function prototype, Purpose of main function, passing parameters, Scope of function, recursion, Call by value and reference, Types of storage classes, Scope of variable: Global and local, static variables, Recursion.. Pointer variables, initializing pointers, pointer operators, pointer expressions, pointers and arrays, pointer and functions,

**Unit-5: DYNAMIC MEMORY ALLOCATION AND FILE PROCESSING:** C's dynamic allocation functions.Streams and file types, opening and closing a data file, input and output operations, text mode versus binary mode, formatted input output operations with files, random access to files.

**Reference Books :-**

1. Programming in C by Schaum Series, McGraw Hills Publishers, New Delhi.
2. Let Us C by YashwantKanetkar; BPB Publication, New Delhi.
3. Exploring C by YashwantKanetkar; BPB Publications, New Delhi.
4. Application Programming in C by RS Salaria, Khanna Book Publishing Co. (P) Ltd., New Delhi.
5. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.
6. Programming with C Language by C Balaguruswami, Tata McGraw Hill, New Delhi.

ENA-107B	COMMUNICATION SKILLS-1	L T P	Cr
		3-0-0	3

**UNIT 1: Communication and its elements:** An introduction to the need of communication competency; Role of vocabulary in effective communication; Word formation; A set of selected 50 synonyms, antonyms, homonyms & homophones; suffixes & prefixes

**UNIT 2: Listening and Reading Skills:** Listening comprehension & reading comprehension; Listening to recorded speeches, TV News and other audio materials to test listening comprehension with given exercises.

**UNIT 3: Writing Skills:** Ad Creation; Slogan making; Picture composition; Expanding hints, proverbs; Movie review.

**UNIT 4: Letter writing:** Types of letter writing; Structure & Lay out; Leave application; Letter of enquiry & response with respect to educational & official matters; Informal letter expressing or discussing social or educational issues.

**UNIT5: Spoken Skills:** Introduction to oral communication; Importance of Pronunciation; Importance of phonetics; Usage of Phonetics; Types of Conversation; Strategies for effective conversation for social and official interaction; Developing conversation on topics of current importance. Soft Skills Non-verbal Importance of Body Language and its usage to communicate better.

CE-109B	ENVIRONMETAL SCIENCE AND ECOLOGY	L T P	Cr
		2 -0 -0	2

**Unit-1:THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

**Unit-2:NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**Unit-3:ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

**Unit-4:BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

**Unit-5:ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management –floods, earthquake, cyclone and landslides.

#### **TEXT BOOK**

Kaushik, Anubha, and Kaushik, C.P., “Perspectives in Environmental Studies”, 4th Edition, New Age International Publishers, 2004

#### **REFERENCE BOOKS**

1. Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
2. BharuchaErach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
3. Brunner R. C., “Hazardous Waste Incineration”, 1st Edition McGraw Hill Inc., 1989.
4. Clark R.S., “Marine Pollution”, 1st Edition Clanderson Press Oxford,1989

EL-111B	BASICS OF ELECTRICAL & ELECTRONICS ENGG.	L T P	Cr
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		<b>2-0-0</b>	<b>2</b>
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**Unit-1: DC NETWORK THEOREMS:** Ohm's law; Voltage and current sources; Series parallel Circuits; Network Terminology; Kirchoff's laws; Network Simplification by using Loop method and Nodal method; Superposition Theorem; Thevenin's theorem; Norton's theorem, Maximum Power Transfer theorem; Star to Delta and Delta to Star transformation.

**Unit-2:SINGLE PHASE &THREE PHASE AC CIRCUITS:** AC Terminology; Derivation of RMS and maximum value of alternating current and voltage; Form factor and peak factor; Behavior of pure R, L & C components in ac circuits; single phase series R-L, R-C, R-L-C circuit; Introduction to resonance; Merits & Demerits of three phase system over single phase system;Three phases interconnection using star and Delta arrangement;Measurement of power using 2-wattmeter method.

**Unit-3:BASICS OF ELECTRICAL MACHINES:** Construction and operation of dc machines (both dc generator and motor); emf equation of dc generator; starting and speed control of dc motor; Necessity of starters in dc motors; Transformers- basic principle, its emf equation, operation of ideal & non-ideal transformer with Phasor diagrams, power losses, efficiency; introduction to auto-transformer.

**Unit-4:DIODES & TRANSISTORS:** Depletion layer; Barrier potential; Forward and reverse biasing of pn junction diode; switching Characteristics of p-n junction diode; zener diode; basic theory of operation of PNP and NPN transistor-VI characteristics; CB; CE and CC configuration; different biasing techniques.

**Unit-5:FIELD EFFECT TRANSISTOR AND THYRISTOR FAMILY:** Introduction of FET ; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction;theory of operation; MOSFET parameters; application, different biasing techniques of FET. Introductory idea of multistage and feedback amplifiers; Introduction to Thyristor Family (SCR).

#### TEXT BOOK

1. Gupta, J.B. "Electrical Technology", 2nd Edition, Katson Publication, 2007
2. Boylestad and Nashelsky, "Electronic Devices and Circuits", 4th Edition, Pearson Education, 1999.

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2. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill
3. Malvino, "Electronic Principles", 5th Edition, Tata McGraw Hill, 2004.
4. Millman and Halkias, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2000.

CH-113 B	APPLIED CHEMISTRY	L T P	Cr
		3-1-0	4

**Unit-1: Phase Rule:** Terminology, Definition of phase rule, Derivation of phase rule equation, One component system ( $H_2O$  system and  $CO_2$  system ), two components system, Simple eutectic system ( Pb – Ag), Pattinson's Process, congruent system ( Zn – Mg ), incongruent system (Na-K system), Merits and demerits of phase rule.

**Unit-2: Thermodynamics:** Second law of thermodynamics, entropy change for reversible & irreversible processes, entropy change for ideal gas, variation of free energy with temperature & pressure, Gibbs-Helmholtz equation, Clapeyron- Clausius equation & it's integrated form

**Unit-3: Corrosion and its prevention:** Definition, Types of corrosion: Dry, wet corrosion (rusting of iron), galvanic corrosion, differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, sacrificial protection and barrier protection), Soil Corrosion.

**Unit-4: Lubrication and Lubricants:** Introduction, mechanism of lubrication, Classification of lubricants, (Solid, semi-solid, liquid , emulsion & synthetic lubricants), Properties of lubricants (Flash & Fire point, Saponification number, Iodine value , Viscosity and Viscosity index Aniline point, Cloud point and pour point, corrosive tendency, decomposition stability).

**Unit-5: Qualitative aspects of water:** Sources of water, hardness of water and its Determination, (EDTA method), alkalinity of water and its determination, Related numerical problems, scale and sludge formation, Boiler corrosion & caustic embrittlement.

Desalination: RO method & electrodialysis. Softening of water: Zeolite method. Ion exchange method: Demineralized and mixed bed demineralize method.



<b>PH-151B</b>	<b>APPLIED PHYSICS LAB</b>	<b>L-T-P</b>	<b>Credits</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF EXPERIMENTS**

23. To find the wavelength of sodium light by Newton's rings experiment.
24. To find the wavelength of various colors of white light with the help of a plane transmission diffraction grating.
25. To find the refractive index of a prism by using spectrometer.
26. To determine the Cauchy's constant (A & B) of a prism by using spectrometer.
27. To find the resolving power of a telescope.
28. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
29. To find the specific rotation of sugar solution by using a Polarimeter.
30. To find the frequency of A.C. mains by using electric vibrator.
31. To find the wavelength of sodium light by Fresnel's bi-prism experiment.
32. To verify inverse square law.
33. To determine the capacity of a capacitor (unknown) by using flashing & quenching method.

### **TEXT BOOK**

1. Worsnop, B. L. and Flint, H. T. "Advanced Practical Physics", KPH

### **REFERENCE BOOKS**

1. Gupta, S. L. & Kumar, V. "Practical Physics", Pragati Prakashan
2. Chauhan & Singh, "Advanced Practical Physics Vol. I & II", Pragati Prakashan.
3. Advanced Practical Physics; Worsnop and Flint, Methuen & Co., London,

<b>EN-153 B</b>	<b>COMMUNICATION SKILLS LAB-1</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF EXPERIMENTS**

21. English Edge Self Learning Basics – Each module should be cleared systematically and start the intermediate as time permits as time permits. Students are free to go at their pace with the module even away from the campus.
22. Conversation ability to converse in given situations
23. Listening comprehension (Speeches, Dialogues, Narrations)
24. Discussion on the various topics- Group Discussion
25. Oral presentation of views / ideas based on the given picture/ hint
26. Role Play to develop a co-ordination between action and dialogue.
27. JAM
28. Extempore Speeches
29. Turncoat Speeches
30. Building a Story from a given beginning/ starting line.

<b>CS-155B</b>	<b>COMPUTER PROGRAMMING LAB</b>	<b>L-T-P 0-0-2</b>	<b>CR 1</b>
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### **LIST OF EXPERIMENTS**

#### **SEQUENTIAL CONTROL STATEMENTS**

- 1 Write a program to Print HELLO
- 2 Write a program to add two numbers
- 3 Write a program to calculate simple interest
- 4 Write a program to calculate average of three numbers
- 5 Write a program to swap two numbers
- 6 Write a program to illustrate mixed data types
- 7 Write a program to calculate area and circumference of circle
- 8 Write a program to evaluate a polynomial expression
- 9 Write a program to add digits of a four digit number
- 10 Write a program to check whether the person is eligible for voting or not

#### **CONDITIONAL CONTROL STATEMENTS**

- 11 Write a program to find greatest of two numbers
- 12 Write a program to find out which type of triangle it is
- 13 Write a program to find out greatest of three numbers
- 14 Write a program to evaluate performance of the student
- 15 Write a program to make a basic calculator

#### **LOOP CONTROL STATEMENTS**

- 16 Write a program to print fibonacci upto the given limit

- 17 Write a program to find the sum of digits of a number
- 18 Write a program to find factorial of a number
- 19 Write a program to print table of any number

### **ARRAYS AND STRINGS**

- 20 Write a program to enter the elements in a one dimensional array
- 21 Write a program to find the sum and average of five numbers
- 22 Write a program to sort the array elements
- 23 Write a program to enter the marks of 50 students and calculate the average
- 24 Write a program to add 2 matrix
- 25 Write a program to multiply 2 matrices
- 26 Write a program to calculate the length of string
- 27 Write a program to concatenate 2 strings
- 28 Write a program to reverse the string
- 29 Write a program to count the numbers of characters in a string
- 30 Write a program that converts lower case characters to upper case
- 31 Write a program without using predefined functions to check whether the string is palindrome or not

### **FUNCTIONS**

- 32 Write a program using function to find the largest of three numbers
- 33 Write a program using function to swap two numbers using call by value
- 34 Write a program using function to swap two numbers using call by reference
- 35 Write a program using function to sum the digits of a number
- 36 Write a program to calculate factorial of a number using recursive function
- 37 Write a program to print first n fibonacci using recursive function

### **POINTERS**

- 38 Write a program to illustrate the concept of chain of pointers

- 39 Write a program to calculate the area and perimeter of circle using pointers
- 40 Write a program to find largest of three numbers

### **STRUCTURES**

- 41 Write a program to read an employee record using structure and print it
- 42 Write a program to prepare salary chart of employee using array of structures

<b>EL-157B</b>	<b>BASICS OF ELECTRICAL &amp; ELECTRONICS ENGG. LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

### **LIST OF PRACTICALS**

1. To verify KCL and KVL in a given DC circuit.
2. To verify Thevenin's and Norton's Theorems.
3. To verify maximum power transfer theorem in D.C Circuit.
4. To verify Reciprocity and Superposition theorems on Dc circuit.
5. To study frequency response of a series & parallel R-L-C circuit and determine its resonant frequency.
6. To perform direct load test of a transformer and plot its efficiency Vs load characteristic.
- 7.. To study V-I characteristics of diode; and its use as a capacitance.
8. Study of the characteristics of transistor in Common Base configuration.
9. Study of the characteristics of transistor in Common Emitter configuration.
10. Study of V-I characteristics of a photo-voltaic cell.

### **REFERENCE BOOKS**

1. Theraja, B.L. "Electrical Technology Vol I & II", S. Chand Publications, 2005
2. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill, 2002
3. Del Torro Vincent, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall of India, 1994.
4. Cathey, J.J. and Naser, S.A. "Basic Electrical Engg.", 2nd Edition, Schaum

<b>ME-159 B</b>	<b>WORKSHOP PRACTICE – I</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>2</b>

#### 1.MACHINE SHOP

Step turning & Taper turning Operation

Exercise 1.To obtain required diameters (steps) on a cylindrical work piece with the given lengths.

Shoulder Turning

Exercise 2.To obtain required diameters on a cylindrical work piece with the given dimensions.

#### 2. CARPENTARY SHOP. Dove Tail Lap Joint

Exercise 3.To make a dovetail lap joint Cross Half Lap Joint

Exercise 4.To make a Cross Half Lap Joint

#### 3. SHEET METAL SHOP

Exercise 5. To make a funnel using G.I Sheet as per dimensions provided.

Exercise 6.To make a Square box using G.I Sheet as per the dimension.

#### 4. WELDING SHOP

Exercise 7. To make a single v-butt joint, using the given mild steel pieces of and by arc welding.

Exercise 8 To make a T- joint using the given mild steel pieces and by arc welding.

#### 5. FOUNDRY SHOP

##### MOULD FOR A SOLID

Exercise 9 To prepare a sand mould, using the given Single piece pattern.

Exercise 10. To prepare a sand mould, using the given Split piece pattern

CH-161 B	APPLIED CHEMISTRY LAB	L T P	Cr
		0-0-2	1

### LIST OF PRACTICALS

- (xxi) Determination of  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  hardness of water using EDTA solution
- (xxii) Determination of alkalinity of water sample using phenolphthalein & methyl orange.
- (xxiii) To find out the melting point & eutectic point for a two component system by using method of cooling curve.
- (xxiv) Determination of viscosity of lubricating oil by Redwood Viscosity ( No. 1).
- (xxv) To Prepare Phenol – formaldehyde and Urea formaldehyde resin.
- (xxvi) To find out saponification value of given oil.
- (xxvii) To determine TDS of Water samples of different sources.
- (xxviii) To determine of concentration of given  $\text{KMnO}_4$  solution using spectrophotometer.
- (xxix) To determine the strength of HCl solution by titrating against NaOH solution conductometrically .

To determine the  $\text{Na}^+$  and  $\text{K}^+$  ions with the help of flame photometry

ME-163 B	COMPUTER BASED ENGINEERING GRAPHICS	L-T-P	Credits
		0-0-4	2

**Unit-1:Geometrical construction of simple plane figure:** Bisecting the line, draw perpendicular, parallel line, bisect angle, trisect angle, construct equatorial triangle, square, polygon, inscribed circle ,Free hand sketching, prerequisites for freehand sketching, sketching of regular and irregular figures, Drawing scales, Engineering scale, graphical scale, plane scale, diagonal scale, comparative scale, scale of chord .

**Unit-2:Projection of points, lines and plane, Orthographic Projection** ,Principle of projection, method of projection, orthographic projection, plane of projection, first angle of projection, third angle of projection, reference line A point is situated in the first quadrant, point is situated in the second quadrant, point is situated in the third quadrant, point is situated in the fourth quadrant, projection of line parallel to both the plane, line contained by one or both the plane, line perpendicular to one of the plane, line inclined to one plane and parallel to other, line inclined to both the plane, true length of line, Missing views.

**Unit-3:Orthographic projection of simple solid:** Introduction, types of solid, projection of solid when axis perpendicular to HP, axis perpendicular to VP, axis parallel to both HP and VP, axis inclined to both HP and VP, Missing views.

**Unit-4:Development of Solids and Isometric projection:** Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes, Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems



**Unit-5:Introduction to computer-aided drafting (CAD):** Cartesian and Polar Co-ordinate system, Absolute and Relative Coordinates systems: Basic Commands: Line, Point, Rectangle, Polygon, Circle, Arc, Elipse, Polyline : Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror : Display Commands : Zoom, Pan, Redraw, and Regenerate : Simple dimensioning and text, simple exercises.

**Text and Reference books:**

B. Agrawal and CM Agrawal, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited, 2008.

D. A. Jolhe, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited, 2006.

K Venugopal, Engineering Drawing and Graphics, 2nd ed, New Age International, 1994.

MA-102B	ADVANCE MATHEMATICS & APPLIED NUMERICAL METHODS	L-T-P	Credits
		3-1-0	4

**OBJECTIVE:**

To acquaint the students with the various concepts and tools of applied mathematics which will be very basic and the very soul and guide of various engineering subject.

**Unit-I:SOLUTION OF NONLINEAR EQUATIONS :** Introduction to numbers and their accuracy; absolute, relative and percentage errors and their analysis; Bisection method ; Regula- falsi method; secant method; Newton- Raphson method.

**Unit-II: SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS &INTERPOLATION :** Gauss eliminationmethod; Gauss-Jordan method; Jacobi's iteration method; Gauss-Seidal iteration method; : Introduction to interpolation; Newton's forward and backward interpolation formulae; Stirling formula; Lagrange interpolation; Newton's divided difference formula.

**Unit-III:NUMERICAL DIFFERENTIATION AND INTEGRATION &SOLUTION OF ORDINARY DIFFERENTIAL EQUATION:** Numerical differentiation formulae: differentiation by using forward interpolation formula; backward interpolation formula; Stirling formula; Newton-Cotes formula for numerical integration: Trapezoidal rule; Simpson's rules. Taylor series method; Euler method; Euler modified method; Rungekutta method.

**Unit-IV: LAPLACE TRANSFORMS AND ITS APPLICATIONS:** Laplace transform (LT) of elementary functions; properties of LT; existence conditions of LT; LT of derivatives; LT of integrals; LT of the function multiplication by t; LT of the function division by t; inverse LT's; LT of convolution of two functions.

**Unit V: FOURIER SERIES:**Euler's formula; conditions for a Fourier expansion; change of interval;Fourier expansion of odd and even function;Fourier expansion of square wave, rectangular wave.

#### TEXT BOOK

Grewal, B. S., "Numerical methods in Engineering and Science",9<sup>th</sup> Edition, 2010,Khanna publishers. And Higher Engineering Mathematics: B. S. Grewal

#### REFERENCE BOOKS

1. Jain, R.K. and Iyengar, S.R.K., "Numerical Methods for Scientific and Engg. Computations", 5<sup>th</sup> Edition,2007, New Age International publishers.
2. Sastry, S.S., "Introductory Methods of Numerical Analysis",3<sup>rd</sup> Edition,1999, Prentice Hall of India.
3. Advanced Engg Mathematics: Michael D. Greenberg
4. Advanced Engineering Mathematics: E. Kreyszig

### **B.Tech Automobile Engineering ( II SEMESTER)**

ENA-104 B	COMMUNICATION SKILLS-II	L T P	Cr
		3-0-0	3

**Unit 1: Vocabulary:-**One word substitution, words often confused, Phrasal verbs & idioms & foreign words & phrases (30 each) and their usage in sentences.

**Unit 2: Applied Grammar:-** Parts of speech – conversion and usage; Rules of concord: grammatical and notional Concord ,Types of sentences, conditional sentences, Sentence correction with respect to Parts of speech, tenses & types of sentences, principle of subject &verb.

**Unit3:- Technical Writing:-**Resume Writing (interview skills), Report writing, Types of report including press report by individual – students.

**Unit 4:-Reading Comprehension:-**Comprehending selected prose & poem, unseen passages and preparing précis, Note making,Frankenstein - Merry Shelley

**Unit 5: Business correspondence:-**Format of Business letter writing, Strategies for effective letter writing; Letter of business enquiry, complaint, adjustment and placing order.

### **Prescribed Text book**

1. Technical Communication Principles & Practice (2<sup>nd</sup> Ed.) by Meenakshi Raman & Sangeeta Sharma published by Oxford University
2. The Functional Aspects of Communication Skills by Dr. Prajapati Prasad published by S.K. Kataria & Sons
3. Business Communication by K. Sundar & A. Kumara Raj published by Vijay Nicole Imprints Pvt Ltd. Chennai

### **SUGGESTED READING:**

1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press
2. Common Errors in English, Abul Hashem, Ramesh Publishing House, New Delhi.
3. Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
4. Spoken English for India, R.K. Bansal & J.B. Harrison, Orient Longman, Delhi.
5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.
6. English Phonetics & Phonology, P. Roach, Cambridge University Press, London.

<b>BA-106 B</b>	<b>Engineering Economics and Industrial Management</b>	<b>L T P</b>	<b>Cr</b>
		<b>3-0-0</b>	<b>3</b>

### **UNIT 1**

Meaning and definition of Economics, Central Problem of an economy, Demand, Law of Demand, Elasticity of Demand, Meaning of production, production function, law of variable proportion, cost concept, fixed cost, variable cost, average cost, marginal cost and opportunity cost.

### **Unit 2**

Meaning of market and main features of Perfect Competition, Monopoly, Oligopoly and Monopolistic Competition. National Income: GDP and GNP

### **Unit 3**

Definition of management, Nature and scope of management, Functions of management: Planning, Organizing, Staffing, Directing and Controlling

## Unit 4

Meaning of marketing management, Concept of marketing, Functions of marketing, Marketing Mix

## Unit 5

Meaning, Nature and scope of financial management, Functions of Financial Management, Objectives of FM, Sources of finance: Short term finance, Medium term finance and Long term finance. Stock exchange: NSE, BSE and NIFTY

Reference Books for Economics:

7. P.N. Chopra, Principles of economics, Kalyani Publishers
8. H.L. Ahuja, Modern Economic theory, S. Chand
9. S. K. Mishra, Modern Micro Economics, Pragati Publications

Reference books for management

7. T.N. Chabra, Principles of Management, DhanpatRai Publishers
  8. L.M. Prasad, Principles & Practices of management, Sultan Chand & Sons 2005
- Harold Koontz & O' Doneell Cyril Management, McGraw Hill, 1968

EC-108 B	DIGITAL ELECTRONICS	L T P	CR
		3 1 0	4

**OBJECTIVE** Modern world deals with digital conditioning of various signals. Digitally manipulating signals or using digital circuits have a lot of advantages in terms of accuracy etc. This subject introduces concept of basic digital electronics: gates; combinational and sequential circuits and their designing

### 1- INTRODUCTION OF GATES, COMBINATIONAL DESIGN BY USING GATES AND SIMPLIFICATION

Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess- 3; Gray; EBCDIC; ASCII; Error detection and correction codes; Design using gates; Karnaugh map and QuineMccluskey methods of simplification.

### 2 COMBINATIONAL DESIGN USING MSI DEVICES:

Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers for display devices.

3 **SEQUENTIAL CIRCUITS:** Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.

4. **DIGITAL LOGIC Families:** Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

#### 5. **A/D AND D/A CONVERTERS & PLD:**

Sample and hold circuit; weighted resistor and R -2 R ladder D/A Converters; specifications for D/A converters. A/D converters : successive approximation; counting type;ROM; PLA; PAL; FPGA and CPLDs.

#### **TEXT BOOK**

Jain, R.P., “Modern Digital Electronics”, 4th Ed.; Tata McGraw Hill, 2003

#### **REFERENCE BOOKS**

1. Taub and Schilling, ”Digital Integrated Electronics” Tata McGraw Hill,1997
2. Malvino and Leach; ”Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006
3. Mano, Morris, “Digital Design”, 3rd Edition, Prentice Hall of India,1994
4. Gupta and Singhal, “Digital Electronics”, 2nd Edition, DhanpatRai and Sons, 2000.
5. Wakerly, John F, ”Digital Design Principles and Practices”, 4th Edition, Prentice Hall of India,2005

ME - 108 B	ENGINEERING MECHANICS	L T P	Cr
		3 1 0	4

#### **OBJECTIVE**

Engineering Mechanics is one of the core subjects that introduces the student to analysis of forces and motion and prepares the student for studying strength of materials and theory of machines.

- 11 **FORCE SYSTEMS:** Basic concepts of space, time, mass, force, particle and rigid body; scalars and vectors; principle of transmissibility; force classification; Representation of force in vector form; rectangular components of two dimensional force systems; resultant of two dimensional and

concurrent force systems; moment about a point; Varignon's theorem; Representation of moment in vector form; couple. Numerical.

- 12 **EQUILIBRIUM:** Equilibrium in two dimensions; Lamé's Theorem; system isolation and the free-body-diagram; modeling the action of forces; equilibrium conditions; Numerical.
- 13 **PROPERTIES OF SURFACES/CROSS SECTIONS:** Centre of mass; determining the centre of gravity; centre of gravity of areas including composite sections; moments of inertia; MI of plane figures; parallel axis & perpendicular axis theorem;; MI of composite figures. Numerical.
- 14 **RECTILINEAR AND CURVILINEAR MOTION :** Types of motion ,definitions of displacement , distance, velocity , speed , acceleration Newton's laws of motion , Uniform and non uniform motion equations of motion , motion under gravity. Numerical.
- 15 **PROJECTILES :** Angle of projection , Trajectory , Range of projectile , Duration of flight , Path of projectile , Greatest height attained by a projectile. Numerical.

#### TEXT BOOK

Meriam, J. L. "Engineering Mechanics", John Wiley & Sons.

#### REFERENCE BOOKS

8. Beer, F.P. and Johnston, E.R. "Mechanics of Materials", Tata McGraw Hill
9. Shames, I.H. "Engineering Mechanics", 4th Edition, Pearson Education, 2003
10. Pytel, A and Kiusalaas, J. Thomsom, "Mechanics of Materials", Brooks & Cole, 2003

#### WEB REFERENCES

[www.eCourses.ou.edu](http://www.eCourses.ou.edu)

CS-110B	DATA STRUCTURE AND ALGORITHMS	L T P	Cr
		4 0 0	4

**OBJECTIVE:** To relay the theoretical and practical fundamental knowledge of most commonly used algorithms.

**PRE-REQUISITES:** Knowledge of basic computer programming

**12.INTRODUCTION TO DATA STRUCTURES AND RUNNING TIME:** Definition of data structures and

abstract data types; linear vs. non-linear data structure; primitive vs. non-primitive data structure; static and dynamic implementations; arrays, 1,2-dimensional arrays, insertion & deletion in 1-D array; examples and real life applications. Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion.

13. **STACKS AND QUEUES:** Stacks: definition, array based implementation of stacks;; examples: infix, postfix, prefix representation; conversions, applications; definition of queues, circular queue; array based implementation of queues.
14. **LINKED LISTS:** Lists; different type of linked Lists; implementation of singly linked list, linked list implementation of stacks and queues; implementation of circular linked list; implementation of doubly linked list, applications.
15. **TREES AND GRAPHS:** Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees: searching, insertion & deletion. Definition of undirected and directed graphs; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; graph traversal: breadth first traversal, depth first traversal; implementations and applications.
16. **SORTING AND SEARCHING ALGORITHMS:** Introduction, selection, insertions, bubble sort, efficiency of above algorithms; merge sort, merging of sorted arrays and algorithms; quick sort algorithm analysis, heap sort, searching algorithms: straight sequential search, binary search (recursive & non-recursive algorithms)

#### TEXT BOOK

1. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++ , Prentice Hall of India, 2009.
2. R. S.Salariya, Data Structure and Algorithm, Khanna Publications.

#### REFERENCE BOOKS

17. Aho A. V., Hopcroft J. E. and Ullman T. D., —Data Structures and Algorithms, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
18. Horowitz Ellis and Sahni S artaj, —Fundamentals of Data Structures, Addison-Wesley Pub, 1984.
19. Horowitz, Sahni and Rajasekaran, —Fundamentals of Computer Algorithms, 2007.
20. Kruse Robert, —Data Structures and Program Design in C, Prentice Hall of India, 1994

CE-110 B	Surveying	L T P	Cr
		3 0 0	3

1. **FUNDAMENTALS & LINEAR MEASUREMENTS:** Compass and chain traversing: Principles of Surveying; Definition, objects, classification, fundamental; principles, methods of fixing stations. Measurement; Direct

measurement, instruments for measuring distance, instruments for making stations, chaining of line. Errors in chaining, tape corrections example. Methods of traversing, instruments for measurement of angles: prismatic and surveyor's compass, bearing of lines, local attraction, examples.

**2. LEVELLING:** Definition of terms used in leveling; types of levels and staff; temporary adjustment of levels; principles of levelling; reduction of levels; booking of staff readings, examples. Contouring: characteristics of contour lines; locating contours, interpolation of contours.

**3. THEODOLITE AND PLANE TABLE SURVEYING:** Traversing; Theodolite: temporary adjustment of theodolite, measurement of angles, repetition and reiteration method. Traverse surveying with theodolite; checks in traversing, adjustment of closed traverse, examples. Plane table: methods of plane table surveying: radiation, intersection, traversing and resection. Two point and three point problems.

**4. TACHEOMETRY:** Uses of tacheometry, principle of tacheometric surveying, instruments used in tacheometry, systems of tacheometric surveying: stadia system' fixed hair method, determination of tacheometric constants, tangential systems, examples.

**5. CURVES:** Classification of Curves, elements of simple circular curve, location of tangent points; Chain & Tape methods, instrumental methods, examples of simple curves, Transition curves; Length & type of transition curves, length of combined curves, examples. Vertical curves: Necessity & types of vertical curves. TEXT BOOK Punmia, B.C., Jain Ashok Kumar, Jain. Arun Kumar., "SURVEY –I", Laxmi Publication Pvt Limited, New Delhi, 2005 REFERENCE BOOKS 1.Kanitkar T.P., "SURVEY –I", Standard Publication, New Delhi, 2008 2.Subramania.R., "Surveying and leveling, second Edition, Oxford University Press, India, 2012 3.Duggal, S.K., "Surveying Volume –I" Tata McGraw Hill, July 2004 4. Bannister., "Surveying", 7th Edition, Pearson Education, 2009 5. William, Irvine., Finlay, MacLennan., "Survey for Construction", McGraw-Hill, 5th Edition, 2006.

EL-111B	BASICS OF ELECTRICAL & ELECTRONICS ENGG.	L T P	Cr
		3-0-0	3



**Unit-1:DC NETWORK THEOREMS:** Ohm's law; Voltage and current sources; Series parallel Circuits; Network Terminology; Kirchhoff's laws; Network Simplification by using Loop method and Nodal method; Superposition Theorem; Thevenin's theorem; Norton's theorem, Maximum Power Transfer theorem; Star to Delta and Delta to Star transformation.

**Unit-2:SINGLE PHASE &THREE PHASE AC CIRCUITS:** AC Terminology; Derivation of RMS and maximum value of alternating current and voltage; Form factor and peak factor; Behavior of pure R, L & C components in ac circuits; single phase series R-L, R-C, R-L-C circuit; Introduction to resonance; Merits & Demerits of three phase system over single phase system;Three phases interconnection using star and Delta arrangement;Measurement of power using 2-wattmeter method.

**Unit-3:BASICS OF ELECTRICAL MACHINES:** Construction and operation of dc machines (both dc generator and motor); emf equation of dc generator; starting and speed control of dc motor; Necessity of starters in dc motors; Transformers- basic principle, its emf equation, operation of ideal & non-ideal transformer with Phasor diagrams, power losses, efficiency; introduction to auto-transformer.

**Unit-4:DIODES & TRANSISTORS:** Depletion layer; Barrier potential; Forward and reverse biasing of pn junction diode; switching Characteristics of p-n junction diode; zener diode; basic theory of operation of PNP and NPN transistor-VI characteristics; CB; CE and CC configuration; different biasing techniques.

**Unit-5:FIELD EFFECT TRANSISTOR AND THYRISTOR FAMILY:** Introduction of FET ; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction;theory of operation; MOSFET parameters; application, different biasing techniques of FET. Introductory idea of multistage and feedback amplifiers; Introduction to Thyristor Family (SCR).

#### **TEXT BOOK**

1. Gupta, J.B. "Electrical Technology", 2nd Edition, Katson Publication, 2007
2. Boylestad and Nashelsky, "Electronic Devices and Circuits", 4th Edition, Pearson Education, 1999.

#### **REFERENCE BOOKS**

1. Leonard S. Bobrow, "Fundamentals of Electrical Engineering", 2nd Edition, Oxford University Press, 2005
2. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill
3. Malvino, "Electronic Principles", 5th Edition, Tata McGraw Hill, 2004.
4. Millman and Halkias, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2000

<b>ME-112B</b>	<b>Machine Drawing</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-4</b>	<b>2</b>

**Objective:** This course makes the student to learn the representation of components and assemblies into various views and vice versa. This will enable the student to learn to conceive an object and go for its production.

### 1. INTRODUCTION

Introduction to Graphic language, Sectional views, Types of sectional views, Hatching, Isometric scale, Isometric drawing of Circles; Conversion of isometric to orthographic and vice versa.

### 2. TOLERANCE AND MACHINE COMPONENTS

Standard abbreviation – Limits , Fits and Tolerance, Surface finish; Gear terminology, types of gear; Draw the gear profile; Springs, Belts & Pulleys, Bearings.

### 3. KEYS AND COTTERS

Various types of keys and cotters, Spigot and socket joint, Gib and cotter joint, Knuckle joint

### 4. JOINTS AND COUPLINGS

Rivets and Riveted Joints, Caulking and fullering of riveted joints, Types of riveted joints, Bolts and nuts, Welded Joint, Flange coupling (Protected and non-protected), muff coupling and half-lap muff Coupling.

### 5. ASSEMBLY DRAWING

Assembly of Lathe Tail stock, Machine vice; Cylinder, Piston, rings and Connecting rod; Steam stop valve, Stuffing box, Drill jigs and Milling fixture, Screw Jack.

#### Text Books:

1. Machine Drawing - N D Bhatt and V M Panchal, Charotar Publishing House.
2. A Text Book of Machine Drawing - P S Gill Pub.: S K Kataria & Sons.

#### Reference Books:

1. A Text Book of Machine Drawing Laxmi Narayana and Mathur, M/s. Jain Brothers, New Delhi.
2. Machine drawing by N Sidheshwar, Kannaiah, V S Sastry, TMH., New Delhi

<b>EC-112-B</b>	<b>ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES</b>	<b>L T P</b>	<b>CR</b>
		<b>3 0 0</b>	<b>3</b>

**OBJECTIVE** The objective of this course is to introduce the student to basic concept of semiconductor device operation based on energy bands and carrier statistics. It also provides the operation of p-n junctions and metal-semiconductor junctions. It extends this knowledge to descriptions of bipolar and field effect transistors, and other microelectronic basic devices. This course is intended for students who plan to study in the area of microelectronics or just have an interest in that area. This course emphasizes the fundamentals of materials and device operation. It is expected that the students taking this course will include ECE and non-EE majors. In this course, one will study semiconductor devices from a fundamental point of view emphasizing a thorough understanding of the mechanisms of device operation. It is expected that students who successfully complete the course will have an understanding of basic semiconductor devices sufficient to design transistors and diodes to particular specifications.

**1 CONDUCTING MATERIALS:** Drift velocity, collision time; Mean free path; mobility; conductivity; relaxation time; factors affecting conductivity of materials; types of thermal conductivity; Wiedemann-Franz law; Super conductivity; applications.

**2. DIELECTRIC MATERIALS:** Behavior of dielectric materials in static electric field; Dipole moments; Polarization; Dielectric constant; Polarizability, Susceptibility; mechanisms of polarization; behavior in alternating field; dielectric loss; loss tangent types of dielectric and insulating materials; electrostriction; Piezo-electricity.

**MAGNETIC MATERIALS:** Permeability; Magnetic susceptibility; magnetic moment; origin of magnetic dipole moment; angular momentum; Magnetization; Classification of magnetic materials-Para; Dia, ferro, antiferro; and ferri; Langevin's theory of dia; Curie-Weiss law; spontaneous magnetism; domain theory; Magnetosriction; eddy current and hysteresis losses; applications.

**3. SEMICONDUCTORS:** Review of Si and Ge as semi-conducting materials; Continuity Equation; P-N junction; Drift and Diffusion; Diffusion and Transition capacitances of P-N junction; breakdown mechanisms; ZENER diode.

4 **OPTICAL PROPERTIES OF MATERIALS:** Optical properties of metals; semiconductors and insulators; Phosphorescence; Luminiscence; Phosphors for CRO; display material for LCD; LED; solar cells and photo-detectors.

5 **SEMICONDUCTOR DEVICES:** Brief introduction to Planar Technology for device fabrication; BJT; JFET; MOSFETS.

**POWER DEVICES:** Thyristor; IGBT; VMOS; UJT; GTO; their working principles and characteristics.

**TEXT BOOK** Dekker, A.J., —Electrical Engineering Materials, 3rd Ed. Pentice Hall of India; 2009

#### **REFERENCE BOOKS**

1. Boylested and Nashelsky, —Electronic Devices and Circuit Theory, Pearson. Education, 2009
2. DuttaAlok, —Semiconductor Devices and Circuits, Oxford University Press, 2008
3. Streetman and Banerjee, —Solid State Electronic Devices, Pearson, 2010
4. Millman and Halkias, —Electronic Devices and Circuits, McGraw Hill, 1996
5. Gupta, J.B., —Electrical Engineering Materials and Semiconductor Devices, Katsons, 2006



<b>MA-150B</b>	<b>Applied Numerical Methods Lab</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>2</b>

List of Practical (Using C++ software)

- (1) Find the root of the equation by using Bisection Method.
- (2) Find the root of the equation by using Newton Raphson Method.
- (3) Find the root of the equation by using Secant Method.
- (4) Find the root of the equation by using Regula Falsi Method.
- (5) Solve the system of linear equation by Gauss Elimination Method.
- (6) Solve the system of linear equation by Gauss-Jacobi Method.
- (7) Solve the system of linear equation by Gauss-Siedel Method.
- (8) Lagrange Interpolation or Newton Interpolation.
- (9) Simpson's rule.
- (10) Trapezoidal Rule

EC-154B	Digital Electronics Lab	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

### **LIST OF EXPERIMENTS**

1. Study of TTL gates – AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR.
2. Design and realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer and Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R; J-K; T and D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design and verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
10. To design and realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND and NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

CE-162 B	Surveying Lab	L T P	Cr
		0 0 2	1

- LIST OF EXPERIMENTS**
1. Chain surveying : chaining and chain traversing
  2. Compass Traversing
  3. Plane Tabling : methods of plane table surveying ,Two point Problem
  4. Plane Tabling :Three point problem
  5. Leveling : profile leveling and plotting of longitudinal section and cross sections , Fly leveling
  6. Use of tangent clinometers.
  7. Contours; Block and radial contours. Practice of reading contour maps
  8. Traversing : different poles and alignment
  9. Tacheometry; Tacheometric constants, calculating horizontal distance and elevation with the help of tacheometer
  10. Study and use of Theodolite in making horizontal and vertical angles

CS-156 B	DATA STRUCTURE AND ALGORITHMS LAB	L T P	Cr
		0 0 2	1

## LIST OF EXPERIMENTS

### ARRAY OPERATIONS

73. Write a program to insert an element at given position in linear array
74. Write a program to insert an element in sorted array.
75. Write a program to delete an element from given position in linear array
76. Perform following operations on matrices using functions only
  - a) Addition b) Subtraction c) Multiplication d) Transpose

### SEARCHING

77. Search an element in a linear array using linear search.
78. Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method

### RECURSION

79. Write a program to compute factorial of given number using recursion
80. Write as program to solve Tower of Hanoi problem using recursion
81. Write a program to find power of given number using recursion

### STACK & QUEUE

82. Write a program for static implementation of stack
83. Write a program for dynamic implementation of queue



- 84. Write a program for static implementation of circular queue
- 85. Write a program for dynamic implementation of queue
- 86. Write a program to evaluate a postfix operation

### **LINKED LIST**

- 87. Create a linear linked list & perform operations such as insert, delete at end , at beg & reverse the link list
- 88. Create a circular linked list & perform search, insertion & delete operation
- 89. Create a doubly linked list & perform search, insertion & delete operation

### **TREE & GRAPH**

- 90. Write program to implement binary search tree. (Insertion and Deletion in Binary Search Tree)
- 91. Write program to simulate the various tree traversal algorithms
- 92. Write program to simulate various graph traversing algorithms.

### **SORTING ALGORITHMS**

- 93. Write program to implement Bubble, Insertion & selection sort.
- 94. Write program to implement quick sort
- 95. Write program to implement merge sort
- 96. Write a program to implement heap sort

### **TEXT BOOK**

- 7. A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
- 8. Langsam, Augentem M.J. and Tenenbaum A. M., —Data Structures using C & C++ , Prentice Hall of India, 2009.

### **REFERENCE BOOKS**

- 10. R. S. Salaria -Data Structure Using C
- 11. Kruse Robert, —Data Structures and Program Design in C , Prentice Hall of India, 1994
- 12. Lipschitz Jr. Seymour, —Theory & Problems of Data Structures , Schaum's Outline, 2nd Edition, Tata McGraw Hill

<b>EL-157B</b>	<b>BASICS OF ELECTRICAL &amp; ELECTRONICS ENGG. LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0-0-2</b>	<b>1</b>

#### **LIST OF PRACTICALS**

1. To verify KCL and KVL in a given DC circuit.
2. To verify Thevenin's and Norton's Theorems.
3. To verify maximum power transfer theorem in D.C Circuit.
4. To verify Superposition theorems on Dc circuit.
5. To study frequency response of a series & parallel R-L-C circuit and determine its resonant frequency.
6. To perform direct load test of a transformer and plot its efficiency Vs load characteristic.
- 7.. To study V-I characteristics of diode; and its use as a capacitance.
8. Study of the characteristics of transistor in Common Base configuration.
9. Study of the characteristics of transistor in Common Emitter configuration.
10. Study of V-I characteristics of a photo-voltaic cell.

#### **REFERENCE BOOKS**

8. Theraja, B.L. "Electrical Technology Vol I & II", S. Chand Publications, 2005
9. Kothari and Nagarath, "Basic Electrical Engg.", 2nd Edition, Tata McGraw Hill, 2002
10. Del Torro Vincent, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall of India, 1994.
11. Cathey, J.J. and Naser, S.A. "Basic Electrical Engg.", 2nd Edition, Schaum

EC-158 B	ELECTRICAL ENGINEERING MATERIALS AND SEMI-CONDUCTOR DEVICES LAB	L T P	CR
		0 0 2	1

## LIST OF EXPERIMENTS

1. To study V-I characteristics of diode, and its use as a capacitance.
2. Study of the characteristics of transistor in Common Base configuration.
3. Study of the characteristics of transistor in Common Emitter configuration.
4. Study of V-I characteristics of a photo-voltaic cell.
5. Study of characteristics of MOSFET/JFET in CS configuration.
6. To plot characteristics of thyristor.
7. To plot characteristics of UJT.
8. To plot characteristics of diac&Triac.

9. Study of loss factor in a dielectric by an impedance bridge.
10. Study of photo-resist in metal pattern for planar technology.

CS-114B	DATABASE MANAGEMENT SYSTEMS	L T P	Cr
		3 0 0	3

## OBJECTIVE

To provide knowledge about various organizations and management information systems, keeping in view the aspects of share ability, availability, evolvability and integrity

## PRE-REQUISITES

Knowledge of data structures, discrete mathematical structures

6. **INTRODUCTION:** What is database, Purpose of database system; advantages of using DBMS; database concept and architecture; data abstraction; data models; instances and schema; data independence; schema architecture; database languages; database administrator; database users
7. **DATA MODELING:** Entity sets attributes and keys, relationships (ER); database modeling using entity; type role and structural constraints, weak and strong entity types; enhanced entity-relationship (EER), ER diagram design of an E-R database schema; specialization and generalization
8. **RELATIONAL MODEL:** Relational model: relational model -basic concepts, enforcing data integrity constraints, Relational algebra: introduction, Selection and projection, set operations, renaming,

Joins, Division, syntax, semantics. Operators; extended relational algebra operations, Calculus: Tuple relational calculus, Domain relational Calculus; Codd's rules.

9. **DATABASE DESIGN AND SQL:** Database design process; relational database design, anomalies in a database; functional dependencies membership and minimal covers normal forms, multi-valued dependencies, join dependencies, inclusion dependencies; reduction of an E-R schema to tables; effect of de-normalization on database performance, Query-by-example (QBE), Introduction to SQL, basic queries in SQL, advanced queries in SQL, functions in SQL; basic data retrieval, aggregation, categorization, updates in SQLs; views in SQL.
10. **TRANSACTION PROCESSING:** Desirable properties of transactions, implementation of atomicity and durability; consistent model, read only and write only model; concurrent executions, schedules and recoverability; serializability of schedules concurrency control; serializability algorithms; testing for serializability; precedence graph; concurrency control, deadlock handling - detection and resolution.

#### TEXT BOOK

3. Silberschatz A., Korth H. F. and Sudarshan S., "Database System Concepts", 6th edition, McGraw-Hill, International Edition, 2010
4. [Steven Feuerstein, Bill Pribyl](#) , "Oracle PL/SQL", O'Reilly Media , 4th Edition, 2005

#### REFERENCE BOOKS:

8. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
9. Elmasri R. and Navathe S. B., "Fundamentals of Database Systems", 6th edition, Addison-Wesley, Low Priced Edition, 2010
10. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition, 2003
11. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
12. Hansen G. W. and Hansen J. V., "Database Management and Design", 2nd edition, Prentice- Hall of India, Eastern Economy Edition, 1999
13. Majumdar A. K. and Bhattacharyya P., "Database Management Systems", 5th edition, Tata McGraw-Hill Publishing, 1999
14. Looms, "Data Management & File Structure", Prentice Hall of India, 1989.

<b>CS-160 B</b>	<b>DATABASE MANAGEMENT SYSTEMS LAB</b>	<b>L T P</b>	<b>Cr</b>
		<b>0 0 2</b>	<b>1</b>

14. Introduction to PL/SQL

15. Write a program to carry out

- k. Creation of table
- l. Insertion of data into table
- m. Viewing of data into table: All rows and all columns, Selected columns and all rows, Selected rows and all columns, Selected rows and selected columns, Elimination of duplicates from selected statements, Sorting of data into a table.
- n. Deletion of data from given table: Removal of all rows, Removal of selected rows
- o. Updating of table contents: Updating all rows, Updating of record conditionally
- p. Modifying the structure of table: Adding new column, Modifying existing column
- q. Renaming tables
- r. Destroying tables
- s. Examining objects created by user: Finding tables created by user, Finding column details of table created
- t. Computation on table data: Arithmetic operators, Logical operators ( AND, OR, NOT), Range searching ( BETWEEN, NOT BETWEEN), Pattern matching (LIKE, IN, NOT IN)

16. Oracle set functions (Scalar, Group & Pattern Matching Operator): AVG, SUM, MIN, MAX, COUNT, COUNT(\*), ABS, ROUND, LENGTH, SUBSTR, POWER, SQRT, LOWER, UPPER, LPAD, RPAD, LTRIM, RTRIM
17. Data constraints at column level and at table level: NULL value concept, UNIQUE constraints, Primary key constraint, Foreign key constraint, Check constraint.
18. VIEWS: Creation of views, Renaming of columns in view, Selection, Updation, Destroy
19. Grouping Data from tables in SQL
20. INDEXES
21. SEQUENCES
22. Granting and Revoking Permissions in SQL
23. CURSORS & its Applications
24. Create Function and use Cursor in Function
25. TRIGGERS
26. Hands on Exercises

## REFERENCE BOOKS

5. SQL, PL/SQL the Programming Language of Oracle, Ivan Bayross
6. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
7. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
8. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition

Lingaya's Vidyapeeth

School of Mechanical Engineering

### **B.Tech Automobile Engineering (III SEMESTER)**

Course code	Course title	L	T	P	Credits
<b>ME-201B</b>	<b>STRENGTH OF MATERIALS - I</b>	3	1	0	4

Course Objectives:

The strength of materials is one of the core subjects

and it aims to provide a sound foundation to

design various elements of mechanical equipment.

## **UNIT-1:SIMPLE STRESSES AND STRAINS**

Resistance to deformation; Hook's law and stress-strain diagram; types of stresses; stresses and strains in bars of varying sections; stresses in composite bars; lateral strain and Poisson's ratio; volumetric strain, modulus of rigidity and bulk modulus; relation between elastic constants Numerical.

## **UNIT-2:TORSION OF CIRCULAR SHAFTS AND SIMPLE BENDING**

Torsion formula of circular shaft, power transmission by shaft, types of beams and loads, reaction produced on supports for beams with point load, uniformly distributed load, uniformly varying load and combined loads. Numerical. Bending equation, flitched beam. Numerical

## **UNIT-3:SHEAR FORCE & BENDING MOMENT**

Definitions: SF and BM diagrams for cantilevers, simply supported beams with or without overhang and calculation of max. BM and SF and point of contra-flexure under i) concentrated loads, ii) uniformly distributed loads over whole span or part of it iii) combination of concentrated and uniformly distributed loads.

## **UNIT-4:ANALYSIS OF PERFECT FRAMES**

Types of frames, Assumptions made in finding out the forces in frames, Reactions of supports of a frame, Analysis of frame by Method of Joint, Analysis of frames by Method of Section.

## **UNIT-5: COMPLEX STRESS SYSTEM**

Complex stress system in unidirectional, bi direction and bidirectional along with shear stress, its graphical as well as analytical studies. Numerical.

### **TEXT BOOK**

Ferdinand P Beer & Russel E Johnston;—Mechanics of Materials I, Tata McGraw Hill; 2009

### **REFERENCE BOOKS**

1. Hibbeler, R. C.,—Mechanics of Materials I, Pearson Education, 2005
2. Ryder, G H., —Strength of Materials I, Macmillan, 2001
3. Srinath L S, —Strength of Materials I, Macmillan, 2001
4. Andrew / Kiusalaas, Jaan., —Mechanics of Materials I, Thomson, 2003

<b>Course outcomes:</b>
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1.	Upon completion of this course, the students can able to apply mathematical knowledge to calculate the deformation behavior of simple structures.
2.	Critically analyse problem and solve the problems related to mechanical elements and analyse the deformation behavior for different types of loads.

Course code	Course title	L	T	P	Credits
<b>ME-203B</b>	<b>FLUID MACHINES</b>	3	1	0	4

Course Objectives:

On completion of this course; students will be able to know the construction; working;

installation of hydraulic turbines; pumps and other hydraulic systems.

## **UNIT-1:IMPACT OF FREE JETS**

Impulse – momentum principle; jet impingement - on a stationary flat plate; inclined plate and a hinged plate; at the center of a stationary vane; on a moving flat plate; inclined plate; a moving vane and a series of vanes; Jet striking tangentially at the tip of a stationary vane and moving vane(s); jet propulsion of ships. Problems

## **UNIT-2:IMPULSE TURBINES**

Classification – impulse and reaction turbines; water wheels; component parts; construction; operation and governing mechanism of a Pelton wheel; work done; effective head; available head and efficiency of a Pelton wheel; design aspects; speed ratio; flow ratio; jet ratio; number of jets; number of buckets and working proportions; Performance Characteristics; governing of impulse turbines. Problems

## **UNIT-3: REACTION TURBINE**

**Francis Turbines:** Component parts; construction and operation of a Francis turbine; governing mechanism; work done by the turbine runner; working proportions and design parameters; slow; medium and fast runners; degree of reaction; inward/outward flow reaction turbines; Performance Characteristics; Problems.

**Propeller and Kaplan turbines:** Component parts; construction and operation of a Propeller; Kaplan turbine; differences between the Francis and Kaplan turbines; draft tube - its function and different forms; Performance Characteristics; Governing of reaction turbine;

## **UNIT-4:CENTRIFUGAL PUMPS**

Classification; velocity vector diagrams and work done; manometric efficiency; vane shape; head capacity relationship and pump losses; pressure rise in impeller; minimum starting speed; design considerations; multi-stage pumps. Similarity relations and specific speed; net positive suction head; cavitation and maximum suction lift; performance characteristics; Brief introduction to axial flow; mixed flow and submersible pumps; Problems.

## **UNIT-5:**

**Reciprocating Pumps:** Construction and operational details; discharge coefficient; volumetric efficiency and slip; work and power input; effect of acceleration and friction on indicator diagram (pressure – stroke length plot); separation; air vessels and their utility; rate of flow into or from the air vessel; maximum speed of the rotating crank; characteristic curves; centrifugal V/S reciprocating pumps; brief introduction to screw; gear; vane and radial piston pumps; Problems.

**Hydraulic systems:** Function; construction and operation of Hydraulic accumulator; hydraulic intensifier; hydraulic crane; hydraulic lift and hydraulic press; Fluid coupling and Torque converter; Hydraulic ram; Problems.

### **TEXT BOOKS:**

1. Hydraulics & Fluid Mechanics – Modi & Seth; Pub. - Standard Book House; N. Delhi
2. Hydraulic Machines – Jagdish Lal; Metropolitan

### **REFERENCE BOOKS:**

1. Fluid Mechanics and Hydraulic Machines – S S Rattan; Khanna Publishers
2. Introduction to Fluid Mechanics and Fluid Machines – S K Som and G Biswas; Tata McGraw Hill
3. Fluid Mechanics and Fluid Power Engineering – D S Kumar; S K Kataria and Sons

Course outcomes:	
1.	Students can able to understand momentum and the importance of jets.
2.	Critically analyze the applications of positive displacement machines.
3.	Critically analyze the performance of Rotodynamic machines.

Course code	Course title	L	T	P	Credits
<b>ME-205B</b>	<b>KINEMATICS OF MACHINES</b>	3	1	0	4

#### Course Objectives:

- To understand the basic components and layout of linkages in the assembly of a system / machine.
- To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
- To understand the basic concepts of toothed gearing and kinematics of gear trains and the effects of friction in motion transmission and in machine components.

### UNIT-1:INTRODUCTIONOFMECHANISMSANDMACHINES

Concepts of Kinematics and Dynamics, Mechanisms and Machines, Planar and Spatial Mechanisms, Kinematic Pairs, Kinematic Chains, Kinematic Diagrams, Kinematic Inversion, Four bar chain and Slider Crank Mechanisms. and their Inversions, Degrees of Freedom, Mobility and range of movement - Kutzbach and Grubler's criterion, Number Synthesis, Grashof's criterion Position analysis of Four bar, slider crank mechanisms, transmission angle, Mechanical Advantage.

### UNIT-2:VELOCITY AND ACCELERATION ANALYSIS

Velocity and Acceleration Diagrams, Instantaneous Centre of Velocity, Rubbing Velocity, Coriolis's component of acceleration. Special Mechanisms: Straight line mechanisms, Hooke's Joint, Steering Mechanisms.

### UNIT-3:CAMS AND FOLLOWERS

Introduction: Classification of cams and followers, nomenclature, displacement diagrams of follower motion. Synthesis and Analysis: Determine of basic dimensions and synthesis of cam profiles using graphical methods, cams with specified contours.

### UNIT-4:GEARS

Terminology, Law of Gearing, Characteristics of involute and cycloidal action, Interference and undercutting, centre distance variation, minimum number of teeth, path of contact, contact ratio, Gear Trains: Synthesis of Simple, compound & reverted gear trains, Analysis of epicyclic gear trains.

### UNIT-5:SYNTHESIS OF MECHANISMS

Definitions of Type, Number and Dimensional Synthesis, Definitions of Motion, Path and Function generation, precision position, Chebychev's spacing, structural error, Freudenstein's equation, three position synthesis (function generation only) of four bar mechanisms by analytical.

## TEXT BOOKS

Rattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, 2009.

## REFERENCE BOOKS:

1. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.
2. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2005
3. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.
4. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961

Course outcomes:	
1.	Upon completion of this course, the students can able to apply fundamentals of mechanism for the design of new mechanisms and analyse them for optimum design.
2.	Students can able to understand the effects of friction in motiontransmission and in machine components.
3.	understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions

Course code	Course title	L	T	P	Credits
<b>ME 207B</b>	<b>MANUFACTURING TECHNOLOGY</b>	4	0	0	4

### Course Objectives:

To provide an overview of the basic production techniques and allied / supporting techniques used to Produce finished products from raw materials. In addition to theory, students will be given practical Training on various basic production techniques.

### UNIT-1:SAND CASTING PROCESSES

Advantages and limitations; sand mold making procedure; pattern sand core; pattern materials; pattern allowances; types of patterns; color coding; molding materials; Molding sand composition; sand preparation; sand properties and testing; sand molding processes.

### UNIT-2:MOULD MAKING AND INSPECTION

Types of cores; core prints; chaplets and chills; Gating system; gates and risers; Melting practice; cupola and induction furnace; charge calculations; casting cleaning and casting defects; fettling; defects in casting and their remedies; methods of testing of casting for their soundness.

### UNIT-3:SPECIAL CASTING PROCESSES

Shell molding; precision investment casting; permanent mold casting; die casting; centrifugal casting; and continuous casting.

### UNIT-4:METAL FORMING AND OTHER PROCESSES

Nature of plastic deformation; hot working and cold working Principles of rolling; roll passes; roll pass sequences; Forging; Forging operations; smith forging; drop forging; press forging; forging defects Extrusion principle; hot extrusion; cold extrusion; wire drawing; swaging; tube making; sheet metal operations; press tool operations; shearing action; drawing dies; spinning; bending; stretch forming; embossing and coining

### UNIT-5:WELDING

Classification ;oxy-acetylene welding equipment's and techniques; Electric arc welding, Electrodes; manual metal arcwelding; inert gas shielded arcwelding ;tungsten inert gas welding(TIG);metal inert gas welding (MIG);Submergedarcwelding (SAW)Principle;resistance spotwelding;resistance seamwelding;upsetwelding;flashweldingOther welding processes; introduction of thermitwelding; electro slag welding; electron beam welding; friction welding; diffusion welding; brazing and soldering

### TEXT BOOK

1 RaoPN., "Manufacturing Technology – Foundry,Forming and Welding", Tata McGraw Hill.

### REFERENCE BOOKS

1. Ghosh. A. Mallik A.K., "Manufacturing Science", Affiliated East West Press, 2005
2. Sinha, K P, Goel D B., "Foundry Technology", Standard Publishing, New Delhi, 2005
3. Richard, L Little., "Welding and Welding Technology", Tata McGraw Hill, 2000
4. Rosenthal; "Principle of Metal Casting", Tata McGraw Hill, 2001 Raghuwanshi B S., " Workshop Technology", VolI., DhanpatRai, 2004

Course outcomes:	
1.	Upon completion of this course, the students can able to apply the different manufacturing Process and use this in industry for component production.
2.	Students can able to understand the concepts of basic manufacturing processes and fabrication techniques.

Course code	Course title	L	T	P	Credits
<b>ME-209B</b>	<b>THERMODYNAMICS</b>	3	1	0	4

### **Course Objectives:**

This course introduces the student to the fundamental laws of thermodynamics, the interaction between Energy and matter, the quantitative and qualitative aspects of energy and its transformations, the Properties of the working substance and their relationship

### **UNIT-1:FUNDAMENTALS AND BASIC CONCEPTS**

System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Quasi – static Process, Reversible and Irreversible Process, Causes of Irreversibility, Energy and its forms, Work and heat (sign convention), Equality of Temperature, Zeroth Law of Thermodynamic and its utility, Problems.

### **UNIT-2:FIRST LAW OF THERMODYNAMICS**

Thermodynamic definition of work, Displacement work and flow work, Displacement work for various non-flow processes, Joules' experiment, First law analysis for closed system (non-flow processes), Internal energy and enthalpy, PMM-I, Numerical Steady flow systems and their analysis, Steady flow energy equation, Boilers, Condensers, Turbine, Throttling process, Pumps etc., Numerical

### **UNIT-3:SECOND LAW OF THERMODYNAMICS AND ENTROPY**



Limitations of 1<sup>st</sup> law, Thermal reservoirs, Energy conversion, Heat engines, Efficiency, Reversed heat engine, Heat pump, Refrigerator, Coefficient of Performance, Kelvin Planck and Clausius statement of second law of thermodynamics, Carnot cycle and Carnot engine, Carnot theorem and its corollaries, Thermodynamic Temperature Scale, PMM-II. Clausius inequality, Concept of Entropy, Entropy change of pure substance in different thermodynamic processes, Tds equation, Principle of entropy increase, Statement of the third law of thermodynamics, Availability and Irreversibility Problems

#### UNIT-4: PROPERTIES OF PURE SUBSTANCES

Pure substance, Property of Pure Substance (steam), Triple point, Critical point, Saturation states, Sub-cooled liquid state, Superheated vapour state, Phase transformation process of water, Graphical representation of pressure, volume and temperature, P-T & P- V diagrams, T-S and H-S diagrams, use of property diagram, Steam-Tables & Mollier chart, Dryness fraction and its measurement, processes involving steam in closed and open systems. Simple Rankine cycle.

#### UNIT-5: THERMODYNAMIC RELATIONS, IDEAL AND REAL GASES

Maxwell Relations, Clapeyron Equation, Relations for changes in Enthalpy and Internal Energy & Entropy, Specific Heat Capacity Relations, Joule Thomson coefficient & inversion curve. Ideal gases, Ideal gas laws, real gases, compressibility factor, compressibility charts.

##### TEXT BOOK

Nag, P.K., "Engineering Thermodynamics", Tata McGraw Hill.

##### REFERENCE BOOKS

1. Rao, Y VC., "Theory and Problems of Thermodynamics", Wiley Eastern Ltd, 2007
2. Arora C P., "Engineering Thermodynamics", Tata McGraw Hill; 2008
3. Domkundwar., "Thermal Engineering", Dhanpat Rai & Company, 2006
4. Estope, TD and Meconkey A., "Applied Thermodynamics for Engineers Technologists", AWL, 1999

Course outcomes:	
1.	Upon completion of this course, the students can able to apply the Thermodynamic Principles to Mechanical Engineering Application
2.	Apply mathematical fundamentals to study the properties of steam, gas and gas mixtures.

3.	To understand the fundamentals of thermodynamics and to perform thermal analysis on their behavior and performance
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Course code	Course title	L	T	P	Credits
<b>ME-211B</b>	<b>OPERATION MANAGEMENT</b>	3	1	0	4

### Course Objectives:

To gain an understanding and appreciation of the principles and applications relevant to the planning, design, and operations of manufacturing/service firms.

To develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in complex socio-economic productive systems.

### UNIT 1: WORKSTUDY

Method study; Principle of motion economy; techniques of method study—various charts; THERBLIGS; Work measurement—various methods; time study PMTS; determining standard time; work sampling; Numerical.

### UNIT 2: PRODUCTIVITY AND MANUFACTURING COST ANALYSIS

Productivity—Definition; various methods of measurement; Factors affecting productivity; Strategies for improving productivity; various methods of job evaluation and merit rating; Various incentive payments schemes; behavioral aspects; financial incentives

Fixed and variable costs; Direct; indirect and overhead costs; Process and Job costing; Recovery of overheads; Standard costing; cost control; cost variance Analysis; Labour; material overheading volume; rate and efficiency; breakeven analysis; marginal costing and contribution; numerical

### **UNIT 3: MATERIALS MANAGEMENT**

Strategic importance of materials in manufacturing industries; relevant costs; inventory control models– economic order quantity (EOQ); Economic batch quantity (EBQ) with and without shortage; Purchase discounts; sensitivity analysis; inventory control systems– PQS Systems; Service level; Stock out risk; determination of order point and safety stock; selective inventory control– ABC; FSN; SDE; VED and three dimensional; Numerical

### **UNIT 4: QUALITY MANAGEMENT**

Definition of quality; various approaches; concept of quality assurance systems; costs of quality; statistical quality control (SQC); Variables and Attributes;  $\bar{X}$ ;  $R$ ;  $P$  and  $C$ – charts; Acceptance sampling; OC– curve; concept of AOQL; Sampling Plan– single; double and sequential; introduction to TQM and ISO 9000.

### **UNIT 5: PRODUCTION PLANNING & CONTROL**

Basic concept its relations with other decision areas; decision options – Basic and Mixed strategies; Master production schedule (MPS) Scheduling Operations Various methods for line and intermittent production

systems; Gantt chart; sequencing– Johnson algorithm for  $n$ -Jobs-2 machines;  $n$ -jobs-3 machines; 2 jobs machines  $n$ -Jobs  $m$ -machines; various means of measuring effectiveness of PPC; Introduction to JIT; Numerical

#### **TEXT BOOK:**

Chary. "Production and Operations Management", Tata McGraw Hill.

#### **REFERENCE BOOKS:**

- 1 Buffa, S. S., "Modern Production Management", John Wiley
- 2 Sadagopan, "Management Information Systems", Prentice Hall of India.
- 3 Schroeder, "Operations Management", McGraw Hill ISE.
- 4 Monks, "Operation Management", McGraw Hill ISE.
- 5 Martinich, "Production and Operations Management", John Wiley SE
- 6 Turner, MIZE, CHASE., "Industrial and Systems Engineering", Prentice Hall of India.

**Course outcomes:**

1.	Explain the various parts of the operations and production management processes and their interaction with other business functions (strategy, engineering, finance, marketing, HRM, project management and innovation)
2.	Develop the ability to identify operational methodologies to assess and improve an organizations performance

Course code	Course title	L	T	P	Credits
<b>ME-251B</b>	<b>STRENGTH OF MATERIALS LAB</b>	0	0	2	1

**Course Objectives:**

To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally.

**LIST OF EXPERIMENTS:**

1. To perform the Brinell Hardness Test
2. To perform the Rockwell Hardness Test

3. To study the Impact Testing Machine and perform the Impact Tests (IZOD & CHARY)
4. To study UTM and Torsion Testing Machine
5. To perform the Tensile Test on UTM
6. To perform the Shear Test on UTM
7. To perform the torsion test on Torsion Testing Machine
8. To determine the Moment of Inertia of a Flywheel about its own axis of rotation
9. To study the Erichsen Sheet Metal Testing Machine and Perform the Erichsen Sheet Metal Test;
10. To verify support reactions for different types of loads at different locations on the beam

Course outcomes:	
1.	Students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.
2.	Test the different materials under the action of various forces and determine their characteristic experimentally
3.	Apply theoretical knowledge about the Mechanics of Solids with practical testing for determining the strength of materials under externally applied loads.

Course code	Course title	L	T	P	Credits
<b>ME-253B</b>	<b>FLUID MACHINES LAB</b>	0	0	2	1

#### Course Objectives:

Upon Completion of this subject, the students can able to have hands on experience in flow measurements using different devices and also perform characteristic study of pumps, turbines etc.,

#### LIST OF EXPERIMENTS:

1. To study the constructional details and draw characteristic and constant efficiency curves of a Pelton turbine
2. To study the constructional details and draw characteristic and constant efficiency curves of a Francis turbine
3. To study the constructional details and draw characteristic and constant efficiency curves of a Kaplan turbine
4. To study the constructional details and draw characteristic curve of a centrifugal pump
5. To study the constructional details and draw characteristic curve of a reciprocating pump
6. To study the constructional details and draw performance curve of a gear oil pump
7. To study the constructional details and determine the efficiency of a hydraulic Ram
8. To study the constructional details of a centrifugal compressor
9. To study the model of a hydro power plant and draw its layout
10. To determine the volumetric efficiency of a reciprocating

Course outcomes:	
1.	Ability to use the measurement equipment's for flow measurement
2.	Ability to do performance test on different fluid machinery.

Course code	Course title	L	T	P	Credits
<b>ME-255B</b>	<b>KINEMATICS OF MACHINE LAB</b>	0	0	2	1

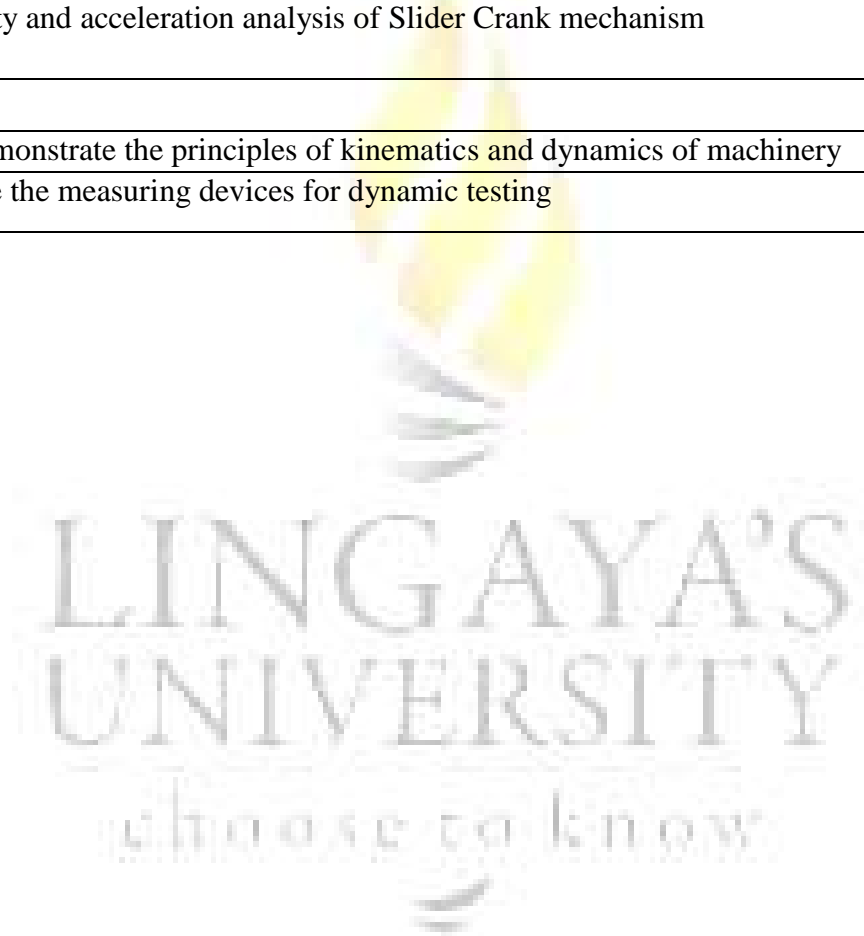
#### Course Objectives:

- To supplement the principles learnt in kinematics and Dynamics of Machinery.
- To understand how certain measuring devices are used for dynamic testing.

#### LIST OF EXPERIMENTS:

1. To study inversions of four bar chain: Coupling Rod, Beam Engine
2. To study Steering Mechanisms; Davis and Ackerman.
3. Study of quick return mechanism and draw velocity and acceleration diagram.
4. Study of inversion of Double slider chain Oldham Coupling, Scotch Yoke and Elliptical Trammel.
5. Study of various cam-follower arrangements.
6. To plot displacement v/s angle of rotation curve for various cams
7. To determine co-efficient of friction using two roller oscillating arrangement.
8. Study of various types of dynamometers, Brakes and Clutches.
9. To determine moment of inertia of the given object using of Trifler suspension.
10. Perform study of the following using Virtual Lab <http://www.vlab.co.in/>
11. Position, velocity and acceleration analysis of Grashof four bar mechanism
12. Position, velocity and acceleration analysis of Slider Crank mechanism

Course outcomes:	
1.	Ability to demonstrate the principles of kinematics and dynamics of machinery
2.	Ability to use the measuring devices for dynamic testing



Course code	Course title	L	T	P	Credits
<b>ME-257B</b>	<b>MANUFACTURING TECHNOLOGY LAB</b>	0	0	2	1

Course Objectives:

To Study and practice the various operations that can be performed in foundry, lathe, sheet metal and welding machines etc. and to equip with the practical knowledge required in the core industries

### **LIST OF EXPERIMENTS:**

1. To make a pattern for a given casting with all the necessary allowances
2. To make a component involving gas welding joints and to study the welding defects and suggesting their remedies
3. To make a component involving MIG welding and study the welding defects and suggest their remedies
4. Development and manufacture of a Complex sheet metal component such as, five-piece elbow
5. To make a casting of aluminium material
6. To study defects in a casting and suggest the remedial measures
7. To make a sand mould with a core for making a hollow job
8. To prepare a simple Engg; component by forging
9. To make a sheet metal job involving punching and blanking on a press
10. To prepare a job involving soldering / brazing



### **B.Tech Automobile Engineering (IV SEMESTER)**

Course code	Course title	L	T	P	Credits
<b>ME-202B</b>	<b>DYNAMICS OF MACHINES</b>	3	1	0	4



### **Course Objectives:**

- To understand the force-motion relationship in components subjected to external forces and analysis of standard mechanisms.
- To understand the undesirable effects of unbalances resulting from prescribed motions in mechanism.
- To understand the effect of Dynamics of undesirable vibrations.

### **UNIT-1:INTRODUCTION**

Mechanisms and Machines: Kinematics links; pairs; chains; Kinematics inversions; Four bar planar mechanisms; mobility and range of movement; Miscellaneous mechanisms; (straight line; steering; pantograph), Transmission angle.

### **UNIT-2:CAMS**

Classification of cams and followers; disc cam nomenclature; Construction of

displacement/velocity/acc; for different types of follower motions; Synthesis of cam profile by graphical and analytical approaches; Cams with specified contours/ tangent and circular arc cams.

GOVERNORS: Watt, Porter, Proell, Hartnell and spring-controlled governors, governor effort, power, stability, inertia effects.

### **UNIT-3:GEARS**

Terminology, tooth form, Law of gearing, involute spur gears, characteristics of involute

action, standard interchangeable tooth profile, minimum number of teeth on pinion in contact with gear or rack, interference and undercutting, center distance variation, Involutometry, Nomenclature of Spiral/Helical/ Bevel/ Worm gears.

GEAR TRAINS: Simple, compound, reverted and epicyclic gear trains, analytical, tabular, graphical and vector methods for velocity ratio, gear boxes- sliding and constant mesh for automobiles.

### **UNIT-4:GYROSCOPE**

Principle of gyroscopic couple, effect of gyroscopic couple and centrifugal force on vehicle taking a turn, stabilization of sea vessels. Inertia force analysis, Velocity and acceleration of slider crank and four bar mechanism, inertia force, piston thrust and forces on connecting rod, turning moment diagram, flywheel.

## **UNIT-5: BALANCING**

**BALANCING OF ROTATING COMPONENTS:** Static/dynamic balancing; Balancing of rotating masses; Two plane balancing-graphical and analytical methods; balancing of rotors; field balancing; balancing machines.

**BALANCING OF RECIPROCATING PARTS:** Balancing of single cylinder engine, balancing of multi-cylinder - inline/radial/V-type engines, firing order

### **TEXT BOOKS**

Rattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, 2009.

### **REFERENCE BOOKS:**

1. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.
2. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2005
3. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.
4. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961

<b>Course outcomes:</b>	
1.	Upon completion of this course, the Students can able to predict the force analysis in mechanical system and related vibration issues and can able to solve the problem.
2.	Implement the concept of Cam systems and their analysis of Forced vibration.
3.	Apply principles of governors and gyroscopes.

Course code	Course title	L	T	P	Credits
<b>ME-204B</b>	<b>PRODUCTION ENGINEERING</b>	3	0	0	3

<b>Course Objectives:</b>
The course provides knowledge on mechanism of metal cutting; different types of machine tools and special manufacturing processes like gear manufacturing and part programming on CNC machines; After the course completion; the students will be in a position to supervise work in a modern machine shop.

## **UNIT-1: MECHANISM OF METAL CUTTING**

Mechanics of chip formation; types of chips; mechanism of orthogonal and oblique cutting; merchant cutting force circle and shear angle relationship in orthogonal cutting; factors affecting tool forces; cutting speed; feed; depth of cut and surface finish temperature distribution at tool chip interface; Numerical on cutting forces and merchant circle.

## **UNIT-2: CUTTING TOOLS MATERIAL AND MACHINABILITY**

Cutting Tool Materials; Characteristics of cutting tool materials; various types of cutting tool material; tool coating; Cutting Fluids; Purpose and type of cutting fluids; Effect of cutting fluids on tool life; Tool wear and machinability; Type of wear; types of tool wear; tool life; machinability: evaluation of machinability; factors affecting machinability; Numerical on tool life; Economics of Machining; Optimizing cutting parameters for minimum cost; optimizing cutting parameters for max. production.

## **UNIT-3: METAL WORKING**

Hot working; Cold Working; Plastic deformation and fluid criteria relationship between tensile and shear field stress; Various forming operations; Rolling; forging; drawing; deep drawing; bending; extrusion; punching and blanking; high energy: rate forming process. Principles of rolling; roll passes; roll pass sequences;

## **UNIT-4: METAL FORMING PROCESSES**

Forging operations-Smith forging; drop forging; press forging; forging defects; Forging of different automobile components and selection of suitable material for them.

## **UNIT-5: SHEET METAL PROCESSES:**

Sheet metal operations; press tool operations; shearing action; drawing dies; spinning; bending; stretch forming; embossing and coining.

## **TEXT BOOK**

Rao P N, "Manufacturing Technology Metal Cutting and Machine Tools"; Tata McGraw Hill

## REFERENCE BOOKS

1. Grover, MP., "CAD/CAM", Grover and Zimmer Prentice Hall
2. Sen, G. C, and A Bhattacharya., "Principles of Machine Tools", Tata McGraw Hill.
3. Pandey, P. C, and Shan, H, S., "Modern Machining Processes", Tata McGraw Hill.
4. Raghuwanshi, B. S., "Workshop Technology", Vol II
5. Kempster, M. H. A., "Introduction to Jig and Tool Design", Hodder and Stoughton, England

Course outcomes:	
1.	Upon completion of this course, the students can able to apply the different manufacturing process and use this in industry for component production
2.	Gain hands on experience about the various cutting tools and techniques of selecting tools.
3.	Students can gain the knowledge on the non-traditional machining process.

Course code	Course title	L	T	P	Credits
<b>ME-206B</b>	<b>ENERGY CONVERSION</b>	3	1	0	4

#### Course Objectives:

It enables the students to understand the use of thermodynamic laws in design and functioning of Various equipment used in steam power systems and compressors.

### UNIT-1:

Classification of fuels-solid; liquid and gaseous fuels; Combustion equations; Stoichiometric air-fuel ratio; Excess air. Calorific values of fuel; Exhaust gas analysis; Orsat apparatus; Enthalpy and internal energy of combustion; Enthalpy of formation; Adiabatic flame temperature; Problems

### UNIT-2: BOILER

Classification ; comparison between fire and water tube boilers Essentials of a good boiler; Constructional and operational details of Babcock-Wilcox; Cochran; Locomotive and Lancashire boilers; High pressure boilers- Benson; Lamont; Loeffler and Velox boilers; Boiler mountings and accessories; Boiler performance; Natural and Artificial Drafts; Chimney height; Maximum draft and chimney efficiency ; Boiler heat balance Sheet; Problems

### UNIT-3: BASIC POWER CYCLES & NOZZLES & TURBINES

Carnot and Rankine vapor cycles effect of operating Conditions on thermal efficiency of Rankine cycle; Rankine cycle with superheat; reheat And regeneration Binary Vapor cycle Problems

Classification of nozzles, Velocity and heat drop; mass discharge through a nozzle; critical pressure ratio and its significance effect of friction and nozzle efficiency; Supersaturated flow; design pressure ratio; Problems

### UNIT-4: STEAM TURBINES

Classification; Impulse Turbine- Flow through blades; velocity Diagram ; power output and efficiency maximum blade efficiency of single stage impulse Turbine; Blade friction; compounding of impulse turbine. Reaction Turbine-Flow through Impulse reaction blades degree of reaction; velocity diagram; power output; efficiency And blade height comparison of impulse and impulse reaction turbines; Losses in steam Turbines; stage efficiency; overall efficiency and reheat factor; Governing of steam Turbines Problems

### UNIT-5: CONDENSER & COMPRESSOR

Elements of a condensing plant; types of condensers and their studies comparison of jet and surface condensers; Condenser vacuum; sources of air leakage and its Disadvantages; vacuum efficiency and condenser efficiency; Problems. Working of a single stage reciprocating air compressor; calculation of work input; Volumetric efficiency; Isothermal efficiency; Advantages of multi stage compression; Two stage compressor with Inter-cooling; Perfect Inter cooling; Optimum intercooler pressure Problems

### TEXT BOOK

Eastop, T. D, and McConkey., “Applied Thermodynamics for Engineering Technologists”, Pearson Education.

### REFERENCE BOOKS

- 1 Domkundwar., “Thermal Engineering”, Dhanpat Rai and Company.
- 2 Vasandani, V. P., and Kumar, D. S., “Heat Engineering”, Metropolitan Book Co
- 3 Ballaney, P. L., “Thermal Engineering”, Khanna Publishers,

Course outcomes:	
1.	Students can able to Understand the basic concepts of Gas power cycles
2.	Students can able to Compare various steam Turbine & Steam Nozzle
3.	Students can able to Examine Single Acting & Double Acting Compressor

Course code	Course title	L	T	P	Credits
<b>ME-208B</b>	<b>FLUID MACHINERY</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

<b>Course Objectives:</b>
On completion of this course; students will be able to know the construction; working; installation of hydraulic turbines; pumps and other hydraulic systems.

## **UNIT-1:IMPACT OF FREE JETS**

Impulse – momentum principle; jet impingement - on a stationary flat plate; inclined plate and a hinged plate; at the center of a stationary vane; on a moving flat plate; inclined plate; a moving vane and a series of vanes; Jet striking tangentially at the tip of a stationary vane and moving vane(s); jet propulsion of ships. Problems

## **UNIT-2:IMPULSE TURBINES**

Classification – impulse and reaction turbines; water wheels; component parts; construction; operation and governing mechanism of a Pelton wheel; work done; effective head; available head and efficiency of a Pelton wheel; design aspects; speed ratio; flow ratio; jet ratio; number of jets; number of buckets and working proportions; Performance Characteristics; governing of impulse turbines. Problems

## **UNIT-3: REACTION TURBINE**

**Francis Turbines:** Component parts; construction and operation of a Francis turbine; governing mechanism; work done by the turbine runner; working proportions and design parameters; slow; medium and fast runners; degree of reaction; inward/outward flow reaction turbines; Performance Characteristics; Problems.

**Propeller and Kaplan turbines:** Component parts; construction and operation of a Propeller; Kaplan turbine; differences between the Francis and Kaplan turbines; draft tube - its function and different forms; Performance Characteristics; Governing of reaction turbine;

## **UNIT-4:CENTRIFUGAL PUMPS**

Classification; velocity vector diagrams and work done; manometric efficiency; vane shape; head capacity relationship and pump losses; pressure rise in impeller; minimum starting speed; design considerations; multi-stage pumps. Similarity relations and specific speed; net positive suction head; cavitation and maximum suction lift; performance characteristics; Brief introduction to axial flow; mixed flow and submersible pumps; Problems.

**UNIT-5 Reciprocating Pumps:** Construction and operational details; discharge coefficient; volumetric efficiency and slip; work and power input; effect of acceleration and friction on indicator diagram (pressure – stroke length plot); separation; air vessels and their utility; rate of flow into or from the air vessel; maximum speed of the rotating crank; characteristic curves; centrifugal V/S reciprocating pumps; brief introduction to screw; gear; vane and radial piston pumps; Problems.

**Hydraulic systems:** Function; construction and operation of Hydraulic accumulator; hydraulic intensifier; hydraulic crane; hydraulic lift and hydraulic press; Fluid coupling and Torque converter; Hydraulic ram; Problems.

### Text Books:

1. Hydraulics & Fluid Mechanics – Modi & Seth; Pub. - Standard Book House; N.Delhi
2. Hydraulic Machines – Jagdish Lal; Metropolitan

### Reference Books:

1. Fluid Mechanics and Hydraulic Machines – S S Rattan; Khanna Publishers
2. Introduction to Fluid Mechanics and Fluid Machines – S K Som and G Biswas; Tata McGraw Hill
3. Fluid Mechanics and Fluid Power Engineering – D S Kumar; S K Kataria and Sons

Course outcomes:	
1.	Students can able to understand momentum and the importance of jets.
2.	Critically analyze the applications of positive displacement machines.
3.	Critically analyze the performance of Rotodynamic machines.



Course code	Course title	L	T	P	Credits
<b>ME-210B</b>	<b>COMPUTER AIDED DESIGN</b>	3	0	0	3

**Course Objectives:**

- To understand hardware and software requirement for CAD/CAM
- To develop basic knowledge and experience of engineering modeling concepts
- To teach the fundamentals of Modeling of Curves; Surfaces and Solids
- To study and use various CAD/CAM software
- To study the fundamentals of Finite Element Analysis

## **UNIT-1: INTRODUCTION & PRIMITIVES**

Fundamentals of CAD; Design process; Applications of computer for design; Benefits of CAD; Points and Lines; Line drawing algorithms; DDA algorithm; Bresenham's line algorithm; Circle generation algorithm; Mid point circle algorithm.

## **UNIT-2: TRANSFORMATIONS**

Transformation Principles; Translation; Scaling; Rotation; Matrix Representations and Homogeneous Coordinates; Composite transformations and other transformations WINDOWS and CLIPPING: Introduction; The Viewing Transformation; Viewing transformation implementation; Clipping operation

## **UNIT-3: GEOMETRIC MODELING**

Wire frame modeling; wireframe entities and their definitions; Concept of Parametric and nonparametric representation of curve; hermite cubic splines; Bezier curves; B-splines Surface modeling

and entities; Algebraic and geometric form; Parametric space of Surface; Blending functions; Reparametrisation of surface patch, Composite surface Solid models; Solid entities; Solid representation; Sweep representation; Constructive solid geometry and Boundary representation; Solid modeling based applications

#### **UNIT-4:FINITE ELEMENT ANALYSIS**

Basic steps of Finite Element Analysis; discrete systems; solid and structural mechanics plane trusses Euler Bernoulli Beam Element; Plane Frame elements.

#### **UNIT-5:RAPID PROTOTYPING**

Introduction and history of RP.need for compression of product development cycle. Classification of RP.Stereolithography (SLA), Selective Laser sintering(SLS), Laminate Object Manufacturing (LOM), 3D Printing, Fused Deposition Modeling (FDM). Principles, Process parameters and applications.introduction to STL files and internet based softwares.

#### **TEXT BOOK**

Ibrahim,Zeid., “CAD”, Tata McGraw Hill

#### **REFERENCE BOOKS**

1. Hearn and Baker., “ Computer Graphics”, Tata McGraw Hill
2. Mikel, P. Groover, and Emory, W, Zimmers., “CAD/CAM”, Prentice Hall of India
3. Rao, P. N., “CAD/CAM”, Tata McGraw Hill
4. Reddy. J. N., “Finite Element Method”, Tata McGraw Hill, 3rd edition.

Course outcomes:	
1.	Upon completion of this course, the students can able to use computer and CAD software's for modeling of mechanical components.
2.	Students can able to understand the various algorithm of CAD.
3.	Students can understand the importance of Finite Elements Methods.

Course code	Course title	L	T	P	Credits
<b>ME-212B</b>	<b>Strength Of Material-II</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
Course Objectives:					
The strength of materials is one of the core subjects and aim is to provide a sound foundation to design various elements of mechanical equipment.					

1. **BENDING STRESS:** Flexural formula for straight beam under pure bending, for curved beam under pure bending, Shear stress distribution in I section, T sectional beams Numerical
2. **SLOPE AND DEFLECTION OF BEAMS:** Relationship between bending moment; slope and deflection, Calculation of slope and deflection by method of integration; Calculation of slope and deflection by Macauley's method ; deflection of beams. Numerical.
3. **COLUMNS AND STRUTS:** Column under axial load, Concept of instability and buckling, slenderness ratio; Euler's formula for elastic buckling load for a column hinged at both the ends Euler's formula for elastic buckling load for a column fixed at one end and free at the other end, Euler's formula for elastic buckling load for a column fixed at both ends, Euler's formula for elastic buckling load for a column fixed at one end and hinged at the other end, Equivalent length of a column, Slenderness Ratio, Rankine's formula. Numerical.
4. **THIN & THICK CYLINDERS:** Thin walled pressure vessels; Hoop stress and longitudinal stress for a thin cylindrical vessel, Hoop stress and longitudinal stress for a thin spherical vessel, Derivation of Lamé's equations for thick cylinders; Radial and hoop stresses and strains in thick cylinders.

5. **STRAIN ENERGY AND THEORIES OF FAILURE** : Strain energy and its definitions, resilience and modulus of toughness. Expressions for strain energy. Strain energy for three dimensional stress systems. Castigliano's and Maxwell theorems Strain energy due to bending and torsion. Theories of failures

### TEXT BOOK

Ferdinand P Beer & Russel E Johnston; Mechanics of Materials, Tata McGraw Hill; 2009

### REFERENCE BOOKS

1. Hibbeler, R. C.,—Mechanics of Materials, Pearson Education, 2005
2. Ryder, G H., —Strength of Materials, Macmillan, 2001

Course outcomes:	
1.	Determine Beam deflections using various theorem.
2.	Know about the induced stresses in thin and thick cylinders & spheres

Course code	Course title	L	T	P	Credits
<b>ME-252B</b>	<b>DYNAMICS OF MACHINES LAB</b>	0	0	2	1

Course Objectives:
To understand how certain measuring devices are used for dynamic testing.

### LIST OF EXPERIMENTS

1. To study various types of links; pairs; chains and mechanisms
2. To study planar four bar mechanism and its inversions (four bar mechanism; single and double slider crank mechanism Graphical synthesis of
  - a. 4 bar mechanism
  - b. radial cam with roller follower
3. Kinematic study of mechanisms
  - a. shaper machine mechanism
  - b. power hacksaw mechanism
4. To study various types of cam and follower arrangement and plot follower displacement v/s cam rotation for various cam follower systems
5. To study various types of gears and generate spur gear involute tooth profile using simulated gear shaping process and study standard and non-standard involute gear tooth profile
6. To study various types of gear laws; simple; compound; reverted; epicyclic and differential

7. To perform experiment for static balancing / dynamic balancing on balancing apparatus
8. Determine M O I of connecting rod by compound pendulum method and tri filer suspension pendulum
9. Determine gyroscopic couple on motorized Gyroscope

Course outcomes:	
1.	Ability to demonstrate the principles of kinematics and dynamics of machinery.
2.	Ability to use the measuring devices for dynamic testing.

Course code	Course title	L	T	P	Credits
<b>ME-254B</b>	<b>PRODUCTION ENGINEERING LAB</b>	0	0	2	1

Course Objectives:
To Study and acquire knowledge on various basic machining operations in special purpose machines and its applications in real life manufacture of components in the industry

### LIST OF EXPERIMENTS

1. Prepare a pattern for given casting with all the necessary allowances.
2. Make a green sand mold and prepare it for the casting; investigate the casting defects and suggest the remedies.
3. Make a casting by shell molding process.
4. Make a component involving horizontal and vertical welding (Arc welding)
5. Cut a sheet with gas welding and investigate the defects.
6. To join two sheets using resistance spot welding.
7. Make a job using turning; taper turning and facing and boring operations on lathe.
8. Prepare a job on surface grinder.
9. Development and manufacture of sheet metal component such as elbows and transition pieces.

10. Cut external threads on a lathe
11. Manufacture and assembly of a unit concept of tolerances and fits (shaft and bush assembly or shaft; key and bush assembly)
12. Multi slot cutting on milling machine by indexing.

Course outcomes:	
1.	Ability to use different machine tools to manufacturing gears
2.	Ability to use different machine tools for finishing operations
3.	Develop CNC part programming

Course code	Course title	L	T	P	Credits
<b>ME-256B</b>	<b>ENERGY CONVERSION LAB</b>	0	0	2	1

Course Objectives:
<ul style="list-style-type: none"> <li>To supplement the principles learnt in Energy conversion.</li> <li>To understand how turbines are working.</li> </ul>

## LIST OF EXPERIMENT

1. To study low pressure boilers with their accessories and mountings.
2. To study high pressure boilers with their accessories and mountings.
3. To prepare heat balance sheet for a given boiler.
4. To study impulse and reaction steam turbines.

5. To find out dryness fraction of steam by throttling calorimeter.
6. To calculate power output and efficiency of a steam turbine.
7. To study and determine the condenser efficiency.
8. To study and determine the volumetric efficiency of a reciprocating air compressor.
9. To study cooling tower and determine its efficiency.
10. To determine calorific value of a sample of fuel using bomb calorimeter.
11. To determine composition of flue gases by orsat apparatus.

Course outcomes:	
1.	Students can able to Understand the basic concepts of Gas power cycles
2.	Students can able to Compare various steam Turbine & Steam Nozzle
3.	Students can able to Examine Single Acting & Double Acting Compressor

Course code	Course title	L	T	P	Credits
<b>ME-258B</b>	<b>FLUID MACHINERY LAB</b>	0	0	2	1

Course Objectives:
Upon Completion of this subject, the students can able to have hands on experience in flow measurements using different devices and also perform characteristic study of pumps, turbines etc.,

### LIST OF EXPERIMENTS

1. To study the constructional details and draw characteristic and constant efficiency curves of a pelton turbine

2. To study the constructional details and draw characteristic and constant efficiency curves of a Francis turbine
3. To study the constructional details and draw characteristic and constant efficiency curves of a Kaplan turbine
4. To study the constructional details and draw characteristic curve of centrifugal pump
5. To study the constructional details and draw characteristic curve of a reciprocating pump
6. To study the constructional details and draw performance curve of gear oil pump
7. To study the constructional details and determine the efficiency of a hydraulic Ram
8. To study the constructional details of a centrifugal compressor
9. To study the model of hydro power plant and draw its layout
10. To determine the volumetric efficiency of a reciprocating

Course outcomes:	
1.	Ability to use the measurement equipments for flow measurement
2.	Ability to do performance test on different fluid machinery.

Course code	Course title	L	T	P	Credits
<b>ME-260B</b>	<b>COMPUTER AIDED DESIGN LAB</b>	0	0	2	1

Course Objectives:
To gain practical experience in handling 2D drafting and 3D modelling software systems

## LIST OF EXPERIMENTS

Implementation of simple programmes for graphical representation:



1. Implement programmes for the graphic representation of transformation and projections.
2. Implement programmes for the graphic representation of Conic sections.
3. Implement programmes for the graphic representation of cubic splines and B-splines.
4. Implement programmes for the graphic representation of surfaces – Bilinear and Bicubic.
5. Implement programmes for the graphic representation of surface patch and Bezier surface.
6. Modeling:
  - a) Modeling of machine components.
  - b) Modeling of Surfaces of diffuser section; propeller
  - c) Modeling of Gear blank and other mechanical parts
  - d) Modeling of Mechanical assembly of parts

Course outcomes:	
1.	Ability to develop 2D and 3D models using modeling softwares.
2.	Students can understand the various transformations and projections.
3.	Students can implement the various splines and surfaces.

### **B.Tech Automobile Engineering ( V SEMESTER)**

Course code	Course title	L	T	P	Credits
<b>ME-301B</b>	<b>HEAT TRANSFER</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Objectives:**

This course imparts basic knowledge of heat transfer and the knowledge imparted will enable him to reduce or increase heat transfer in existing equipment as the need may be and be able to go for preliminary design of heat exchanger.

## **UNIT-1: BASICS AND LAWS**

Modes of heat transfer, Steady State Heat Conduction: Boundary conditions in heat transfer; 1-D heat conduction: a plane wall; long hollow cylinder; hollow sphere and composite structures; Overall htc. Conduction equation in Cartesian; polar and spherical co-ordinates systems; Initial and Boundary conditions; Critical Thickness of Insulation, Log Mean Area of Cylinders and Spheres, Numericals

## **UNIT-2: STEADY STATE AND UNSTEADY STATE HEAT CONDUCTION**

Introduction; 1 – D heat conduction with heat sources; Plane wall; hollow cylinder and sphere; Current carrying conductor; Extended surfaces (fins); Fin effectiveness Numericals, Systems with negligible internal resistance; Transient heat conduction in plane walls; cylinders; spheres with convective boundary Conditions; Chart solutions only; Periodic heat transfer in one dimension; Numericals

## **UNIT-3: CONVECTION (WITH AND WITHOUT PHASE CHANGE)**

Forced convection-Thermal and hydro-dynamic boundary layers; Equation of continuity; Momentum and energy equations; some results for flow over a flat plate and flow through tube; Fluid friction and heat transfer (Colburn analogy); Use of; Empirical relations for free convection from vertical and horizontal planes and cylinders; Numericals, Laminar film condensation on a vertical plate; Drop-wise condensation; Boiling regimes; Free convective; Nucleate and film boiling; Numericals

## **UNIT-4: THERMAL RADIATION**

Absorptivity; Reflectivity; Transmissivity; Black body; emissive power; radiosity; laws of thermal radiation; intensity of radiation; Shape factor and its properties; Hottel's Method; Radiation exchange between black and gray surfaces; Two body; three body enclosures; Radiation shielding; Numericals

## **UNIT-5: HEAT EXCHANGERS**

Classification; Performance variables; Analysis of a parallel and counter flow heat exchanger using LMTD and NTU; Heat exchanger effectiveness; Use of charts for multipass exchanger and Cross flow heat exchanger; Fouling factor; Compact heat exchangers; Plate heat exchangers; Heat Pipe, Numericals

### **TEXT BOOK**

NAG, P. K., "Heat Transfer", McGraw Hill

### **REFERENCE BOOKS**

1. Arpasi, V.S., "Conduction Heat Transfer", Addison Wesley
2. Domkundwar., "Heat Transfer",
3. Holman, J. P., "Heat Transfer", Tata McGraw Hill
4. Goshdastidar, P.S., "Heat Transfer", Oxford Univ Press

5. Lienhard, J.V, J. H. Lienhard. V., “ A Heat Transfer Text Book

Course outcomes:	
1.	Upon completion of this course, the students can able to understand and apply different heat and mass transfer principles of different applications.
2.	Students can able to understand the various heat transfers and also the Heat exchangers.
3.	Can able to understand the Periodic heat transfer in one dimension and three dimension.



Course code	Course title	L	T	P	Credits
<b>ME 303B</b>	<b>MATERIALS SCIENCE</b>	3	0	0	3

Course Objectives:
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The course provides the knowledge on the composition; testing and applications of materials; It also provides knowledge about the structure of materials and the effect of temperature; composition and time on various metallurgical processes. The study of this course will help the students to identify and select suitable materials for various engineering applications.
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## **UNIT-1:METALS & STRUCTURE OF MATERIALS**

Ferrous Metals: Plain carbon steel; high speed steel and cast iron; Crystal structure; Crystal imperfections and their classifications; point defects; line defects; edge & screw dislocations; surface defects; volume defects & effects of imperfections on metal properties

## **UNIT-2:SOLID SOLUTIONS AND PHASE DIAGRAM**

Solid solution and its types; importance and objectives of phase diagram; systems; phase and structural constituents; cooling curves; Gibbs's phase rule; Lever rule; Iron Carbon equilibrium diagram and TTT diagram.

## **UNIT-3:HEAT TREATMENT**

Principles; purpose; classification of heat treatment processes; annealing; normalizing; hardening; tempering; carburizing; nitriding; cyaniding; flame and induction hardening. Allotropy of iron. Martempering and Austempering

## **UNIT-4:DEFORMATION OF METALS**

Elastic and plastic deformation; mechanism of plastic deformation; yield point phenomena; strain ageing; work hardening; Bauschinger effect; stress cracking. Recovery; re-crystallization and grain growth.

## **UNIT-5:CORROSION, CREEP, FATIGUE&ALLOY PROPERTIES**

Phenomenon of Corrosion ; Creep concept and creep curve; mechanism of creep; creep testing and prevention against creep ; fatigue; fatigue limit; mechanism of fatigue; factors affecting fatigue; fatigue testing and SN curve. Effect of alloying elements on steel and stainless steel; Properties and applications of non ferrous metals – Aluminium; Copper and their common alloys.

### **TEXT BOOKS**

Narula, Narula and Gupta., "Material Science", Tata McGraw Hill, 2009

#### REFERENCE BOOKS

- 1 Budinski, K. G, & Budinski MK., "Engineering Materials Properties and Selection", PMI; 2010
- 2 Van Vlack., "Elements of Material Science and Engineering", Wesley Pub Comp 1998
- 3 Raghuwanshi, B. S., "Workshop Technology", Vol I Dhanpat Rai & Co.

Course outcomes:	
1.	Understand the constitution of alloys and phase diagrams and Phase rules.
2.	Understand the deformation mechanisms of materials.
3.	Upon completion of this course, the students can able to apply the different materials, their processing, heat treatments in suitable application in mechanical engineering fields.



Course code	Course title	L	T	P	Credits
<b>ME-305B</b>	<b>MEASUREMENT INSTRUMENTATION AND CONTROL</b>	3	1	0	4

**Course Objectives:**

The main objective is to enable students to understand the construction and operation of instruments for measurement of pressure; level; flow and temperature; describe a suitable calibration procedure for a particular measurement instrument and also to introduce the basic principles of modeling; analysis and control of dynamic systems.

## **UNIT-1:INSTRUMENTATION AND CHARACTERISTICS**

Block representation of measurement systems; Need for calibration and Standards; Static and Dynamic characteristics of instruments: Instrumentation error. Basic statistical concepts.

## **UNIT-2:SENSORS AND TRANSDUCERS**

Analog and digital transducers: electromechanical: potentiometric; Inductive; Self generating and Non-self-generating types; Electromagnetic; Electrodynamic; Eddy current; Magnetostrictive; variable inductance; variable capacitance; piezo- electric transducer and associated circuits; unbonded and bonded strain gauges; strain gauge bridge circuits; Ionisation Transducers; Opto-electrical transducers; photo conductive transducers; photo voltaic transducers

## **UNIT-3:MEASUREMENT**

Measurement of motion, force, torque, pressure, flow, level and temperature.

## **UNIT-4:CONTROL SYSTEMS**

Types of Control Systems; Block diagram Representation of closed loop control system; Transfer Function; Signal flow diagrams; Mathematical modeling; Types of control action; hydraulic controllers; pneumatic controllers; Electronic controllers; Transient response of 1st and second order systems; response characteristics; steady state error and error constants.

## **UNIT-5:FREQUENCY RESPONSE ANALYSIS AND STABILITY OF CONTROL SYSTEMS**

Introduction, polar plot; Bode plot; Routh's criterion; Nyquist's criterion and Root locus methods for stability study.

### TEXT BOOKS

1. Nakra, Chaudary., "Instrumentation: Measurement and Analysis", Tata McGraw Hill, 2000
2. Nakra, B.C., "Theory and Applications of Automatic Control", New Age Publishers.

### REFERENCE BOOKS

- 1 Ernest, O. Doebelin., "Measurement Systems Application and Design", Tata McGraw Hill, 2008
- 2 Alan, S. Morris., "Principles of Measurement
3. Ogata, "Modern Control Engineering"; Prentice Hall of India
4. Kuo., "Automatic Control Systems", Prentice Hall

Course outcomes:	
1.	Able to apply the concept of basic measurement system.
2.	Able to apply the concept of basic measurement system.
3.	Upon completion of this course, the Students can demonstrate different measurement technologies and use of them in Industrial Components.

Course code	Course title	L	T	P	Credits
<b>ME-307B</b>	<b>MACHINE DESIGN -1</b>	3	2	0	5

#### Course Objectives:

The objectives of this course are to cover basics of design process; engineering materials; failure prevention under static loadings and characteristics of a few types of mechanical elements like joints –temporary / permanent etc

### UNIT-1:DESIGN PHILOSOPHY

Design procedure, Preferred numbers; Stress-Strain Curves of various materials; Static loading; Factor of safety; Limits, Fits and Tolerances; Hole basis and shaft basis system; Types of fits; Numericals.

### UNIT-2:MECHANICAL JOINTS

ISO Metric screw threads; Bolted joints in tension; Eccentrically Loaded bolted joints in shear and under combined stresses; Design of spigot and Socket joints; Design of knuckle joints; Design-case study.

### UNIT-3:WELDED AND RIVETTED JOINTS (UNDER STATIC LOADING)

Introduction to Welding and Rivetting; their advantages, disadvantages and applications; Types of Welded Joints; Design of various types of welded joints; eccentric loaded welded joints; Types of Rivets; caulking and fullering; Design of various types of riveted joints under different static loading conditions; eccentrically loaded riveted joints; Design- case study

### UNIT-4:DESIGN OF POWER TRANSMISSION COMPONENTS

Belts; chains; ropes; design of belt drives; Flat and V belt drives; condition for transmission of max. power; selection of belt; design of rope drives; design of chain drives with sprockets; Design of Power screws; Design of Screw Jack; Case Study

### UNIT-5:DESIGN OF CLUTCHES AND BRAKES

Types of clutches in use; Design of friction clutches-Disc; Multidisc; cone and centrifugal; Torque transmitting capacity of clutches; various types of brakes; Self energizing condition of brakes; design of shoe brakes- Internal and external expanding; band brakes; thermal considerations in brake designing; design-case study

#### TEXT BOOK

Bhandari, V. B., “Design of machine elements”, Tata McGraw Hill, 2nd edition, 2007

#### REFERENCE BOOKS

1. Chitale, A. K, & Gupta, R. C., “Product Design and Manufacturing”, Prentice Hall of India.
2. Robert, L. Norton., “Machine Design An Integrated Approach”, Addison Wesley



3. Robert, C. Juvinall., “Fundamentals of Machine Component Design”
4. Shigley, J.E., “Mechanical Engg Design”, Tata McGraw Hill 8th edition.

Course code	Course title	L	T	P	Credits
<b>ME-309B</b>	<b>OPTIMIZATION TECHNIQUE</b>	4	0	0	4

#### Course Objectives:

The objective of the course is to give the student experience in modeling; solving and analyzing problems using linear programming; Emphasis will be on theory and applications; By the end of the course; the student should have developed the skills to consider real world problems; develop linear programming models that consider the key elements of the real world problem; solve the models for their optimal solutions; interpret the models solutions and infer solutions to the real world problems.

### UNIT-1: LINEAR PROGRAMMING

Origin and development of operations research, general methodology of OR, applications of OR to industrial problems, Linear Programming Problems: Different types of models, formulation of linear programming problems (LPPs), product-mix problems, deterministic models, graphical solution. Simplex Method: Simplex algorithm, computational procedure in simplex method, applications of simplex technique to industrial problems.

### UNIT-2: TRANSPORTATION & ASSIGNMENT MODELS

Stepping stone method, MODI methods, degeneracy, assignment; traveling salesman; problems.

### UNIT-3: QUEUING MODEL

Introduction; queue parameters, M/M/1 queue performance of queuing systems applications in industries; problems

### UNIT-4: NETWORK MODEL

Network diagram; event; activity defects in network; PERT CPM; float in network PERT and CPM problem variance and probability of completion time project cost – direct; indirect; total optimal project cost by crashing of network, resources leveling in project; problems

### UNIT-5: DECISION THEORY

Basics concept, Simon model of decision making Decision making under certainty, uncertainty and risk. Maxi max, mini max Laplace, Hurwitz criteria Expected money value Decision Tree.

## TEXT BOOK

Taha, H. A., “Operation Research”, Prentice Hall of India, Sixth/Seventh Edition

## REFERENCE BOOKS

1. Rao, S.S., “Engineering Optimisation: Theory and Practice”, New Age International, 3rd Edition
2. Gupta and Sharma., “Operation Research”, National Publishers
3. Vohra., “Quantitative Techniques”, Tata McGraw Hill
4. Wagher, H. M., “Principles of Operation Research”, (with applications to Managerial Decisions), Prentice Hall of India

Course outcomes:	
1.	Students can gain the knowledge about various transportation methods.
2.	Can understand the network and queuing model.
3.	Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems.

Course code	Course title	L	T	P	Credits
<b>ME-311B</b>	<b>POWER PLANT ENGINEERING</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Objectives:**

After going through the course the students will have the knowledge of different types, working and economy of power plant together with direct energy conversion systems. This course imparts the necessary knowledge regarding conventional and non conventional power plants. Further, the student should be able to work out the economics of a power plant.

1. **INTRODUCTION:** Energy resources and their availability; types of power plants; selection of the Plants; review of basic Thermodynamic cycles used in power plants.
2. **STEAM POWER PLANTS:** Flow sheet and working of modern-thermal power plants; super critical Pressure steam stations; site selection; coal storage; preparation; coal handling systems; feeding and burning of pulverized fuel; ash handling systems; dust collection-mechanical dust collector and electrostatic precipitator. **COMBINED CYCLES:** Constant pressure gas turbine power plants; Arrangements of combined plants (Steam and gas turbine power plants); repowering systems with gas production from coal; using PFBC systems; with organic fluids; parameters affecting thermodynamic efficiency of combined Cycles; Problems
3. **NUCLEAR POWER PLANTS:** Principles of nuclear energy; basic nuclear reactions; nuclear reactors-PWR; BWR; CANDU; Sodium graphite; fast breeder; homogeneous; gas cooled; Advantages and Limitations; nuclear power station; waste disposal **HYDRO ELECTRIC POWER PLANTS:** Rainfall and run-off measurements and plotting of various curves For estimating stream flow and size of reservoir; power plants design; construction and operation of different components of hydro-electric power plants; site selection; comparison with other Types of power plants
4. **POWER PLANT ECONOMICS:** load curve; different terms and definitions; cost of electrical energy; Tariffs methods of electrical energy; performance and operating characteristics of power plants incremental Rate theory; input-out put curves; efficiency; heat rate; economic load sharing; Problems
5. **NON-CONVENTIONAL POWER GENERATION** Solar radiation estimation; solar energy collectors; low; medium and high temperature power plants; OTEC; wind power plants; tidal power plants; Geothermal power plants; Direct Energy Conversion Systems: Fuel cell; MHD power

generation-principle; open and closed Cycles systems; thermoelectric power generation; thermionic power generation.

### TEXT BOOK

Nag, P.K., "Power Plant Engineering", Tata McGraw Hill, Second Edition, 2001

### REFERENCE BOOKS

1. El-Waki, M.M., "Power Plant Engg", McGraw Hill 1985
2. Sharma, P. C., "Power Plant Engg", S K Kataria and Sons
3. Arora and Domkundwar,, "A Course in Power Plant Engineering", DhapatRai and Sons.
4. Bernhardt, G.A, Skrotzki, and William, A. Vopat., "Power station Engineering and Economy", Tata McGraw Hill

Course outcomes:	
1.	Understand the principles and components of steam power plants.
2.	Analyze the working of a Gas power plant and the related cycles.
3.	Learn about the utility and applications of nuclear power plant.

Course code	Course title	L	T	P	Credits
<b>ME-351B</b>	<b>HEAT TRANSFER LAB</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**Course Objectives:**

- To study the heat transfer phenomena predict the relevant coefficient using implementation.
- To study the performance of refrigeration cycle / components.

## LIST OF EXPERIMENTS

1. To determine the thermal conductivity of a metallic Rod. To determine the thermal conductivity of an insulating power
2. To find out the heat transfer and effectiveness of a pin fin under natural convection condition
3. To calculate the heat transfer and effectiveness of a pin fin under forced convection condition
4. To determine the emissivity of a given specimen body
5. To verify the Stefan Boltzman constant for thermal radiation
6. To determine the overall heat transfer coefficient and effectiveness of a given heat exchanger under parallel flow condition
7. To determine the overall heat transfer coefficient and effectiveness of a given heat exchanger under counter flow condition
8. To determine the convective heat transfer coefficient for a horizontal rod
9. To determine the overall thermal resistance of a composite wall

**Course outcomes:**

1.	Ability to demonstrate the fundamentals of heat and predict the coefficient used in that transfer application and also design refrigeration cycle.
2.	Students can apply their heat transfer knowledge in industries.

Course code	Course title	L	T	P	Credits
<b>ME- 353B</b>	<b>MEASUREMENT INSTRUMENTATION &amp; CONTROL LAB</b>	0	0	2	1

Course Objectives:
To familiar with different measurement equipment's and use of this industry for quality inspection.

### LIST OF EXPERIMENTS

1. To study a linear variable differential transformer (LVDT) and use it in a simple experimental set up to measure small displacement
2. To measure strain using strain gauges mounted on a cantilever beam
3. To measure torque using strain gauge torque transducer
4. To measure temperature using a thermocouple. Temperature measurement by resistance temperature device and to draw its characteristic curve;
5. To draw the characteristic curve for the given thermistor;
6. To measure the speed of a motor shaft with the help of (non contact type) magnetic pick up)
7. To measure the speed of a motor shaft with the help of a proximity sensor;
8. To measure load using load cell. Measurement of pressure using pressure cell

Course outcomes:	
1.	Ability to handle different measurement tools and perform measurements in quality impulsion.
2.	Gain basic principles and knowledge about interfacing techniques.

Course code	Course title	L	T	P	Credits
<b>ME-357B</b>	<b>MATERIAL SCIENCE LAB</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

Course Objectives:
To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally.

## LIST OF EXPERIMENTS

1. To study the creep deformation of the solder wire
2. To study the Bravais Lattices
3. To study the arrangement of atoms in simple crystal with the aid of models
4. To study the chemical methods of corrosion
5. To normalize a given specimen and check its toughness
6. To temper the given hardened steel specimen at 300°C and measure hardness
7. To temper the given hardened steel specimen at 500°C and measure hardness
8. To study the microstructure of heat treated steel
9. To harden a given specimen and check its hardness
10. To anneal a given specimen and check its hardness

Course outcomes:
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1.	Interpret the hardness values obtained from different heat treatment processes.
2.	Identify the materials based on their microstructures.

### **B.Tech Automobile Engineering (VI SEMESTER)**

Course code	Course title	L	T	P	Credits
<b>MEA-302B</b>	<b>INTRODUCTION TO ELECTRIC VEHICLE TECHNOLOGY</b>	3	0	0	3

#### **Course Objectives:**

It imparts the knowledge of proper functioning of basic systems used in electric vehicle technology. It will enable a student to test and evaluate the performance of an electric vehicle engine.

#### **UNIT-1: INTRODUCTION TO ELECTRIC VEHICLE**

Past, Present & Future of EV, Current Major Issues, Impact of EV- Impact on power grid, impact on environment and impact on economy, Social and environmental importance of electric vehicles, Comparison of EV vs IC Engine.

#### **UNIT-2: ELECTRIC VEHICLE SYSTEM AND PARAMETERS**



EV Configuration: Fixed & variable gearing, single & multiple motor drive, In-wheel drives, Weight, size, force, energy & performance parameters. Electric vehicle types: Battery Electric Vehicle (BEV), Hybrid Electric Vehicle (HEV), Fuel Cell Electric Vehicle (FCEV), Comparison of different vehicle types.

### UNIT-3:ELECTRIC VEHICLE PROPULSION

Introduction of Propulsion, Motors used- Permanent Magnet Brushless DC Motor, Permanent Magnet Synchronous Motor, Induction Motor, Switched Reluctance Motor, Advantages, disadvantages and usage of different motor types. Regenerative braking system, Inverter.

**UNIT-4:ENVIRONMENTAL AND SOCIAL IMPACT:**Introduction to pollution, Air Pollution: Nitrogen Oxides, Carbon Monoxide, Unburned Hydrocarbons, Other Pollutants, Global Warming, Petroleum Resources.

**EV Adoption Problems** - Technological Problems, Limited Range, Long Charging Period, Safety Concerns, Insufficient Charging Stations, Economic Problems.

### UNIT-5:ENERGY SOURCES AND CHARGING

Battery and its types( Lead-Acid, Li-Ion, Li-Zinc Ni-d), Ultra capacitors, Combination of battery and UC to complement each-other's shortcomings, Fuel cell.

**Charging Systems-** AC Charging, DC Charging, Wireless Charging.

### References:

1. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003

Course code	Course title	L	T	P	Credits
<b>MEA-304B</b>	<b>AUTOMOTIVE ENGINES</b>	3	1	0	4

### Course Objectives:

It imparts the knowledge of proper functioning of basic systems used in IC Engine and gas turbines and also in rotary compressors. It will enable a student to test and evaluate the performance of an internal combustion engine.

### UNIT-1:SI ENGINE FUEL SYSTEM

Requirements; Tanks; filters; fuel lines: metallic and flexible; Fuel pumps: mechanical and electrical; Fuel filters: inline; sediment bowl; Air cleaner: types; functions; thermostatically controlled fuel gauge; Carburation and carburetor; air-fuel ratios: stoichiometric Effect of air-fuel ratio on efficiency and fuel consumption; Factors for fuel carburetion; Carburetor: requirements; limitation; construction and operation; Numerical on carburetion; Carburetor systems : float; idle slow speed; high speed; power; accelerator pump choke; Types: one; single stage two barrel; Two-stage two barrel; four barrel; Additional systems hot: idle compensator valve; idle enrichment valves; altitude compensating; SU Carburetor; Zenith Carburetor; Solex; variable venturi; MPFI: Electronic fuel injection system; Subsystems: air intake system; fuel delivery

system; Electronic control system; Engine management; open and close loop control systems; Fuel System Components : Fuel pump; fuel pressure regulator; Bosch Injectors; fuel feed and return pipe; fuel and vapour hoses; fuel pump relay; fuel gauge sending unit.

## **UNIT-2:CI ENGINE FUEL SYSTEM.**

Fuel system layout; Fuel tank; fuel lines; high pressure lines;fuel filters: coarse and fine; Feed pumps : diaphragm type and plunger type; Injection pumps :inline and rotary : description and working; Governors : mechanical; pneumatic and hydraulic;Injectors: types; pintle; single hole; pintaux : functions; Spray patterns : swirling pattern;description of component parts; Fuel system trouble and diagnosis; Supercharger: types: roots;Vane compressor and centrifugal; Turbocharger: requirements; design; Intercooler : Design details and working.

## **UNIT-3:COMBUSTION – SI ENGINES**

Theory of combustion; Combustion reaction requirements;Types of CC; shapes: hemispherical; wedge; pre-combustion chamber; squish or quench area;Advantages and disadvantages of Such shapes; Supercharging SI engines: Advantages;Detonation; pre-ignition: Differences and Prevention; Effect of compression ratio on knock; Stages of combustion; flame propagation; rate of pressure rise; Required characteristic of gasoline rating: HUCR; octane number; performance number; Dieseling; Causes of abnormal Combustion.

## **UNIT-4:COMBUSTION – CI ENGINES**

Chemistry of Diesel combustion; Requirements of diesel fuel combustion; Ignition Delay: pressure: time diagram: factors causing ignition delay; Phases of normal Combustion; Properties of diesel fuel; Effects of high or low Centane number; Diesel knock and Cetane Number; Diesel engine combustion chambers: direct and indirect injection; comparison

## **UNIT-5: NON-CONVENTIONAL ENGINES**

Wankel Rotary CI engine: Principle; geometry; sweptvolume; C; Rand rotor contour; sealing; lubrication; cooling; Ignition system; advantages and disadvantages; Applications; Gas turbine engines: classification, regenerative cycle, major components: compressor, turbine, regenerator, combustor, transmission, Fuel requirements; performance; Advantages; Stratified charge engine: methods of charge stratification : Fuel injection and positive ignition; swirl stratification; characteristics of stratified charge engines; Applications; Advantages and; disadvantages.

### **Text Books:**

### **Reference Books:**

Course outcomes:
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1.	Students can have the sound knowledge in automotive engine.
2.	Students can have the Detailed concept, construction and principle of operation of engine and various engine components, combustion, cooling and lubrication systems
3.	At the end of the course the students will have command over automotive engines and the recent development in the area of engines



Course code	Course title	L	T	P	Credits
<b>MEA-306B</b>	<b>MOTOR VEHICLE TECHNOLOGY</b>	3	1	0	4

**Course Objectives:**

The purpose of this course is to Acquaint the students in the basic technical aspects component and anatomy of automobile.

**UNIT-1: I.C ENGINES (INTRODUCTION) AND. ENGINE COMPONENT**

Working and difference between SI and CI Engines; Two and four stroke cycles; Theoretical heat cycles : idea and actual otto and diesel cycle, mixed cycle; Numerical; Working of two and four stroke SI and CI engines; Scavenging methods of two-stroke petrol engines; Comparison of two and four stroke cycle engines.; Auto engines classifications – arrangement of cylinders, valves and camshaft ;Types of fuels used, engine speed, methods of cooling, engine balance; Principle of combustion, detonation and pre-ignition– Differences.; Valve timing diagrams – SI and CI, two and four stroke engines. Cylinder block : Types; Crankcase, liners : wet and dry; Gaskets, Timing covers, oil pan, cylinder head; SI engines combustion chambers : types and comparison; CI engine combustion chambers : Direct and Indirect injection, Intake & exhaust ports; lubricating passages; Intake & Exhaust valves and mechanisms; Camshafts: Side & overhead, advantages and disadvantages; Valve seat and conical angles, Valve seat insert, Valve springs, locks, Rocker-shaft, rocker arm, push rod, Cam followers-types; Timing of valves; Intake and exhaust manifold; Mufflers-types; Crankshaft: Nomenclature; Flywheel-functions; Oil seals; Engine Bearings : Thrust, ball, taper roller, needle, split, journal; Bearing materials, properties; Connecting rod; Piston : function, types, materials, piston rings: types, design details, Piston Pins, Component material chart : All engine components.

## **UNIT-2:ENGINE PERFORMANCE**

Bore and stroke, swept and clearance volume, compression ratio, effect of C.R, engine torque, mean effective, bmep, bhp, lhp, fhp; Engine efficiencies – air standard, mechanical, thermal, indicated thermal, brake thermal, volumetric, requirements of high volumetric efficiency, Factors.; Specific fuel consumption; Numerical.

## **UNIT-3:CHASSIS AND BODY**

Types–unitized and separate body and chassis, Advantages, Designs:chassis frame; Chassis side and cross member, sections and joints; Body: requirements, main parts, Material composition, Body shape aerodynamic design, CD for different types of vehicles; Vehicle component's attachments, Front and Rear wheel drive component locations: advantages and disadvantages; Rear mounted engine and rear wheel drive : advantages; Definitions : wheel base, wheel track, minimum radius, front and rear overhang, ground clearance, gradeability, laden and unladen weight; Car seat and seat belt mounting and adjustment.

## **UNIT-4:CLUTCH SYSTEM GEAR BOX, PROPELLER SHAFT AND DIFFERENTIAL**

Principle, requirements, operation, components of conventional single plate clutch, diaphragm clutch, multiple plate wet clutch, centrifugal clutch; Fluid coupling-characteristics, principle, velocity diagrams, efficiency and torque capacity curves; Comparison of conventional and diaphragm clutch and fluid coupling. Clutch operating systems: rod, cable, hydraulic; Clutch Plate: requirements, construction, material, linings : required properties, types; Numerical; Clutch faults and diagnosis, Clutch pedal free play. Necessity of gearbox, types of gear wheels, function, construction and working details of sliding mesh, constant mesh,

synchronesh and epicyclic gearbox: application and advantages; Overdrive, torque converter: principle and performance curves; Automatic gearbox; Gear selector mechanisms, synchronizing rings : materials and construction; Continuously variable transmission (CVT); Numericals. Gear box lubrication : Grade of oil, topping : up procedure, leakage prevention : static and dynamic seals; Final drive : Hotch Kiss and Torque tube; Propeller shaft : requirement, construction, maintenance, critical speed vibration, double propeller shaft, Maruti half shafts; Universal Joints : types, rubber doughnut, hookes, constant velocity (Birfield), speed variation of hookes coupling, coupling with driven shaft; Numericals; Differential : requirements,

principle, construction and working; Bevel gears, hypoid gear, worm and worm wheel, Differential lock, limited slip differential, double reduction. Numericals

### **UNIT-5: REAR AXLES AND TYRES**

Axle Casing, types, rear axle shafts—stresses and load taken, semifloating,  $\frac{3}{4}$  floating and fully floating; Comparative data : axles; Automobile wheel : loads, torques and stresses, types of wheels, requirements, specifications; Types of rims, Advantages of smaller wheels; Requirement of tyres. Types : conventional, radial and tubeless, Inner tubes; Merits of tubeless tyres over pneumatic tyres; Pneumatic tyres: constructional details: plies, tread designs, characteristics, aspect ratio, inflation pressure : comfort, braking, cornering, cost, fuel consumption, tyre materials; Tyre specifications; Points to increase tyre life : load, vehicle handling, speed, wheel balancing, tyre rotation, wheel alignment Procedure: Tyre retreading.

### **TEXT BOOK**

Crouse, W.H, “Automobile Technology”, Tata McGraw Hill

### **REFERENCE BOOKS**

Sethi, H. M, “Automotive Technology”, Tata McGraw Hill, 2003

Gupta R. B, “Automobile Engineering”, Dhanpat Rai & Sons, 1998

<b>Course outcomes:</b>	
1.	Understand the basic design principle of vehicle.
2	Equip themselves familiar with functions of several variables pertaining to vehicular design.
3	
	Able to draw the performance curves pertain to engine.

Course code	Course title	L	T	P	Credits
<b>MEA-308B</b>	<b>AUTOMOBILE MAINTENANCE &amp; SERVICES</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

Course Objectives:
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To know about the various methods of maintaining vehicles and their subsystems.
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## UNIT-1:INTRODUCTION

Maintenance Objectives; Importance; training and safety; classification:preventive; running and breakdown; preventive maintenance concept; functions; benefits and limitations; service training handbook; maintenance schedules; workshop manuals; owner's manual; Job card; history card; Warranty Procedures; pre-delivery inspection (PDI): front manager; service advisor : functions and duties.

## UNIT-2:CONDITION BASED MAINTENANCE (CBM)

Benefits; Objectives; Principles; what and when to monitor; Techniques; manual inspections; performances monitoring; vibration monitoring; oil debris spectroscopy; thermography and corrosion monitoring. Reliability centered maintenance (RCM); logic; benefits evaluations.

## UNIT-3:VEHICLE MAINTENANCE TOOLS AND EQUIPMENTS AND MAINTENANCE SCHEDULE

Figs and Specifications of standard tools; non Standard tools; denting tools; painting equipments; testing equipments; Service station equipments; Hydraulic lift; Tyre changer; Tyre inflation gauge; Car Washer; Air Compressor; Spark Plug Cleaner and Tester; brake and transmission bleeding equipment; Grease Guns; Hydraulic Hoist; Analyzers: CO; HC; NOx; smoke meter: Engine analyzer: Petrol and Diesel; Ignition timing light; Wheel Balancer; Wheel aligner; Headlight aligner; Cylinder boring and honing; crankshaft grinder; Brake lathe m/c; ridge cutter and boring m/c; Trolley Jacks; Engine lifting cranes. Difference between chassis and ball bearing grease; graphite grease; molybdenum grease; use of lubricants: SAE 20-30; SAE 40-50; SAE 90-120; Machine oil; Brake fluid; Lubrication and maintenance schedules for clutch system; Gear Box; Propeller shaft; universal joints; differential; axles; wheel bearings; tyres; Cooling and lubrication system; Specification of one petrol and one diesel Engine; Engine Troubles and Diagnosis.

## UNIT-4:ENGINE TUNING

Procedure for carburetor based S.I Engine tuning; use of compression gauge; vacuum gauge; engine analyzer; exhaust analyzer; battery tester S.G tester; adjustment of spark plugs electrodes; Cam-dwell angle; valve tappet clearance; CB point; carburettor cleaning; air filter cleaning; replacement of engine oil and filter; ignition timing setting by timing light; tightening head bolts. Tyre inflation pressure; checking fuel consumption; MPFI and CRDI Engines: Study of tools needed to service the system: assembly line diagnostic link (ALDL) connector; ALDL read out scan tool; test light; ohmmeter; digital volt meter; jumper wires; vacuum gauge; Tachometer; computerized automotive maintenance system. Knowledge of diagnostic codes; service engine soon (SES) light; ECM; CALPAK. Study of important components : name; location and functions : TPS; IAC valve; ECM; MAP sensor; engine coolant temp sensor; IAT sensor; VSS; camshaft and Crankshaft – position sensor; start signal; PSP switch; Oxygen sensor; Fuel Vapour Cannister; Catalytic Converter;

Particulate filter; Troubles and diagnosis MPFI engines.

## **UNIT-5:CLUTCH; DRIVE LINE; SUSPENSION; STEERING AND BRAKES AND ENGINE**

Disassembly; cleaning; visual inspection; inspection by measurement and assembly of clutch; gearbox; universal joints; propeller shaft; differential; axles; steering and suspension system (leaf spring and Mc-Phearson strut); Drum and disc Brakes; bleeding of brakes ; Gaps and Clearances. Tyre maintenance and wheel balancing; service limits and wheel alignment. Procedure for engine removal from vehicle; disassembly; cleaning of parts; cleaning procedures; agents; method of decarburizing; Top overhauling; Visual inspection of component parts; inspection by measurement; preparation of engine inspection sheets: engine; crankshaft main and big end journals; connecting rod bearing and parents bores; camshaft journal and parent bores; service limits; machining of component parts : boring and honing of cylinder bores; cylinder head; crankshaft; connecting rod; big-end Journals; camshaft grinding and lapping of engine valves; Fitting valve seat inserts and guides; Idea of oversize pistons and undersize split bearings; testing of cylinder heads and valve springs; Cooling system :maintenance and Service; troubles and diagnosis.

### **TEXT BOOK**

Shrivastava, Sushil Kumar., “Industrial Maintenance Management”, S Chand & Company Ltd., 2005

### **REFERENCE BOOKS**

- Kohli, P.L., “Automotive Chassis and Body”, McGraw Hill.
- Maruti Suzuki Manuals

Course outcomes:	
1.	Upon the completion of the course, the student can able to understand the importance of maintenance and also the step by step procedure for maintain the various automotive sub systems
2.	Students will have the knowledge about condition based maintenance.
3.	Upon the completion of the course, the student can able to understand the importance of Engine tuning.



Course code	Course title	L	T	P	Credits
<b>MEA-310 B</b>	<b>DESIGN OF AUTO COMPONENTS</b>	3	1	0	4

**Course Objectives:**

At the end the course the student will be able to understand the fundamental principles involved in design of components of automotive chassis; the complete design exercise and arrive at important dimensions of chassis components.

### **UNIT-1:INTRODUCTION TO DESIGN**

Variable Loading: Different type of fluctuating/ variable stresses; fatigue strength considering stress concentration factor; surface factor; size factor; reliability factor etc.; Fatigue design for finite and infinite life against combined variable stresses using Goodman and Soderberg's criterion; fatigue design using Miner's equation.

### **UNIT-2:SHAFTS AND SPRINGS**

Detailed design of shafts for static and dynamic loading; eccentrically loaded bolted joints in shear and under combined stresses, Rigidity and deflection consideration, Type of springs; design for helical springs against tension and their uses; compression and fluctuating loads design problem.

### **UNIT-3:BEARINGS**

Selection of ball and roller bearing based on static and dynamic load carrying capacity using load life relationship; type of lubrication: boundary; mixed and hydrodynamic lubrication; design of journal bearings using lubricants and their properties; selection of suitable lubricants; design problems.

### **UNIT-4:SPUR AND HELICAL GEARS**

Force analysis; selection of material for gears; beam and wear strength of gear tooth; form or Lewis factor for gear tooth; dynamic load on gear teeth;; design problems.

### **UNIT-5:DESIGN OF CYLINDER; PISTON; CONNECTING ROD AND FLYWHEEL**

Choice of material for cylinder and piston; piston friction; piston slap; design of cylinder; piston; piston pin; piston rings; piston failures; lubrication of piston assembly; material for connecting rod; design of flywheel.

### **TEXT BOOK**

“Design Data Book”, PSG College of Technology, Coimbatore, 2000.



## REFERENCE BOOKS

- Heldt, P. M., “High Speed Combustion Engines”, Oxford-IBH Publishing Co., 1965.
- Heywood, B., “Internal Combustion Engine Fundamentals”, McGraw Hill 1988.
- Newton Steeds and Garret., “Motor Vehicle”, Illiffe Books Ltd., London; 2000.
- Joseph Edward., “Mechanical Engg. Design”., McGraw Hill.
- Norton, R. L., “Machine Design – An Integrated

Course outcomes:	
1.	Can Gain knowledge of Steady Stresses and Variable Stresses in Machine Members.
2.	Study characteristics of Temporary and Permanent Joints and analyze simple joints.
3.	Upon completion of this course, the students can able to successfully design machine components

Course code	Course title	L	T	P	Credits
<b>MEA-352B</b>	<b>INTRODUCTION TO ELECTRIC VEHICLE TECHNOLOGY LAB</b>	0	0	2	2

**Course Objectives:**

It imparts the knowledge of proper functioning of basic systems used in electric vehicle technology. It will enable a student to test and evaluate the performance of an electric vehicle engine.

**LIST OF EXPERIMENTS:**

1. Study about Electric Vehicle system.
2. Study the difference between transmission system of I.C. engine and Electric vehicle.
3. Study and working of single phase induction motor.
4. Study and working of three- phase induction motor.
5. Study and working of Fuel- Cell.
6. Study and working of Lead- Acid battery & Lithium- Ion battery.
7. Study and working of AC & DC charging system.
8. Study and working of Inverter.
9. Diagnose the electrical fault in electric vehicle.

Course code	Course title	L	T	P	Credits
<b>MEA-354B</b>	<b>AUTOMOTIVE ENGINES LAB</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives:**

- To provide students a good environment to understand the technology know-how, testing, service and set-up of modern motor vehicles.
- To provide facilities for undergraduate projects and postgraduate research projects.

**LIST OF EXPERIMENTS**

7. Identification and function of each component of lubrication system of an automotive engine.
8. Measurement of BHP; F.H.P by William's line method using dynamometer.
9. Performance test on automotive multi cylinder S.I and C.I engines and draw performance curves.
10. Morse test on multi cylinder S.I engines and find BHP.
11. Heat balance test on automotive multi cylinder C.I engine.
12. Study of P- $\theta$  and PV diagrams for IC engine with piezoelectric pick up; charge amplifier; angle encoder.
13. Draw a line diagram of fuel system of petrol and diesel engine and explain function of each component.
14. Identification and function of each component of different types of Injectors.
15. Identification and functions of each component of in-line fuel injection pumps.
16. Identification and functions of each component of rotary fuel injection pumps.
17. Study of turbo chargers and draw its layout line diagram.
12. Study of super chargers and draw its layout line diagram

**Course outcomes:**

1.	Students can understand the function of each component of lubrication system of an automotive engine.
2.	Students can make the engine performance test.
3.	Students can have the knowledge about turbo chargers and super chargers.

Course code	Course title	L	T	P	Credits
<b>MEA-356B</b>	<b>MOTOR VEHICLE TECHNOLOGY LAB</b>	0	0	2	1

**Course Objectives:**

This course is intended to inculcate among the students about the knowledge of chassis layout, function of engines, clutches, etc.,

**LIST OF EXPERIMENT**

1. Identify, write specifications and draw sketches of i) General Tools ii) Measuring Tools iii) Special Tools used in an automobile workshop and Practice to use them.
2. Identify various assemblies and sub-assemblies of an automobile chassis. Draw layout and explain function of each unit.
2. Study of 4 stroke C.I and S.I engines. Draw Sketches and explain the function of each component.
3. Study of 2 stroke S.I engine. Draw Sketch and explain the function of each component.
4. Study the Cooling System of an Automotive Engine sketch the various components and explain function of each.
5. Identification of components of single plate, multiplate clutch system. Draw sketch and explain function of each component.
6. Identifications of components of sliding mesh constant mesh and synchromesh gear box. Draw power flow diagrams at various speeds.
7. Identify and give functions of each component of differential and rear axle assembly.
8. Study construction of different types of Automobile wheels and tyres and draw their sketches.
9. Study the propeller Shaft, Slip joint and universal Joints of a Vehicle. Draw sketches and label various components parts.

**Course outcomes:**

1.	After the completion of this course students can able to draw the layout of chassis.
2.	Students can have the knowledge about clutches.

3.	Students can have the knowledge about the transmission elements like propeller shaft, universal joints, etc.,
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Course code	Course title	L	T	P	Credits
<b>MEA-358B</b>	<b>AUTOMOBILE MAINTENANCE &amp; SERVICES LAB</b>	0	0	0	2

Course Objectives:
To know about the various methods of maintaining vehicles and their subsystems.

1. Study of Automobile Service ,Maintenance & Repair Shop floor layout
2. Study of various Tools, Equipment Used in a Workshop
3. Cleaning and Testing of SPRAY Plug and Injector
4. Servicing of Clutch and Gearbox
5. Dismantling/Assembly, Servicing of Propeller Shaft
6. Dismantling/Assembly, of Rear Axle
7. Dismantling/Assembly, of Front Axle
8. Wheel, Alignment of Light Commercial Vehicles
9. To Find The Adjustment Of Drum Brakes
10. Study Of Service Manuals of Petrol & Diesel Engine Vehicle

### **B.Tech Automobile Engineering (VII SEMESTER)**

Course code	Course title	L	T	P	Credits
<b>ME-401B</b>	<b>MECHANICAL VIBRATIONS</b>	3	1	0	4

#### **Course Objectives:**

To study essential concepts for mechanical vibrations induced in various equipments. To study single degree of freedom, two degree of freedom system, vibration absorber and analyze effects of vibrations on mechanical equipment

**UNIT 1.** Introduction: Harmonic motion, periodic motion, vibration terminology. Single Degree of freedom Systems: Free and forced vibrations with and without damping, magnification factor, transmissibility and isolation.

**UNIT 2.** Two degree of Freedom Systems: Generalized co-ordinates, principal co-ordinates, derivation of equation of motion, co-ordinate coupling, Lagrange's equation. Vibration Absorber: Tuned absorber, determination of mass ratio, tuned and damped absorber (qualitative treatment only), untuned viscous damper.

**UNIT 3.** Multi Degree of Freedom system: Derivation of equation, calculation of natural frequencies by Rayleigh, Stodala, matrix, matrix iteration and Holzer methods. Vibration Analysis: Introduction, Influence coefficient, Stiffness Matrix, Flexibility Matrix, Natural Frequencies and Normal Modes.

**UNIT 4.** Transient Vibrations: Impulse Excitation, Arbitrary Excitation, Response to step Excitation, Base Excitation Solution by Laplace Transforms, Response Spectrum, Runge- kutta Method.

**UNIT 5 .** Automotive Noise Control Noise Characteristics of engines, Assessment of mechanical noise, Transmission noise. Control Techniques: Noise levels, Static and Dynamic Balancing, Methods of controlling noise in engines.

**Text Books:**

1. Mechanical Vibration – V.P.Singh, Dhanpat Rai & Sons. 2. Mechanical Vibration :G.K.Grover – Nem Chand & Bros., Roorkee, INDIA

**Reference Books:**

1. Thomson, W.T, “Theory of Vibration with Applications”, CBS Pub. & Distributors, 3rd Ed, 1988. 2. Tse, Morse and Hinkle, “ Mechanical Vibration”, prentice Hall of India Ltd, 1987 3. Schaum Outline Series, “Mechanical Vibration”, McGraw Hill Book Company, 1990. 4. Lindley and Higgins, “Maintenance Engineering Hand Book” McGraw Hill Book Company, 1977.

Course outcomes:	
1.	Learn vibrations leading to analysis of first degree of freedom
2.	Be Familiarized with multi degree of freedom systems using various numerical methods
3.	Understand the influence and stiffness coefficients

Course code	Course title	L	T	P	Credits
<b>MEA-403B</b>	<b>AUTO ELECTRICALS EQUIPMENTS</b>	4	0	0	4

Course Objectives:
<ul style="list-style-type: none"> <li>• Understand the principle of alternator and to test the alternator</li> <li>• Know the importance of Driver assistance, security and warning system</li> </ul>

**UNIT-I:** Storage Battery: Principles of lead acid cells and their characteristics, construction and working of lead-acid battery. types of batteries, testing of batteries, effect of temperature on capacity and voltage, battery capacity, voltage, efficiency, charging of batteries, sulphation and desulphation, maintenance and servicing. Fault diagnosis. New developments in electrical storage.

**UNIT-II:** Ignition System: Conventional ignition system and study of its components. Types of ignition systems, spark advance and retarding mechanisms. Types of spark plugs, ignition timing, maintenance, servicing and fault diagnosis. Electronic ignition systems, programmed ignition, distributorless ignition, a) Starter motor: Construction and working of series and shunt automotive starter motor, types of device arrangement, solenoid switches, starter motor troubles and repairs. b) Electronic controls of carburetion, component of fuel injection systems, multipoint injection. Bosch Lvariation electronic control diesel fuel injection.



**UNIT-III:** Charging system: Principle of generation of direct current.Principle, construction and working of alternator generating systems.Maintenance, servicing and trouble shooting.Bosch compact alternator. Wiring for auto electrical Systems: Earth return and insulated return systems, six volt and twelve volt systems, fusing of circuits, low and high voltage automotive cables, wiring diagram for typical automotive wiring systems, maintenance and servicing.

**Unit-IV:** Dash board units and electrical accessories: Principle of automobile illumination, head lamp construction and wiring, horn, wind screen wiper signalling devices, fog lamps, auxiliary lighting, temperature gauge, oil pressure gauge, fuel gauge, speedometer, odometer.

**Unit-V** Number system codes and data representation: Binary numbers, number base conversion, decimal, octal and hexadecimal numbers, BCD codes, memory representation of positive and negative integers, conversion real numbers, floating point notations and representations of floating point numbers, binary arithmetic, addition and subtraction of binary numbers, ones and two's complement method. Logic gates, arithmetic circuits and introduction to microprocessors: Study of basic and universal logic gates, study of X-OR and X-NOR gates, flip flop, S-R, S-J flip flop and counters and shift register, half adders and subtractors.

## TEXT BOOK

1. Automotive Electrical auxiliary systems -By N R. Khatawale Digital
  2. Logic and Computer Design by Mano, Prentice hall of India
- REFERENCES: 1. Automotive Electrical systems -By Young and Griffith, Butterworth 2. Basic automotive electrical systems -By C.P. Nakra, DhanpatRai.
3. Automotive mechanics -By William H. Grouse, TMH
  5. Modern Electrical Equipments -By A. W. Judge,
  4. Automotive Electrical Equipment -By P.I. Kohli, TMH

## REFERENCE BOOKS

1. Automotive mechanics -By William H. Grouse, TMH
5. Modern Electrical Equipments -By A. W. Judge,
2. Automotive Electrical Equipment -By P.I. Kohli, TMH

**Course outcomes:**

- |    |   |
|----|---|
| 1. | Understanding battery, Cranking motor construction and testing methods. |
|----|---|

Course code	Course title	L	T	P	Credits
<b>MEA – 405B</b>	<b>AUTOMOBILE AIR CONDITIONING</b>	4	0	0	4

**Course Objectives:**

It helps the students to understand the concepts and uses of various types of refrigeration systems and equipments. The student will be able to estimate the heating/cooling load and design air conditioning system and equipments.

## **UNIT-1:INTRODUCTION OF AIR CONDITIONING AND REFRIGERANT**

Second law of thermodynamics, Refrigeration effect, Cycles – vapor compression refrigeration system, vapor absorption refrigeration system, gas refrigeration, CO<sub>2</sub> (R744) based refrigeration cycle; Automobile air conditioning; air conditioning for passengers; isolated vehicles; transport vehicles; applications of refrigeration and air conditioning. Classification; properties; selection criteria; commonly used refrigerants; alternative refrigerants; eco-friendly refrigerants; applications of refrigerants; refrigerants used in automobile air conditioning.

## **UNIT-2:PSYCHOMETRY AND HUMAN COMFORT**

Psychometric properties; tables; charts;psychometric process; comfort charts; factors affecting comfort; effective temperature; ventilation requirements.

## **UNIT-3:AIR CONDITIONING SYSTEMS AND LOAD ANALYSIS**

Classification; layouts; central/unitary air conditioning systems; components like compressors; evaporators; condensers; expansion devices; fan blowers; heating systems, anti-frosting devices, drier/accumulator etc.Outside and inside design consideration; factors forming the load on refrigeration and air conditioning systems; cooling and heating load calculations for automobiles; effect of air conditioning load on engine performance; Booster heating system – PTC heaters; Diesel fuel booster system.

## **UNIT-4:AIR DISTRIBUTION SYSTEMS AND AIR ROUTINE**

Distribution duct system; sizing supply / return ducts; type of grills; diffusers; ventilation; air noise level; layout of duct systems for automobiles and their impact on load calculations; Air filtration; controlling flow; control of air handing systems; evaporator care air flow through the dash re-circulating unit.

## **UNIT-5:AIRCONDITIONINGCONTROL**

Testing sensors–temperature (NTC and PTC), sun loadsensors, pressure sensors, position sensors, speed sensors, humidity sensors (capacitive), air quality sensor (metal oxide semiconductor).

Actuators: solenoids (relays and coolant valves), motor (permanent magnet type), stepper motor, multiplexing wiring system, wiring diagrams, Automotive A/C auto temperature control system; Automotive A/C manual control system; Automatic climate control system.

### **TEXT BOOKS**

5. Paul Lung., “Automotive Air Conditioning”, C.B.S Publisher and Distributor
6. Steven Daly, “Automotive Air Conditioning and Climate Control System”, BH Publication
7. Crouse and Anglin, “Automotive Air Conditioning”, McGraw Hills

### **REFERENCE BOOKS**

- "Heating and Air Conditioning Systems", Mitchel Information Services.
- American Society of Heating, Refrigeration and Air Conditioning, “ASHRAE Handbook – Fundamentals”, 1985
- L.F. Goings, “Automotive Air Conditioning”, ATS

<b>Course outcomes:</b>	
1.	understand the underlying principles of operations in different Refrigeration & Air

	conditioning systems and components
2.	Can understand the various control systems in Refrigeration Systems.
3.	Upon completion of this course, the students can able to demonstrate the operations in different Refrigeration & Air conditioning systems and also able to design Refrigeration & Air conditioning systems



Course code	Course title	L	T	P	Credits
<b>MEA-407B</b>	<b>FUTURE TRANSPORTATION FUELS AND EMISSION CONTROLS</b>	3	0	0	3

Course Objectives:
Understand the effects of CO2 emission from different forms of transport.

## UNIT I

Introduction Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution, noise vibration and harshness (NVH).

## **UNIT II**

. Pollutant Formation in Engines Pollutant formation in SI Engine, mechanism of HC, CO and NO in SI engine, exhaust emission and factors affecting the emission, evaporative emission, crankcase emission, lead emission CI engine emissions: formation of smoke, factors affecting the smoke formation, diesel odour, unburned hydrocarbons, carbon monoxide, oxides of nitrogen, smog and comparison of diesel and petrol emissions. Two stroke engine pollution

## **UNIT III**

Control of Emissions from Engines Design strategies to control emission from engines, effect of design and operating parameters on emission concentrations, modification in the engine design, modifying the fuel used, exhaust gas treatment devices, crankcase emission control, evaporative emission control, exhaust emission control, air injection system, second generation air injection system, spark timing emission control system, thermal reactor package, catalytic converter package, NO<sub>x</sub> emission control, control of smoke, odour control, and pollution from gas turbine and its control.

## **UNIT IV**

Noise Pollution from Automobiles Noise, Vibration And Harshness, Sources of Noise, Measurement of Noise -Engine combustion noise, Inlet And Exhaust Noise, Traffic Noise, Vehicle Body Noise - control of noise, control devices and noise proof materials

## **UNIT V**

Measurement Techniques Emission Standards and Test Procedure NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles—USA, Japan, Euro and India. Test procedures—ECE, FTP Tests. SHED Test—chassis dynamometers, dilution tunnels.

## **TEXT BOOK**

1. Paul Degobert—Automobiles and Pollution—SAE International ISBN-1-56091-563-3, 1991. 2. Ganesan, V—“Internal Combustion Engines”—Tata McGraw-Hill Co.-2003. o Beranek.L.L. “

## **REFERENCE BOOKS**

1. Noise Reduction”, McGraw Hill Book co., Inc, New York, 1993. o SAE Transactions—“Vehicle Emission”—1982 (3 volumes).

2 Obert.E.F.-“Internal Combustion Engines”-1988 o Marco Nute-“ Emissions from two stroke engines, SAE Publication–1998. o Internal combustion engine by domkundwar

Course outcomes:	
1.	After the completion of this course students can able to draw the layout of chassis.
2.	Students can have the knowledge about clutches.
3.	Students can have the knowledge about the transmission elements like propeller shaft, universal joints, etc.,



Course code	Course title	L	T	P	Credits
<b>MEA-455B</b>	<b>AUTOMOBILE AIR CONDITIONING LAB</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives:**

To provide knowledge on design aspects of Refrigeration & Air conditioning systems.

**LIST OF EXPERIMENTS**

1. To study the vapour compression Refrigeration System and determine its COP and draw p-h and T-s diagram.. To study the mechanical heat pump and find its COP.
2. To study the cascade system and find its COP.
3. To study the cut-sectional models of Reciprocating and Rotary Refrigerant compressors.
4. To study the various controls used in Refrigerating and Air Conditioning systems.
5. To study the Ice-plant; its working cycle and determine its COP and capacity.
6. To study the humidification; heating; cooling and dehumidification processes and plot these on Psychrometric chart.
7. To determine the By-pass factor of Heating and Cooling coils and plot these on Psychrometric chart on different inlet conditions.
8. To study a vapour absorption system and determine its COP.
9. To study a domestic refrigerator and determine its COP.

**Course outcomes:**

1.	Upon completion of this course, the students can able to demonstrate Refrigeration & Air-conditioning System.
2	Students can able to evaluate COP & humidity on the air.

Course code	Course title	L	T	P	Credits
<b>MEA-459B</b>	<b>STC LAB</b>	0	0	2	1

<b>Course Objectives:</b>
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To make the student conversant with automobile safety electrical system and vehicle maintenance .
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## LIST OF EXPERIMENTS

1. Study of Automobile Service ,Maintenance & Repair Shop floor layout
2. Study of various Tools, Equipment Used in a Workshop
3. Major and Minor Tuning Of S.I Engine and C.I Engine
4. Cleaning and Testing of SPRAY Plug and Injector
5. Servicing of Clutch and Gearbox
6. Dismantling/Assembly, Servicing of Propeller Shaft
7. Dismantling/Assembly, of Differential and Overhauling
8. Dismantling/Assembly, of Rear Axle
9. Dismantling/Assembly, of Front Axle
10. Wheel, Alignment of Light Commercial Vehicles
11. To Find The Adjustment Of Drum Brakes
12. Calibration of Inline Fuel Injection Pump
13. Study Of Service Manuals of Petrol & Diesel Engine Vehicle

<b>Course outcomes:</b>
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- |    |  |
|----|--|
| 1. | Student should able to understand basics of servicing of various automotive components system. |
| 2. | Student should able to understand scheduled maintenance process.                               |



Course code	Course title	L	T	P	Credits
<b>ME-400B</b>	<b>SEMINAR</b>	0	0	2	2

Seminar-I shall be on state of the art topic of student's own choice based on relevant specialization approved by an authority. Student should deliver seminar on the state of the art topic in front of the external examiners/internal examiners, staff and student colleagues. Prior to presentation student should carry the details of literature survey form standard references such as international journals and periodicals, recently published reference books etc. The student shall submit the duly certified seminar report in standard format, for satisfactory completion of the work by the concerned Guide and Head of the department/institute. The assessment shall be based on selection of topic its relevance to present context, report documentation and presentation skills.



Course code	Course title	L	T	P	Credits
<b>ME-496B</b>	<b>PROJECT WORK</b>	0	0	8	4



Course code	Course title	L	T	P	Credits
<b>ME-483</b>	<b>INTERNSHIP</b>	0	0	21	16



Course code	Course title	L	T	P	Credits
<b>ME-484</b>	<b>SEMINAR BASED ON INTERNSHIP</b>	0	0		4





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## SCHOOL OF PHARMACY

### SCHEME FOR (B. PHARMA)

B.Pharma			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP101T	Human Anatomy and Physiology I– Theory	3	1	0	4
2	BP102T	Pharmaceutical Analysis I – Theory	3	1	0	4
3	BP103T	Pharmaceutics I – Theory	3	1	0	4
4	BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1	0	4
5	BP105T	Communication skills – Theory *	2	0	0	2
6	BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	0	0	2
7	BP107P	Human Anatomy and Physiology – Practical	2	0	0	2
8	BP108P	Pharmaceutical Analysis I – Practical	0	0	4	2
9	BP109P	Pharmaceutics I – Practical	0	0	4	2
10	BP110P	Pharmaceutical Inorganic Chemistry – Practical	0	0	4	2
11	BP111P	Communication skills – Practical*	0	0	2	1
12	BP112RBP	Remedial Biology – Practical*	0	0	2	1
Total			18	4	16	30

### SCHEME FOR (B. PHARMA)

B. Pharma			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP201T	Human Anatomy and Physiology II – Theory	3	1	0	4
2	BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	0	4
3	BP203T	Biochemistry – Theory	3	1	0	4
4	BP204T	Pathophysiology – Theory	3	1	0	4
5	BP205T	Computer Applications in Pharmacy – Theory *	3	0	0	3
6	BP206T	Environmental sciences – Theory *	3	0	0	3
7	BP207P	Human Anatomy and Physiology II –Practical	0	0	4	2
8	BP208P	Pharmaceutical Organic Chemistry I– Practical	0	0	4	2
9	BP209P	Biochemistry – Practical	0	0	4	2
10	BP210P	Computer Applications in Pharmacy – Practical*	0	0	2	1
Total			18	4	14	29

### SCHEME FOR (B. PHARMA)

B. Pharma			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP-201	Pharmaceutics-III (Physical Pharmacy)	3	0	0	3
2	BP-202	Pharmaceutical Chemistry IV(Organic Chemistry-II)	3	0	0	3
3	BP-203	Pathophysiology	3	0	0	3
4	BPE-101	Environmental Science	2	0	0	2
5	BP-204	Computers & its Applications	3	0	0	3
LAB						
1	BP-251	Pharmaceutics-III Practical	0	0	4	2
2	BP-252	Pharmaceutical Chemistry-IV Practical	0	0	4	2
3	BP-254	Computers & its Applications Practical	0	0	4	2
Total			14	0	12	20

B. Pharma			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP-205	Pharmaceutics-IV	3	0	0	3
2	BP-206	Pharmaceutical Chemistry-V (Medicinal Chemistry)	3	0	0	3
3	BP-207	Pharmaceutical Analysis-II	3	0	0	3
4	BP-208	Pharmacognosy-II	3	0	0	3
5	BP-209	Pharmaceutical Jurisprudence	3	0	0	3
6	PD-293A	Interpersonal Skills	2	0	0	2
LAB						
1	BP-255	Pharmaceutics-IV Practical	0	0	4	2
2	BP-256	Pharmaceutical ChemistryV(Medicinal Chemistry) Practical	0	0	4	2
3	BP-257	Pharmaceutical Analysis-IIPractical	0	0	4	2
4	BP-258	Pharmacognosy-II Practical	0	0	4	2
Total			17	0	16	25

### SCHEME FOR (B. PHARMA)

B.Pharma			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP-301	Microbiology	3	0	0	3
2	BP-302	Pharmaceutical Chemistry-VI	3	0	0	3
3	BP-303	Pharmaceutical Analysis-III	3	0	0	3
4	BP-304	Pharmacology-I	3	0	0	3
5	BP-305	Pharmaceutical Engineering-I	3	0	0	3
6	BPG-301	German	3	0	0	3
LAB						
1	BP-351	Microbiology Practical	0	0	4	2
2	BP-352	Pharmaceutical Chemistry-VI Practical	0	0	4	2
3	BP-353	Pharmaceutical Analysis-III Practical	0	0	4	2
4	BP-354	Pharmacology-I Practical	0	0	4	2
5	BP-355	Pharmaceutical Engineering-I Practical	0	0	4	2
Total			18	0	20	28

B.Pharma			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP-306	Pharmacology-II	3	0	0	3
2	BP-307	Pharmacognosy-III	3	0	0	3
3	BP-308	Hospital Pharmacy	3	0	0	3
4	BP-309	Pharmaceutical Engineering-II	3	0	0	3
5	BP-310	Biochemistry	3	0	0	3
6	BP-311	Pharmaceutical Management	3	0	0	3
7	BP-312	Elective Course *	2	0	0	2
8	PD-392A	Problem Solving Skills	2	0	0	2
LAB						
1	BP-356	Pharmacology-II Practical	0	0	4	2
2	BP-357	**Pharmacognosy-III Practical	0	0	4	2
3	BP-358	Hospital Pharmacy Practical	0	0	4	2
4	BP-359	Pharmaceutical Engineering-II Practical	0	0	4	2
5	BP-360	Biochemistry Practical	0	0	4	2
Total			22	0	20	32



DEPARTMENT OF PHARMA			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP-401	Pharmaceutics-V	3	0	0	3
2	BP-402	Pharmaceutical Chemistry-VII	3	0	0	3
3	BP-403	Pharmaceutics-VI (Dosage Form Design)	3	0	0	3
4	BP-404	Biopharmaceutics and Pharmacokinetics	3	0	0	3
5	BP-405	Pharmacognosy-IV	3	0	0	3
6	BP-406	Clinical Pharmacy and Therapeutics	3	0	0	3
7	PDP	Personality Development Programme	2	0	0	2
PRACTICAL						
1	BP-451	Pharmaceutics-V Practical	0	0	3	2
2	BP-452	Pharmaceutical Chemistry-VII Practical	0	0	3	2
3	BP-453	Pharmaceutics-VI (Dosage Form Design) Practical	0	0	3	2
4	BP-454	Biopharmaceutics and Pharmacokinetics Practical	0	0	3	2
5	BP-455	Pharmacognosy-IV Practical	0	0	3	2
		Total	20		15	30

DEPARTMENT OF PHARMACY			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP 407	BP407 Industrial Training & Project	0	0	48	24
		Total	0	0	48	24

## SYLLABUS FOR (B. PHARMA)

### B.Pharm Semester I

#### PHARMACEUTICAL CHEMISTRY-I (INORGANIC PHARMACEUTICAL CHEMISTRY)

Methods of preparation, tests of identification and special tests (if any), of the following inorganic pharmaceuticals should be studied:

##### Unit I

Sources of impurities & their control. Limit tests for iron, arsenic, lead, heavy metals, chloride and sulphate.

Pharmaceutical aids and necessities: Pharmaceutically acceptable glass. Water (Purified water, Water for injection, Sterile water for injection). Acids and bases (Sodium hydroxide, Phosphoric acid).

##### Unit II

Topical agents: Protectives (Calamine, Titanium dioxide, Talc, Kaolin). Astringents (Zinc sulphate, Alums). Anti-infectives (Boric acid, Hydrogen peroxide, Iodine, Povidone-Iodine, Potassium permanganate, Silver nitrate).

Dental products: Dentifrices, anti-caries agents (Sodium fluoride).

Gases and vapors: Inhalants (Oxygen), anesthetics (Nitrous oxide).

##### Unit III

Gastrointestinal agents: Acidifying agents (Dilute hydrochloric acid). Antacids (Bismuth sub-carbonate, Aluminium hydroxide, Calcium carbonate, Magnesium hydroxide, Magnesium oxide {light and heavy}, Magnesium carbonate {light and heavy}, Combination antacids. Cathartics (Disodium hydrogen phosphate, Magnesium sulphate). Protective and Adsorbents (Activated charcoal, Aluminium sulphate).

Miscellaneous agents: Expectorants (Ammonium chloride, Potassium iodide). Antioxidants (Sodium Meta bisulphite).

##### Unit IV

Major intra and extracellular electrolytes: Physiological ions, electrolytes used for replacement therapy (Sodium chloride, Potassium chloride, Calcium gluconate, Calcium lactate, Magnesium chloride), physiological acid-base balance (Sodium dihydrogen phosphate, Sodium acetate, Sodium bicarbonate), combination therapy including ORS.

Essential and trace elements: Iron and haematinics (Ferrous fumarate, Ferrous gluconate, Ferrous sulphate, Ferric ammonium citrate). Mineral supplements (Cu, Zn, Cr, Mn, I).

## Unit V

Inorganic radiopharmaceuticals: Radioactivity, units of radioactivity and radiation dosimetry, measurement of radioactivity, hazards and precautions in handling of radiopharmaceuticals, clinical applications of radiopharmaceuticals.

Co-ordination compounds and complexation: Co-ordination theory, chelates and their pharmaceutical importance, poison antidotes (Sodium thiosulphate), novel applications of metals in pharmacy.

BP 151

### PHARMACEUTICAL CHEMISTRY-I (INORGANIC) PRACTICAL

1. To perform limit test of chloride, sulphate, iron, heavy metal and arsenic in the given sample.
2. Identification tests for acidic and basic radicals as mentioned in syllabus
3. Preparation and identification tests (if any) of following compounds- Boric acid

Magnesium sulphate

Heavy magnesium carbonate CalciumCarbonate

Alum

Zinc sulphate.

### BOOKS RECOMMENDED:

1. Pharmacopoeia of India, 1996 Edition.
2. Block J.H., Roche E., Soine, T. and Wilson, C., Inorganic, Medicinal & Pharmaceutical Chemistry, Lea &Febiger.
3. Atherden L.M., Bentley and Driver's Text Book of Pharmaceutical Chemistry, Oxford University Press.
4. Miessler, G.L. and Tarr, D.A. Inorganic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Svehla, G. and Sivasankar, B. Vogel's Qualitative Inorganic Analysis, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
6. Rao K.S. and Suresh, C.V. Pharmaceutical Inorganic Chemistry, PharmaMed Press.
7. Chenchu Lakshmi, N.V. Pharmaceutical Inorganic Chemistry: Theory and Practice, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

### PHARMACEUTICAL ANALYSIS-I BP 102

## Unit I

Significance of quantitative analysis in quality control different techniques of analysis, preliminaries and definitions, precision and accuracy. Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards.

#### Unit II

Acid base titrations: Acid base concepts, role of solvent, relative strengths of acids and bases, ionization, law of mass action, common-ion effect, ionic product of water, pH, hydrolysis of salts, Henderson- Hasselbach equation, buffer solution, neutralization curves, acid base indicators, theory of indicators, choice of indicators, mixed indicators, polyprotic system.

#### Unit III

Oxidation reduction titrations: Concepts of oxidation and reduction, redox reactions, strengths and equivalent weights of oxidizing and reducing agents, theory of redox titrations, redox indicators, oxidation reduction curves, iodimetry and iodometry, titrations involving ceric sulphate, potassium iodate, potassium bromate, potassium permanganate.

#### Unit IV

Precipitation titrations: Precipitation reactions, solubility products, effect of acids, temperature and solvent upon the solubility of precipitate. Argentometric titrations and titrations involving ammonium or potassium thiocyanate, mercuric nitrate indicators, Gaylussac method, Mohr's method, Volhard's method and Fajan's method.

#### Unit V

Gravimetric analysis: Precipitation techniques, solubility products, the colloidal state, supersaturation, coprecipitation, post-precipitation, digestion, washing of the precipitate, filtration, filter papers and crucibles, Ignition, thermogravimetric curves, specific examples like barium as barium sulphate, aluminium as aluminium oxide, organic precipitants.

BP 152

#### PHARMACEUTICAL ANALYSIS- I PRACTICAL

The main objective should be to make the students conversant in different analytical tools through demonstration including clear understanding of a typical analytical balance, the requirements of a good balance, weights, care & use of balance, methods of weighing, and errors in weighing. They should also be acquainted with the general apparatus requiring various analytical procedures.

1. Standardization of analytical weights and calibration of volumetric apparatus.
2. Acid Base Titrations: Preparation and standardization of acids and bases, some exercises related with determination of acids and bases separately or in mixture form, some official assay procedures, e.g. boric acid, should also be covered.
3. Oxidation Reduction Titrations: Preparation & standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc. Some exercises related to determinations of oxidizing & reducing agents. Exercises involving potassium iodate, potassium bromate, iodine solution and ceric ammonium sulphate.

4. Precipitation Titrations: Preparation and standardization of titrants like silver nitrate and Ammonium thiocyanate, titrations according to Mohr's, Volhard's and Fajan's methods.
5. Gravimetric Analysis: Preparation of Gooch crucible for filtration and use of sintered glass crucible. Determination of water of hydration, some exercise related to gravimetric analysis should be covered.

#### BOOKS RECOMMENDED:

1. Mendham J., Denney R.C., Barnes J.D., Thomas M, Jeffery G.H., Vogel's Textbook of Quantitative Chemical Analysis, Pearson Education Asia.
2. Connors K.A., A Text book of Pharmaceutical Analysis , Wiley Inter-science.
3. Beckett A.H., and Stenlake J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University of London.
4. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
5. Alexeyev V. Quantitative Analysis. CBS Publishers & Distributors.
6. The Pharmacopoeia of India.

BP 103

#### PHARMACEUTICS I (General Pharmacy)

##### Unit-I

Extraction: Various methods of extraction of crude drugs namely percolation (various types including processes for concentrated preparations, constant hot percolation), maceration (various types

including processes for organized and unorganized drugs, for concentrated preparations, double and triple maceration processes), Decoction. Formulation, preparation and uses of various Formulation, preparation and uses of pharmaceutical extracts.

##### Unit-II

Liquid Preparations: Formulation, preparation and uses of various liquid products namely syrups, aromatic waters, spirits, solutions, mucilages, elixirs, glycerins, mouthwashes, gargles, nasal drops, ear drops.

Semisolid dosage forms (ointments and suppositories): ointment, ointment bases, and factors governing selection of ideal base, preparation of ointments. Suppositories-suppositories bases, Selection of ideal base, preparation of suppositories.

##### Unit-III

Glandular Products: Introduction, extraction methods and preparation of thyroid, liver, pancreas and pituitary gland.

Surgical dressings: Fibres, fabrics, bandages, surgical ligatures and sutures i.e. catgut and other absorbable and non-absorbable products. Quality control of surgical dressings.

#### Unit-IV

Immunology: General introduction, infection, factors influencing infection, kinds of immunity, vaccines (i.e. Tetanus vaccine, Diphtheria vaccine, BCG vaccine, small pox vaccine), virus

immunity, toxoids, toxins, diagnostic preparation, sera, antitoxins (i.e. Diphtheria antitoxins, Botulinum antitoxins), brief control of immunological products-identification tests, toxicity tests, sterility.

tests, potency tests and storage of immunological products.

#### Unit-V

Blood and related products: Whole human blood, concentrated human RBC, dried human plasma, dried human serum, human plasma protein fraction, human fibrinogen, human thrombin, plasma substitute, ideal plasma substitute properties, products i.e. PVP, Dextran, absorbable gelatin, sponge, oxidized cellulose, calcium gluconate.

BP 153

#### PHARMACEUTICS I (General Pharmacy) PRACTICALS

Number of practicals based on aforementioned theory portion and including preparation of the following:

Peppermint water, cinnamon water, camphor water, chloroform water, concentrated peppermint water, concentrated cinnamon water, simple syrup, syrup of ginger, syrup of orange, syrup of tolu, compound syrup of ferrous sulphate, spirit of peppermint, spirit of chloroform, spirit of ether, strong solution of ammonium acetate, surgical solution of chlorinated soda, solution of cresol with soap, solution of ferric chloride, strong solution of iodine, solution of hydrogen peroxide, tannic acid glycerin, boric acid glycerin, mouth washes, nasal drops, ear drops, elixirs, mucilage of acacia, mucilage of tragacanth, tincture of orange, capsicum tincture, strong tincture of ginger, tincture of lemon, tincture of tolu, tincture of nuxvomica, liquid extract of

liquorice, liquid extract of ipecacuanha, liquid extract of belladonna, liquid extract of senna, concentrated infusion of clove, concentrated infusion of quassia, concentrated infusion of senna, liver extract.

#### BOOKS RECOMMENDED:

1. Cooper and Gunn's, "Tutorial Pharmacy", CBS Publishers, Delhi.
2. "Remington' Pharmaceutical Sciences", Mack Publishing Co., P.A..

3. B M Mithal, "A Textbook of Pharmaceutical Formulations", Vallabh Prakashan, Delhi.
4. "Pharmacopoeia of India", Published by the Controller of Publications, Delhi
5. "British Pharmacopoeia", Her Majesty Stationary Office, University Press, Cambridge.
6. "The United States Pharmacopoeia", The United States Pharmacopoeial Convention, Mack Pub Co., Easton, PA.
7. "British National Formulary", Published Jointly by British Medical Association and Royal Pharmaceutical Society of Great Britain

BP 104

Unit I

#### ANATOMY, PHYSIOLOGY & HEALTH EDUCATION - I

Introduction to human body and organization of human body. Functional and structural characteristics of cell. Detailed structure of cell membrane and physiology of transport process.

Structural and functional characteristics of tissues- epithelial, connective, muscle and nerve.

Unit II

Skeletal system: Structure, composition and functions of skeleton. Classification of joints, types of movements of joints.

Muscular system: Anatomy & physiology of skeletal and smooth muscle, energy metabolism, types of muscle contraction, muscle tone.

Unit III

Concept of health and diseases: Disease causing agents and prevention of disease, balanced diet and nutritional deficiency disorders. Demography and family planning, medical termination of pregnancy.

First aid: Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation Methods.

Unit IV

Sense organs: Basic anatomy and physiology of the eye (vision), ear (hearing), taste buds, nose (smell), and skin (superficial receptors).

Unit V

Communicable diseases: Brief outline, their causative agents, modes of transmission and prevention (Chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, helminthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy).

BP 154

#### ANATOMY, PHYSIOLOGY & HEALTHY EDUCATION -I PRACTICAL

1. Preparation of charts/ models of the following :
  - A. Joints,
  - B. Sense organs (eye, ear, taste buds, skin, nose)
  - C. Resuscitation methods
  - D. Malaria life cycle
  - E. Neurotransmission
  - F. Structure of cell
  - G. Transport across cell membrane
  - H. Mechanism of muscle contraction
  - I. Human Skeleton
  - J. Structure of neuron
2. Preparation of charts/ models on selected topics from the course content.

#### BOOKS RECOMMENDED:

1. Marieb E.N. Human Anatomy and Physiology, Benjamin Cummings (Pearson Education Inc.).
2. Park K., Preventive and Social Medicine, Banarsidas Bhanot.
3. Seeley R.R., Stephens T.D. and Tate P. Essentials of Anatomy and Physiology, McGraw-Hill.
4. Tortora G.J. and Anagnostou NP Principles of Anatomy and Physiology, Harper & Row Publishers, New Delhi.
5. Ross & Wilson Anatomy and Physiology in Health and Illness, Churchill Livingstone.
6. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
7. Parmar N.S. Health Education and Community Pharmacy, CBS Publishers, Delhi.
8. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.



9. Dandiya, P.C., Zafer, Z.Y.K., and Zafer, A. Health Education and Community Pharmacy, VallabhPrakashan.

BP-105

## REMEDIAL MATHEMATICS

Objective: This is an introductory course in mathematics, the subject deals with introduction to algebra, trigonometry, differential calculus, integral calculus etc.

### UNIT I

Algebra:

Permutations & combinations - Binomial theorem –Partial fractions (addition, subtraction & multiplication)

–Matrices – Determinants -Application of determinants to solve simultaneous equations (Cramer's Rule).

### UNIT II

Trigonometry: measurement of angles, trigonometry functions, compound angles, trigonometry ratios of multiple angles ( $\sin 2\theta$ ,  $\cos 2\theta$ ,  $\tan 2\theta$ ), Heights and distances(All simple problems only).

Co-ordinate Geometry: Distances between two points, Area of a triangle, division of line segment, locus.

### UNIT III

Differential Calculus: Continuity and limit: Differentiation, derivative of product, derivative of function, derivation of a fraction of functions

Derivatives of trigonometric functions (excluding inverse trigonometric and hyperbolic functions). Derivatives of Logarithmic and exponential functional, partial differentiation, maxima and minima (all simple problems)

### UNIT IV

Integral Calculus: integration of algebraic and exponential functions, Integration of trigonometric functions, integration by parts, integration by the method of substitution, definite integrals, areas and curves (all simple problems)

### UNIT V

Differential equations: Formation of a differential equation, equation of 1st order and 1st degree, Homogenous, exact differential equation

Outcome: The student will learn the basics of mathematics which will be helpful in pharmaceutical calculation in the higher classes

#### BOOKS RECOMMENDED:

1. Intermediate first Year mathematics .
2. Intermediate Second year mathematics., printed and published by Telugu Academy, Himayatnagar, Hyderabad
3. Remedial Mathematics by Shahnaz Bathul
4. Pharmaceutical Arithmetic's by Mohd. Ali CBS publishers and distributor, New Delhi.
5. Higher Engineering Mathematics by Grewal.
6. Text book of Remedial Mathematics by Dr. A Ramakrishna Prasad Cengage Learning.

BP 106

#### REMEDIAL BIOLOGY

Objective: This is an introductory course in biology which gives detailed study on natural sources such as plant and animal origin. This subject deals with the plant cell, animal cell classifications plant kingdom and study of animal issues and study about frogs and some animals.

#### UNIT I

Plant cell and tissues: ultra structure of plant cell and its inclusions. Cell division- mitosis and meiosis. Types of tissues and their functions, tissue systems.

#### UNIT II

Morphology and histology of root, stem, bark, wood, leaf, flower, fruit and seed. Modifications of root and stem.

#### UNIT III

Taxonomy: Systematic position and classification of following families: leguminaceae, umbelliferae, apocynaceae, solanaceae and liliaceae.

#### UNIT IV

Animals cells and tissues: ultrastructure of animal cell, cell division, types of cells and tissues and their functions

Study of anatomy of frog: Basic study of digestive system, CVS, nervous system, respiratory system, genitor-urinary system, musculoskeletal system.

#### UNIT V

Structure and life history of parasites illustrated by amoeba, Entamoeba, Trypanosome, Plasmodium, Taenia, Ascaris, Schistosoma, Oxyuris and Ancylostoma

Outcome: The student will learn details about plant and animal cells plant taxonomy classification and some aspects of physiology of frogs and animals.

BP 156

#### REMEDIAL BIOLOGY LAB

Introduction to simple and compound microscope and their handling Morphological study of various plant parts

Study of histology of monocot root, stem, leaf and dicot root, stem and leaf

Systemic study of representatives of following families: apocyanaceae, solanaceae, three sub families of leguminaceae and liliaceae

Demonstration of various systems of frog

Study of structure of human parasites and insects mentioned in theory with the help of specimen.

Microscopic examination of specimens slides related to plant and animal tissues

#### BOOKS RECOMMENDED:

1. Intermediate First Year and Second Year Botany / Zoology Text Books printed and published by Telugu Academy, Himayatnagar, Hyderabad.
2. A.C. Dutta, Text Book of Botany
3. Botnay for Degree students Vol I & II by B.P. Pandey
4. Enger- Concepts biology

B.Pharm Semester II

BP 107

#### Unit I

## SECOND SEMESTER

### PHARMACEUTICAL CHEMISTRY-II (ORGANIC CHEMISTRY)

Introduction, classification and nomenclature of organic compounds. Electron displacements in organic chemistry (such as; inductive effect, resonance, hyperconjugation). Reaction intermediates (such as; free radicals, carbocations, carbanions, carbenes and nitrenes).

Stereochemistry including geometrical isomerism, optical isomerism, specification of configuration and conformational analysis.

#### Unit II

Introduction to aliphatic organic compounds and some of their characteristic reactions with mechanisms such as; alkanes (free radical substitution), alkenes, alkynes and dienes (electrophilic and free radical additions), cycloalkanes (types of strain including Baeyer strain theory), alkyl halides and alcohols (nucleophilic substitution and nucleophilic elimination), amines, aldehydes and ketones (nucleophilic addition), carboxylic acids and their derivatives.

#### Unit III

Introduction to aromatic organic compounds, aromaticity, structure of benzene, electrophilic and nucleophilic substitution, orientation and reactivity in electrophilic aromatic substitution, arenes, phenols. Polynuclear hydrocarbons (naphthalene, anthracene).

#### Unit IV

Name reactions including reaction mechanisms and synthetic applications of; Meerwein-Ponndorf-Verley reduction, Oppenauer oxidation, Beckmann rearrangement, Hofmann rearrangement, Mannich reaction, Diels Alder reaction, Cannizzaro reaction, Aldol condensation, Benzoin condensation.

#### Unit V

$\alpha$ ,  $\beta$ -Unsaturated carbonyl compounds. Compounds containing active methylene group and their synthetic importance (acetoacetic ester and malonic ester). Organometallic (organolithium and organomagnesium) compounds and their synthetic importance. Aryl diazonium salts and their synthetic importance.

BP 157

### PHARMACEUTICAL CHEMISTRY-II (ORGANIC CHEMISTRY) PRACTICAL

#### Practicals

1. Identification of elements and functional groups in given sample.
2. Purification of solvents like benzene, chloroform, acetone and preparation of absolute alcohol.
3. Synthesis of compounds involving benzylation, acetylation, bromination, reduction & oxidation. Picric acid.

Aniline. Acetanilide. Aspirin Hippuric acid

P-Bromo acetanilide Iodoform

Oxalic Acid

#### BOOKS RECOMMENDED:

1. Morrison R.T., Boyd R.N., and Bhattacharjee, S.K. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education Ltd.).
2. Finar I.L. Organic Chemistry, Vol. I & II, Pearson Education Ltd.
3. Bruice P.Y. and Prasad, K. J. R. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.
4. Sykes P., A Guidebook to Mechanism in Organic Chemistry, Longman Group Ltd.
5. Singh M.S. Advanced Organic Chemistry: Reactions and Mechanisms, Dorling Kindersley (India) Pvt. Ltd.
6. Jain M.K. Organic Chemistry, Sohan Lal Nagin Chand & Co.
7. Mann F.G, and Saunders, B.C., Practical Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education Ltd.).
8. Vogel A.I., Elementary Practical Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education Ltd.).

BP 108

#### Unit I

##### PHARMACEUTICAL CHEMISTRY-III (PHYSICAL CHEMISTRY)

Atomic structure and chemical bonding: atomic structure, atomic orbital, molecular orbital, hybridization, covalent (sigma and pi) bond, electrovalent and co-ordinate bond.

Chemical kinetics: Zero, first and second order reaction, complex reactions, elementary idea of reaction kinetics, characteristics of homogenous and heterogeneous catalysis, acid base and enzyme catalysis.

#### Unit II

Distribution law: Distribution law & application to solvent extraction.

Matter, properties of matter: Physical properties (surface tension, parachor, viscosity, rheochor, refractive index, optical rotation, dipole moment) and chemical constituents. Liquid complexes, liquid crystals, glassy state, solids-crystalline, amorphous and polymorphism.

#### Unit III

Thermodynamics: Fundamentals, first, second, third and zeroth law, Joule-Thompson's effect, absolute temperature scale, conversion of temperature between different scales.

Thermo chemistry: Definition & conventions, heat of reaction, heat of formation, heat of solution, heat of neutralization, heat of combustion, bond energies.

#### Unit IV

Electro-chemistry: Faraday's laws of Electrolysis, Electric conductance & its measurement, molar & equivalent conductivity and its variation with dilution. Kohlrausch law, degree of ionization and Ostwald dilution law. Theory of strong electrolytes (Debye Huckle theory).

#### Unit V

Adsorption: Definition, types and mechanism of adsorption, difference between physical and chemical adsorption, pharmaceutical applications of adsorption

Phase equilibria: Phase, component, degree of freedom, sublimation critical point, phase rule (excluding derivation).

Cooling curves and Phase diagrams for one & two component system involving eutectics, congruent & incongruent melting point (examples-water, sulphur, KI-H<sub>2</sub>O, NaCl-H<sub>2</sub>O).

BP 158

#### PHARMACEUTICAL CHEMISTRY-III (PHYSICAL CHEMISTRY PRACTICAL)

##### Suggested Practicals

1. Determination refractive index of given liquids.
2. Determination of specific rotation of sucrose at various concentrations and determine the intrinsic rotation.
3. Determination of rate constant of simple reaction.
4. Determination of cell constant, verify Ostwald dilution law and perform conductometric titrations.
5. Determination of surface tension.
6. Determination of partition co-efficient.
7. Determination of viscosity.
8. Determine the parachor value.
9. Determine the rheochor value.
10. pH Determination by different methods.
11. Determination of solubility.

##### BOOKS RECOMMENDED:

1. Engel Thomas Reid Philip. Physical Chemistry, Pearson Education.
2. Tinoco I.J., Sauer K., Wang J.C. and Puglisi J.D. Physical Chemistry principles and applications in biological sciences, Pearson Education.
3. Martin A., Bustamante P. and Chun A.H.C- Physical Pharmacy, Lea &Febiger, Philadelphia.
4. Mark L. Introduction to Physical Chemistry, Cambridge University.
5. Levine Ira N. Physical Chemistry, Tata McGraw-Hill Publishing Company.
6. Barrow G.M. Physical Chemistry, Tata McGraw-Hill Publishing Company.

BP 109

#### UNIT I

##### PHARMACEUTICS –II (DISPENSING PHARMACY)

- a. Genesis and Evalution of Pharmacy: History of Pharmacy, origin and development of the Pharmacopoeias, History of Ayurveda, salient features of IP, USP and BP.

Pharmacy Education – D. Pharm, B Pharm, M.Pharm, Pharma-D, Qualification for getting license.

- b. Dispensing Pharmacy: Principles of dispensing, form of prescription, handling of prescription, source of errors in prescription, care required in dispensing procedures including labeling of dispensed products. Weights and Measures, introduction to Latin terms, Percentage calculations, alligation method, proof spirit calculations, displacement value and calculations of isotonicity adjustment. General dispensing procedure- posology-calculations of doses.

#### UNIT-II

1. Definitions and General Dispensing Procedures.
2. Sources of information required for Pharmacists and History of Pharmacopoeias (I.P., B.P., and U.S.P.).
3. Sources of error and care required in dispensing prescriptions.
4. Pharmaceutical Latin-Latin terms used in prescriptions and their English equivalents.
5. Types of Dispensed products.
6. Containers, closures and labelling for dispensed products..

#### UNIT III

PHARMACEUTICAL ADDITIVES: Colouring, flavouring and sweetening agents, cosolvents, preservatives, surfactant and their applications, antioxidants, Natural and Semisynthetic Biopolymers

#### UNIT IV

Principles involved and procedures adopted in dispensing of the following classes of preparations. (i) Mixtures (ii) Solutions (iii) Emulsions (iv) Powders

(v) Lotions & liniments (vi) Ointments (vii) Suspensions (viii) Syrups (ix) Suppositories.

#### UNIT V

Definition of the following preparations like creams, capsules, pastes, jellies, suppositories, ophthalmics, lozenges, pills, inhalations, paints, sprays and tablet triturates. Incompatibilities: Physical, chemical and therapeutic incompatibilities – methods of overcoming and handling of prescriptions with incompatibility.

BP 159

#### PHARMACEUTICS –II (DISPENSING PHARMACY) PRACTICAL

1. Dispensing of prescriptions falling under the categories; Mixtures, solutions, emulsions, creams, ointments, powders, pastes, lotions, liniments, inhalations, paints, syrups, Suppositories etc.
2. Identification of various types of incompatibilities in a prescription, correlation thereof and dispensing of such prescriptions.
3. Dispensing procedures involving pharmaceutical calculations, pricing of prescriptions and dosage calculations for paediatric and geriatric patients.
4. Dispensing of prescriptions involving adjustment of tonicity.
5. Categorization and storage of pharmaceutical products based on legal requirements of labelling and storage.
6. Project report on visit to the community pharmacy for Counseling on the rational use of drugs and aspects of health care.

#### BOOKS RECOMMENDED:

1. Pharmaceutics –I, Practical manual by N.K.Jain, Vijay Mishra
2. dispensing pharmacy practical manual by B.S.Sanmethi, K.Mehta and Anshu Gupta

BP 110

#### ANATOMY, PHYSIOLOGY & HEALTH EDUCATION -II

##### Unit I

Central nervous system: Anatomy of different parts of brain and spinal cord, reflex action, electroencephalogram, specialized functions of the brain. Cranial nerves and their functions.

##### Unit II

Autonomic nervous system: Physiology of the autonomic nervous system. Neuro transmitters, Mechanism of neurohumoral transmission.

##### Unit III



Haemopoietic system: Composition & function of blood & its elements, erythropoiesis, blood groups, blood coagulation, Anemia.

Lymphatic system: Composition, formation and circulation of lymph, lymph node and spleen, thymus and pathophysiology of hypersensitivity and allergy.

#### Unit IV

Urinary system: Anatomy & physiology of urinary system, physiology of urine formation, acid- base balance, pathophysiology of renal failure, glomerulonephritis, urinary tract infection

#### Unit-V

Digestive system: Parts of digestive system, their structure and functions. Various gastro- intestinal secretions and their role.

Pathology of Peptic Ulcer, Ulcerative colitis, Crohn's disease, Zollinger- Ellison syndrome, Hepatitis, Cirrhosis of liver, Pancreatitis

BP 160

#### ANATOMY, PHYSIOLOGY & HEALTH EDUCATION -II PRACTICAL

1. Microscopic study of different tissues.
2. Haematological experiments:
  - A. Estimation of haemoglobin in blood.
  - B. Determination of bleeding time, clotting time.
  - C. R.B.C. Count.
  - D. Total leucocyte count (TLC), Differential leukocyte count (D.L.C.)
  - E. E.S.R. and blood group
3. Recording of body temperature, pulse rate and blood pressure.

#### BOOKS RECOMMENDED

1. Difore S.H., Atlas of Normal Histology, Lea & Febiger Philadelphia.
2. Tortora, G.J., & Anagnostou N.P., Principles of Anatomy and Physiology, Harper & Row Publishers, New Delhi.
3. Dipiro J.L., Pharmacotherapy – A Pathophysiological Approach, Elsevier.

4. Seeley R.R., Stephens T.D. and Tate, P. Essentials of Anatomy and Physiology, McGraw-Hill.
5. Guyton A.C., Hall J.E., Text book of Medical Physiology, WB Saunders Company.
6. Ross and Wilson, Anatomy and Physiology in Health and Illness, Churchill Livingstone.
7. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
8. Zdanowicz, M. M. Essentials of Pathophysiology for Pharmacy, CRC Press.
9. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
10. Sood, R. Medical Laboratory Technology: Methods and Interpretation, Jaypee Brothers, New Delhi.

BP 111

#### PHARMACOGNOSY-I

##### Unit I

Definition history, scope & development of pharmacognosy.

Source of drug: Biological, marine, mineral and plant tissue culture as source of drugs.

Classification of drugs: Alphabetical, morphological, taxonomical, chemical and pharmacological, chemotaxonomy.

##### Unit II

Plant Description: Morphology and anatomy of leaves, woods, barks, inflorescences and flowers, fruits and seeds.

##### Unit III

Propagation, cultivation, collection, processing and storage of crude drugs

- A. Factors influencing cultivation of medicinal plants, Type of Soils & fertilizers of common use.
- B. Pest management and natural pest control agents.
- C. Plant hormones and their applications.
- D. Polyploidy, mutation and hybridization with reference to medicinal plants.
- E. Poly Houses/ Green houses for cultivation.

##### Unit IV

Quality control of crude drugs: Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation including quantitative microscopy.

##### Unit V

Systematic pharmacognostic study of following-

Carbohydrates and derived products: Agar, Guar-gum, Acacia, Honey, Isabgol, Pectin, Starch, Sterculia and Tragacanth.

Lipids: Beeswax, Castor oil, Cocoa butter, Kokum butter, Hydrocarpus oil, Cod liver oil, Shark liver oil, Linseed oil, Wool fat, Rice-bran oil, Lard and Suet.

BP 161

#### PHARMACOGNOSY-I PRACTICAL

1. Morphological characteristics of plant parts mentioned in theory.
2. Microscopical measurements of cell & cell contents Starch grains, Calcium oxalate Crystals & Phloem fibres.
3. Determination of leaf constants such as stomatal index, stomatal numbers, vein islet numbers, vein termination number and palisade ratio.
4. Identification of crude drugs belonging to carbohydrates and lipids.
5. Preparation of herbarium sheets.

#### BOOKS RECOMMENDED

1. Pharmacopoeia of India, The Controller of publications, Vol. III, Delhi, 2010.
2. Trease G.E. and Evans W.C., Pharmacognosy, Bailliere Tindall East Bourne, U.K.
3. Wallis T.E., Text book of Pharmacognosy, J & A Churchill, Ltd.
4. Wallis T.E., Analytical Microscopy, J & A Churchill Limited, London.
5. Brain K.R. and Turner T D. The Practical Evaluation of Phytopharmaceuticals, Wright, Scientechica- Bristol.
6. Dutta A.C, Botany, Oxford University Press, 2007.
7. Schewer PJ, Marine Natural Products, Academic Press, London.
8. Wallis T.E. Practical Pharmacognosy, PharmaMed Press, Hyderabad, 2011.
9. Kokate C.K. Practical Pharmacognosy, VallabhPrakashan,

B.Pharm Semester III

BP201 Pharmaceutics-III (Physical Pharmacy)

Theory 3hrs / week

UNIT I: Matter, properties of Matter : States of matter, change in the state of matter, latent heat and vapor pressure, sublimation critical point, Eutectic mixtures, gases, relative humidity, liquid complexes, liquid crystals, glassy state, solids-crystalline, amorphous and polymorphism. Kinetics and Drug Stability : General considerations & concepts, Degradative pathways, half life determination, Influence of temperature, light, solvent, catalytic species and other factors, Accelerated stability study, expiration dating. ICH guidelines for stability. Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting is tonicity.

UNIT II: Micromeritics and Powder rheology: Particle size and distribution, average particle size, number and weight distribution, particle number, methods for determining particle volume, optical microscopy, sieving, sedimentation, measurement, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

UNIT III: Surface and Interfacial Phenomenon : Liquid interface, surface and interfacial tension, surface free energy, measurement of surface and interfacial tension, spreading coefficient, adsorption at liquid interfaces, Surface active agents, HLB classification, solubilization, detergency, adsorption at solid interfaces, solid- gas and solid- liquid interfaces, complex films, electrical properties of interface.

UNIT IV: Viscosity and rheology : Newtonian systems, Law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling ball, rotational viscometers. Complexation : Classification of complexes, methods of preparation and analysis, applications.

UNIT V: Dispersion Systems : Colloidal Dispersions : Definition, types, properties of colloids, protective colloids, application of colloids in pharmacy; Suspensions and Emulsions; Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations; Emulsions-types, theories, physical stability.

BP251 Pharmaceutics-III (Physical Pharmacy) 3hrs /week Practicals

1. Determination of particle size, Particle size distribution and surface area using various methods of particle size analysis.
2. Determination of derived properties of powders like density, porosity, compressibility, angle of repose etc.

3. Determination of surface/ interfacial tension, HLB value and critical micellar concentration of surfactants.
4. Study of rheological properties of various types of systems using different Viscometers.
5. Studies of different types of colloids and their properties.
6. Preparation of various types of suspensions and determination of their sedimentation parameters.
7. Preparation and stability studies of emulsions.
8. Studies of different types of complexes and determination of their stability constants.
9. Determination of half-life, rate constant and order of reaction.
10. To study the influence of various factors on the rate of reaction.
11. Accelerated stability testing, shelf-life determination and expiration dating of pharmaceuticals.
12. Preparation of pharmaceutical buffers and determination of buffer capacity.
13. Experiments involving tonicity adjustments.

#### BOOKS RECOMMENDED:

1. Martin A, Bustamante P. & Chun A.H.C- Physical Pharmacy, Lea & Febiger, Philadelphia.
2. Shotten E & Ridgaway K, Physical Pharmaceutics, Oxford University Press, London. 3 D.V.Derle ,” Essentials of Physical Pharmacy”.

#### BP202 Pharmaceutical Chemistry –IV (Organic chemistry- II)

Theory 3hrs / week

UNIT I: Pericyclic reactions: Concept of HOMO & LUMO. Drawing of HOMO & LUMO of 1,3-butadiene, allylic cation, radical and anion and 1, 3, 5-hexatriene.

Meaning of conrotatory and disrotatory. Allowed and disallowed thermal and photochemical reactions. Introduction to sigmatropic, electrocyclic and  $(4n+2)$  cycloaddition reactions. Cope, oxy-cope (Claisen rearrangement), Diels alder and retro Diels Alder reaction

UNIT II: Neighbouring group effects; Catalysis by transition metal complexes, Stereoselective and stereospecific reactions; New organic reagents used in drug synthesis.

UNIT III: Heterocyclic Chemistry: IUPAC Nomenclature of heterocyclic rings[3-10 membered] containing O, S and N atoms. Nomenclature of above rings containing mono, di and multiple (same or different) heteroatoms.

Nomenclature of 2 & 3 Fused rings containing mono, di and multiple (same or different) heteroatoms. Synthesis and reaction of 3 to 6 membered rings in detail. Synthesis and reaction of 5 & 6 membered containing mono or di-heteroatoms (O,S & N). Synthesis of Quinoline, Isoquinoline, Benzoxazole and Benzthiazole.

UNIT IV: Chemistry of Carbohydrates: Carbohydrates; Definition and classification; D & L nomenclature in sugars; Different ways of drawing/representing a sugar molecule (including cyclic structure); interconversion of these representations; Anomers and Epimers; Mutarotation; Reactions of glucose; Chain extension and Chain reduction of sugar.

UNIT V: Chemistry of Amino acids & Proteins: Amino acids & proteins; Definition & classification; D & L Amino acids, natural, essential, & non-essential amino acids; Denaturation; Strecker, Gabriel phthalamide methods for the preparation of amino acids; Peptide bond & its formation. Two protective groups each, for  $-NH_2$  &

$-COOH$  functionalities during protein synthesis; Sequencing of a protein by chemical and enzymatic methods.

BP252 Pharmaceutical Chemistry –IV (Organic Chemistry-II)

Practicals        3hrs / week

At least five exercises in synthesis involving various heterocyclic ring systems.

An exercise involving stereoselective synthesis of a compound. Resolution of racemic DL- alanine or any other example.

To detect atoms and functional group in given organic compounds.

To provide advanced synthetic conversions of organic functional groups.

To expose the students towards heterocyclic compounds and their chemistry.

#### BOOKS RECOMMENDED :

1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.
2. Furniss B S, Hannaford A J, Smith P W G and Tathell A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.
3. Pharmacopoeia of India, Ministry of Health, Govt. of India.
4. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.

5. Delagado J N and Remers W A R, Eds., Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
6. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
7. Singh Harkishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
8. Nogrady, T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
9. Finar I L, Organic Chemistry, Vol I & II, ELBS/ Longman, London. 10. Thomas J..Perun," Computer –aided Drug Design methods applications'.
11. Pandi Veerapandian," Structure-Based Drug Design".

BP203 Pathophysiology

Theory 3hrs/ week

UNIT I: Basic Principles of Cell Injury and Adaptation: Causes of Cellular injury, pathogenesis, morphology of cell injury.

UNIT II: Intercellular alterations in lipids, proteins and carbohydrates, Cellular adaptation, atrophy, hypertrophy.

UNIT III: Basic Mechanisms involved in the process of inflammation and repair: Alterations in vascular permeability and blood flow, migration of WBCs, acute and chronic inflammation, mediators of inflammation, brief outline of the process of repair.

UNIT IV: Pathophysiology of Common Diseases: Rheumatoid arthritis, gout, epilepsy, psychosis, depression, mania, hypertension, angina, congestive heart failure, atherosclerosis, myocardial infarction, diabetes, peptic ulcer, asthma, ulcerative colitis, hepatic disorders, acute and chronic renal failure.

UNIT V : Pathophysiology of tuberculosis, urinary tract infections, sexually transmitted diseases, anemias and common types of neoplasms.

Wherever applicable the molecular basis should be discussed.

#### BOOKS RECOMMENDED

1. Difore SH, "Atlas of Normal Histology" Lea & Febiger Philadelphia.
2. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
3. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company.
4. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
5. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.
6. Tortora GJ, & Anagnostikos NP, Principles of Anatomy & Physiology, Harper & Row Publishers, New Delhi.

7. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.
8. Shalya Subhash, Human Physiology, CBS Publishers & Distributors.
9. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.
10. Dipiro JL, Pharmacotherapy – A Pathophysiological Approach, Elsevier.
11. Robbins SL, Kumar V, Basic Pathology, WB Saunders.

BPE 101 Environmental Science

Theory 2hrs/week

Unit -1:Multidisciplinary nature of environmental studies Definition, scope and importance. Need for public awareness. Renewable and non-renewable resources :

Natural resources and associated problems.

- 1) Forest resources: Use and over-exploitation, deforestation, case studies.
- 2) Timber extraction, mining, dams and their effects on forest and tribal people.
- 3) Water resources : Use and over-utilization of surface and ground water,
- 4) Floods, drought, conflicts over water, dams-benefits and problems.
- 5) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- 6) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- 7) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- 8) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
  - a. Role of an individual in conservation of natural resources.
  - b. Equitable use of resources for sustainable lifestyles

Unit – 2: Ecosystems

Concept of an ecosystem.

1. Structure and function of an ecosystem.
2. Producers, consumers and decomposers.
3. Energy flow in the ecosystem.



4. Ecological succession.
5. Food chains, food webs and ecological pyramids.
6. Introduction, types, characteristic features, structure and function of the following ecosystems:-
  - a. Forest ecosystem.
  - b. Grassland ecosystem.
  - c. Desert ecosystem.
  - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

#### Unit – 3: Biodiversity and its conservation

1. Introduction: – Definition: genetic, species and ecosystem diversity.
2. Biogeographical classification of India
3. Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
4. Biodiversity at global, National and local levels.
5. India as a mega-diversity nation
6. Hot-spots of biodiversity.
7. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
8. Endangered and endemic species of India.
9. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

#### Unit – 4: Environmental Pollution

##### Definition

1. Causes, effects and control measures of :
  - a. Air pollution.
  - b. Water pollution.
  - c. Soil pollution.
  - d. Marine pollution.
  - e. Noise pollution.
  - f. Thermal pollution & Nuclear hazards.
2. Solid waste management:- Causes, effects and control measures of urban and Industrial wastes.
3. Role of an individual in prevention of pollution. Case studies.

4. Disaster management:- Floods, earthquakes, cyclones and landslides.

#### Unit – 5: Human Population and the Environment

Population growth, variation among nations.

1. Population explosion – Family Welfare Programmes.
2. Environment and human health.
3. Human Rights.
4. Value Education.
5. HIV/AIDS.
6. Women and Child Welfare.
7. Role of Information Technology in Environment and human health.

#### BOOKS:

1. Principles of Environmental Studies, C. Manoharachary, P. Jyaranama Reddy, Pharma Book Syndicate, Hyderabad.
2. Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standards Vol. I & II. R.K.Trivedy, Pharma Book Syndicate, Hyderabad
3. Relevant Acts & Rules published by Govt. of India with latest amendments.
4. Reddy, M.Anji , ‘ Text Book of Environmental Sciences & Technology”.

BP204 Computers & its Applications

Theory 3hrs/week

#### Unit I

Definition and overview of computer, computer classification, Organisation, computer code, computer classification of Boolean algebra. Input devices, output devices, storage devices. Computer network topology. Internetworking: Bridges, Repeaters and Routers.

#### Unit II

Introduction to Operating system and function, Evolution of operating system, batch, interactive, time- sharing, real time system. Single user operating system and multi-user operating system, compare MS-DOS vs UNIX, various window features. Internal and external commands in MS-DOS.

#### Unit III

Introduction to Ms-Office , word document creation, editing, formatting table handling, mail merge, excel, editing, working retrieval, important functions, short cut keys used in EXCEL.

#### Unit IV

MS-Powerpoint job profile, elements of powerpoint, ways of delivering presentation, concept of four 's'(Planning, preparation practice and presentation) ways of handling presentations eg. Creating, saving, slides show controls, adding formatting, animation and multimedia effects. Database system concepts, Data models schema and instance, Database language, introduction to msAccess 2003, main components of access tables, queries, reports, forms table handling, working on query and use of database. Fundamentals of structured query language (SQL).

## Unit V

Applications in pharmaceutical and clinical studies, uses of internet in pharmaceutical industry. Fundamentals of C programming, Data structure using C, Queue, FIFO, etc, Internet history, Characteristics, uses.

BP254 Computers & its Applications Practical

Practical            3hrs/week

Software lab to be used for the following:

1. Windows, managing windows, working with disks, folders and files.
2. MS-OFFICE 2003 (MS word, MS powerpoint, MS excel, MS access)
3. Computer operating system like DOS and windows.
4. Internet features (E-Mail, browser etc.)
5. Data structure using C
6. Programming using C language

## BOOKS RECOMMENDED:

1. Sinha, R.K., Computer Fundamentals, BPB Publications.
2. Raja Raman, V, Computer Programming in 'C', PHI Publication.
3. Hunt N and Shelley J. "Computers and Common Sense" Prentice Hall of India.
4. N.K.Tiwari, "Computer fundamentals with Pharmacy Applications".
5. G.N.Rao, "Biostatistics & computer Applications".

B.Pharm Semester IV

BP205 Pharmaceutics-IV

Theory 3hrs / week

UNIT I: Preformulation studies: Study of physical properties of drug like physical form, particle size, shape, density, wetting, dielectric constant, Solubility, dissolution and organoleptic properties and their effect on formulation, stability and bioavailability.

UNIT II: Liquid Dosage Forms : Introduction, types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavours and others, Manufacturing packaging & evaluation of clear liquids, suspensions and emulsions.

UNIT III: Semisolid Dosage Forms : Definitions, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection, General formulation of semisolids, clear gels & manufacturing procedure, evaluation and packaging.

UNIT IV: Suppositories : Ideal requirements, bases, manufacturing procedure, packaging and evaluation.

Pharmaceutical Aerosols: Definition, Propellants, general formulation, manufacturing and packaging methods, pharmaceutical applications.

UNIT V: Cosmetology and cosmetic Preparations : Structure of skin, formulation of cold cream, vanishing cream, cleansing cream, all purpose cream, protective cream, antiperspirants, deodorant, face powder. Hair structure, Shampoos, Conditioner, Shaving and after shaving products, Dentifrice & Mouthwash, Lipstick, Nail lacquer.

BP255 Pharmaceutics-IV Practical

Practical            3 hrs / week

1. Preparation of cold cream, vanishing cream, cleansing lotion and creams. Moisturising creams, Skin tonics, Hair creams, Hair Conditioners, Shampoos, Shaving creams and sticks. Tooth powder, Tooth pastes, After shave lotion and other cosmetic preparations.
2. Preparation, evaluation and packing of liquid orals like solutions, suspensions and emulsions, ointments, suppositories, eye drops, eye ointments etc.

#### SUGGESTED PRACTICALS:

Preparation, evaluation, and packing of :

##### I- Liquid Orals

- a) Solutions : Strong Sodium salicylate oral solution BP Chloral hydrate oral solution BP
- b) Suspensions : Magnesium sulphate oral suspension BP Milk of magnesia IP

Aluminium hydroxide gel IP

c) Emulsions : Liquid paraffin oral emulsion BP

II – Semi-Solids

d) Ointments Salicylic acid ointment BP Whitfield ointment BP

Compound benzoic acid ointment

III - Suppositories

e) Suppositories : Glycerin suppositories BP Lactic acid suppositories BP

Preparation of cosmetic preparations

1) Cold cream 2) Vanishing cream 3) Cleansing cream 4) All purpose cream 5) Protective cream 6) Foundation lotion 7) Sunscreen lotion 8) Face powder 9) Body powder 10) Hand cream 11) Face pack 12) Deodorant 13) Antiperspirant 14) Shampoo- powder 15) Oily shampoo 16) Cream shampoo 17) Clear liquid shampoo 18) Shaving cream 19) Brushless shaving cream 20) After shave lotion 21) Hair fixer gel 22) Tooth powder 23) Tooth paste 24) Mouth wash 25) Hair conditioner 26) Anti dandruff shampoo 27) Depilatory cream 28) Bleach cream 29) Hair setting lotion 30) Tooth gel .

#### BOOKS RECOMMENDED

1. Remington's Pharmaceutical Sciences, Vol. I & Vol. – II, Mack Publishing Co., U.S.A.
2. J.W. Cooper, & G. Gunn, Tutorial Pharmacy, Petman Books Ltd., London.
3. Lachman L., Lieberman H.A, Kanig J.L, Theory and Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia, U.S.A.
4. H.C. Ansel, Introduction to Pharmaceutical Dosage Forms, Lea & Febiger, Philadelphia, U.S.A.
- 5 R.L. Juliano, Drug Delivery Systems, Oxford University Press, Oxford.
6. Harrys Cosmetology
7. Balsam and Sagarin, Cosmetics: Science and Technology.
8. Thomssen E.G. Modern Cosmetics, Universal Publishing Corporation.
9. Mittal B.M. & Saha R.N.-a handbook of cosmetics, Vallabh Prakashan.
10. Harry G.Brittain," Polymorphin in Pharmaceuticals Solids".

BP206 Pharmaceutical Chemistry-V (Medicinal Chemistry)

Theory 3hrs / week

UNIT I: Basic Principles of Medicinal Chemistry: Physico-chemical aspects (Optical, geometric and bioisosterism) of drug molecules and biological action, Drug- receptor interaction including transduction mechanisms.

UNIT II: Principles of Drug Design (Theoretic fll Aspects): Traditional analog (QSAR) and mechanism based approaches (Introduction of graph theory, applications of quantum mechanics, Computer Aided Drug Designing (CADD) and molecular modeling.

Synthetic procedures of selected drugs, modefication, uses, structure activity relationship including physicochemical properties of the following classes of drugs:

UNIT III: Drugs acting at Synaptic and neuro-effector junction sites:

- i. Cholinergics and Anticholinesterases
- ii. Adrenergic drugs
- iii. Antispasmodic and anti ulcerdrugs
- iv. Neuromuscularblockingagents.

UNIT IV: Autacoids and related drugs: Histamines and Antihistamines; Eicosanoids; Analgesic-antipyretics; anti-inflammatory (non-steroidal) agents.

UNIT V: Drugs affecting uterine motility:

Oxytocics (including oxytocin, ergot alkaloids and prostaglandins; Biochemical approaches in drug designing wherever applicable should be discussed.

BP256 Pharmaceutical Chemistry-V (Medicinal Chemistry)

Practical 3 hrs / week

1. Exercises based on QSAR: Hansch & Free-Wilson methods.
2. Synthesis of selected drugs from the course content.
3. Spectral analysis of the drugs synthesized.
4. Establishing the pharmacopoeial standards of the drugs synthesized.
5. Determination of partition coefficient, dissociation constant and molarr efractivity of compounds for QSAR analysis.

BOOKS RECOMMENDED :

1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/Longman, London.
2. Furniss B A, Hannaford A J, Smith P W G and Tatehell A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.
3. Pharmacopoeia of India, Minsitry of Health, Govt. of India.
4. Wolff ME. Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
5. Degado J.N. and Remers W A R, 10th eds., Wilson and Giswold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Lippincott, William & Wilkins.

6. Foye W C. Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
7. Singh Harkrishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
8. Nogrady T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
9. Finar I L. Organic Chemistry, Vol I & II, ELBS/ Longman, London.
10. Lednicer, D. The Organic Chemistry of Drug Synthesis Vol. I-V, John Wiley & Sons.

#### BP207 Pharmaceutical Analysis -II

Theory 3hrs / week

Theoretical considerations and application in drug analysis and quality control of the following analytical techniques

UNIT I: Non-aqueous titrations, Complexometric titrations.

UNIT II: Miscellaneous Methods of Analysis: Diazotisation titrations, Kjeldahl method of nitrogen estimation, Karl-Fischer titration, Oxygen flask combustion, gasometry.

UNIT III: Extraction procedures including extraction of drugs from excipients. UNIT IV: Chromatography: The following techniques will be discussed with relevant examples of Pharmacopoeial products.

TLC, HPLC, GLC, HPTLC, Paper Chromatography and Column Chromatography.

UNIT V: Potentiometry, Conductometry, Coulometry, Polarography, Amperometry.

BP257 Pharmaceutical Analysis –II      Practicals Practicals      3hrs /week

1. Non-aqueous Titrations : Preparation and standardization of perchloric acid and sodium/potassium methoxide solutions, Estimation of some pharmacopoeial products.
2. Miscellaneous Determinations : Exercise involving Diazotization, Kjeldahl, Karlfisher.
3. Exercise based on acid base titration in aqueous and non-aqueous media, oxidation reduction titrations using potentiometric technique, determination of acid base dissociation constants and plotting of titration curves using pH meter.
4. Exercises involving conductometric titrations.
5. Exercises based on paper, column and thin- layer chromatography.

#### BOOKS RECOMMENDED :

1. Beckett, A H and Stenlake, J.B, Practical Pharmaceutical Chemistry, Vol, I and II, The Athlone Press of the University of London.
2. Pharmacopoeia of India, published by The Controller of Publications, Delhi.
3. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.

4. Mendham J, Denny RC, Barnes, J.D. Thomas M.J.K. "Vogel's Text Book of Quantitative chemical" Pearson Education Asia.
5. Connors KA, A Textbook of Pharmaceutical Analysis, Wiley Intescience, New York.
6. G.Vidya Sagar," Instrumental Methods of drug Analysis".

#### BP208 Pharmacognosy -II

Theory 3hrs / week

UNIT I: Resins: Study of Drugs Containing Resins and Resin Combination like Colophony, podophyllum, jalap, cannabis, capsicum, myrrh, asafoetida, balsam of tolu, balsam of peru, benzoin, turmeric, ginger.

UNIT II: Tannis: Study of tannins and tannin containing drugs like Gambir, black catechu, gall and myrobalan.

UNIT III: Volatile Oils :General methods of obtaining volatile oils from plants, Study of volatile oils of Mentha, Coriander, Cinnamon, Cassia, Lemon peel, Orange peel, Lemongrass, Citronella, Caraway, Dill, Spearmint, Clove, Fennel, Nutmeg, Eucalyptus, Chenopodium, Cardamom, Valerian, Musk, Palmarosa, Gaultheria, Sandal wood.

UNIT IV: Phytochemical Screening:

- a. Preparation of extracts.
- b. Screening of alkaloids, saponins, cardenolides and bufadienolides, flavonoids and leucoanthocyanidins, tannins and polyphenols, anthraquinones, cynogenetic glycosides, amino acids in plant extracts.

UNIT V: Study of fibres used in pharmacy such as cotton, silk, wool, nylon, glass- wool, polyester and asbestos.

Pharmaceutical aids: Study of pharmaceutical aids like talc, diatomite, kaolin, bentonite, gelatin and natural colors.

#### BP258 Pharmacognosy –II Practicals

Practicals 3hrs / week

1. Identification of crude drugs mentioned in theory.
2. Study of fibres and pharmaceutical aids.
3. Microscopic studies of seven-selected crude drugs and their powders mentioned under the category of volatile oils in theory and their chemical tests,
4. General chemical tests for alkaloids, glycosides, steroids, flavonoids and tannins.

#### SUGGESTED PRACTICALS

1. Morphology of Mentha, Lemongrass, Nutmeg and chenopodium.
2. Morphology of Turmeric, Ginger, Cannabis, Eucalyptus.



3. Morphology and microscopy of Coriander and Cinnamon.
4. Morphology and microscopy of Dill and Caraway.
5. Morphology and microscopy of Cardamom and Fennel.
6. Morphology and microscopy of Clove and to study its transverse section.
7. Study of Cotton, Silk and Wool along with their chemical Tests.
8. To study the morphology and chemical tests of Talc, Diatomite, and Kaolin.
9. Morphology and microscopy of Bentonite, Gelatin and natural colours (Saffron).
10. To perform the chemical tests of Balsam (Tolu and Peru) and Asafoetida.
11. Preparation of reagents for the chemical tests of Alkaloids and to perform the chemical tests on any Alkaloid containing drug.
12. Test for identification of Glycosides (Saponin and Anthraquinone).
13. Test for identification of Tannins.
14. Tests for identification of steroids.
15. Tests for identification of flavonoids.

PROJECT WORK :

Utilization of Aromatic plants; ((Monograph).

BOOKS RECOMMENDED :

1. Trease G.E., & Evans W.C., "Pharmacognosy" Balliere Tindall East Bourne U.K.
2. Tyler V.E. et al "Pharmacognosy" Lea & febiger, Philadelphia.
3. Wallis, T.E. "Text Book of Pharmacognosy" J&A Churchill Ltd, London.
4. Kokate C.K. et al "Pharmacognosy" Nirali Prakashan, Pune.
5. Atal C.K. & Kapur BM, "Cultivation & utilization of Medicinal plant, RRL, Jammu.
6. Harborne J B, Phytochemical method, Chapman & Hall International Edition, London.
7. Mohammed Ali," Pharmacognosy & Phytochemistry".

BP-209 Pharmaceutical Jurisprudence & Ethics

Theory 3 hrs /week

1. Introduction

- a.
- b. Pharmaceutical Legislations - A brief review.

Drugs & Pharmaceutical Industry - A brief review.

- c. Pharmaceutical Education - A brief review.

An elaborate study of the following

2.

- a.
- b.
- c. Pharmaceutical Ethics Pharmacy Act 1948.

Drugs and Cosmetics Act 1940 and Rules 1945.

d.

- e. Medicinal & Toilet Preparations (Excise Duties) Act 1955.

Narcotic Drugs & Psychotropic Substances Act 1985 & Rules.

- f. Drugs Price Control Order.

3. A brief study of the following with special reference to the main provisions.

- a. Poisons Act 1919
- b. Drugs and Magic Remedies (Objectionable Advertisements) Act 1954
- c. Medical Termination of Pregnancy Act 1970 & Rules 1975.
- d. Prevention of Cruelty to Animals Act 1960.
- e. States Shops & Establishments Act & Rules.
- f. Insecticides Act 1968.

- 4. a. AICTE Act 1987.

b. Factories Act 1948.

c. Minimum Wages Act 1948. d. Patents Act 1970.

5. A brief study of the various Prescription/Non-prescription Products, Medical /Surgical accessories, Diagnostic aids, appliances available in the market.

BOOKS RECOMMENDED :

1. B.M., Mittal, Textbook of Forensic Pharmacy, National Book Centre, Dr. Sundari Mohan Avenue, Calcutta.
2. Relevant Acts & Rules Published by the Govt. of India.
3. N.K. Jain, A Textbook of Forensic Pharmacy, Vallabh Prakashan, N. Delhi.
4. Singh, Harkishan "History of Pharmacy in India- Vol.-I, II & III" Vallabh Prakashan.

#### B.Pharm Semester V

##### BP301 Microbiology

Theory 3hrs /week

#### UNIT I: (a) Introduction to the scope of microbiology

(b) Structure of bacterial cell. Classification of microbes and their taxonomy. Actinomycetes, bacteria, rickettsiae, spirochetes and viruses.

UNIT II: Identification of Microbes: Stains and types of staining techniques, electron microscopy. Nutrition, cultivation, isolation of bacteria, actinomycetes, fungi, viruses, etc. Microbial genetics and variation.

UNIT III: Control of microbes by physical and chemical methods.

a. Disinfection, factors influencing disinfectants, dynamics of disinfection, disinfectants and antiseptics and their evaluation.

b. Sterilization, different methods, validation of sterilization methods & equipments. Sterility testing of all pharmaceutical products.

Sterility testing as per I.P.

UNIT IV: Immunity, primary and secondary, defensive mechanisms of body, microbial resistance, interferon.

UNIT V: Microbial assays of antibiotics, vitamins & amino acids. Factory and hospital hygiene-control of microbial contamination during manufacture, manufacture of sterile products- clean and aseptic area, nosocomial infection, control of hospital infections.

##### BP351 Microbiology Practical

Practicals 3 hrs /week

#### PRACTICAL

Experiments devised to prepare various types of culture media, sub-culturing of common aerobic and anaerobic bacteria, fungus and yeast, various staining methods, various methods of isolation

and identification of microbes, sterilization techniques and their validation, validation of sterilization techniques, evaluation of antiseptics and disinfectants, testing the sterility of pharmaceutical products as per I.P. requirements, microbial assay of antibiotics and vitamins.

#### SUGGESTED PRACTICALS

1. Study of sterilization methods & equipments
  - Dry heat
  - Moist heat
2. Preparation of various types of culture media.
3. Isolation of bacteria.
4. Sub-culturing of common bacteria, fungi, yeast.
5. Identification and staining of bacteria.
  - Simple staining
  - Gram staining
  - Acid fast staining
  - Hanging drop preparation
6. Evaluation of disinfectants and antiseptics
  - Phenol coefficient test, minimum inhibitory concentration.
7. Test for sterility of pharmaceutical products as per IP.
8. Microbial assay of antibiotics as per IP.

#### BOOKS RECOMMENDED :

1. Aneja K.R. Experiments in Microbiology, Plant Pathology, Tissue Culture & Mushroom Cultivation, Vishwa Prakashan.
2. Gunasekaran P, Lab Manual of Microbiology, New Age Publishers.
3. Davis, Dulbetco, Eisen Microbiology.
4. Stanier R.Y., Ingraham, J.L., Wheelis M.L. & Painter P.R. General Microbiology, Macmillan Press Limited.
5. Hugo and Russell, Pharmaceutical Microbiology, Black Well Scientific Publication, Oxford.
6. Prescott L.M., Harley J.P. & Klien D.A. Microbiology, McGraw Hill.
7. Sykes, Disinfection and Sterilization.
8. Pelczar & Reid, Microbiology, Tata Mc Graw Hill, Delhi.

9. Virella G. Microbiology and Infectious Diseases, William & Wilkins.
10. Ananthanarayan R & Paniker CKJ, Textbook of Microbiology, Orient Longman.

BP-302 Pharmaceutical Chemistry - VI (Medicinal Chemistry - II)

Theory 3 hrs / week

Synthetic procedures of selected drugs, mode of action, uses, structure activity relationship including Physico-Chemical properties of the following classes of drugs.

UNIT I: Steroids and related drugs : Steroidal nomenclature and stereochemistry, androgens and anabolic agents, estrogens, and progestational agents, adrenocorticoids.

UNIT II: Drugs acting on the Central Nervous System: General Anesthetics, Local Anesthetics, Hypnotics and Sedatives, Opioid analgesics, anti convulsants, Antiparkinsonism drugs, CNS stimulants, Psychopharmacological agents (neuroleptics, antidepressants, anxiolytics).

UNIT III: Drugs acting on Kidney:

Diuretics and Antidiuretics

UNIT IV: Cardiovascular drugs: Antihypertensive, Antiarrhythmic, Antianginal

UNIT V: Drugs affecting blood and blood formation:

Anticoagulant and Antiplatelet drugs.

BP-352 Pharmaceutical Chemistry - VI (Medicinal Chemistry - II) Practicals 3 hrs /week

1. Workshop on stereo model use of some selected drugs.
2. Synthesis of selected drugs from the course content involving two or more steps and their spectral analysis.
3. Establishing the Pharmacopoeial standards of the drugs synthesized.

BOOKS RECOMMENDED :

1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.
2. Furniss B S, Hannaford A J, Smith P W G and Tathell A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.
3. Pharmacopoeia of India, Ministry of Health, Govt. of India.
4. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.

5. Delagado J N and Remers W A R, Eds., Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
6. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
7. Singh Harkishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
8. Nogrady, T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
9. Finar I L, Organic Chemistry, Vol I & II, ELBS/ Longman, London. 10. Thomas J..Perun," Computer –aided Drug Design methods applications'.
11. Pandi Veerapandian," Structure-Based Drug Design".

BP-303 Pharmaceutical Analysis – III

Theory 3 hrs / week

UNIT I: GLP, ISO 9000, TQM, Quality Review and Quality Documentation. Regulatory control, regulatory drug analysis, interpretation of analytical data.

UNIT II: Validation, quality audit: quality of equipment, validation of equipment, validation of analytical procedures.

UNIT III: The theoretical aspects, basic instrumentation, elements of interpretation of spectra, and applications of the following analytical techniques should be discussed:

- a. Ultraviolet and visible spectrophotometry
- b. Fluorimetry.
- c. Infrared spectrophotometry.

UNIT IV: The theoretical aspects, basic instrumentation, elements of interpretation of spectra, and applications of

- a. Nuclear Magnetic Resonance spectroscopy including  $^{13}\text{C}$  NMR.
- b. Mass Spectrometry.
- c. Flame Photometry.
- d. Emission Spectroscopy.
- e. Atomic Absorption Spectroscopy.

UNIT V: X-ray Diffraction, Radio immunoassay.

BP-353 Pharmaceutical Analysis – III

Practicals 3 hrs / week

1. Quantitative estimation of at least ten formulations containing single drug or more than one drug, using instrumental techniques.

2. Estimation of Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>++</sup> ions using flame photometry.
3. IR of samples with different functional groups (-COOH, -COOR, -CONHR; -NH<sub>2</sub>, -NHR, -OH, etc.).
4. Workshop to interpret the structure of simple organic compounds using UV, IR, NMR and MS.

#### BOOKS RECOMMENDED

1. Pharmacopoeia of India, Ministry of Health, Govt of India.
2. Becket A.H. and Stenlake J.B. Practical Pharmaceutical Chemistry Vol. I and II, The Athlone Press of the University of London.
3. Chatten L.G. A text book of Pharmaceutical Chemistry Vol. I & II Marcel, Dekker, New York.
4. Willard H.H. and Merrit L. Jr and Dean J.A., Instrumental methods of analysis Van Nostrand Renhold, New York.
5. Obonson J.W.R. Undergraduate Instrumental Analysis, Marcel Dekker Inc, New York, 1970.
6. Parikh V.H. Absorption Spectroscopy of Organic Molecules Addison-Wesley Publishing Co., London 1974.
7. Silver stein RM & Webster FX, Spectrometric Identification of Organic Compounds, John Wiley & Sons.
8. Skoog V, Principles of Instrumental Analysis, Holler-Neimen

BP-304 Pharmacology I

Theory 3 hrs / week

UNIT I: General Pharmacology: Introduction to Pharmacology, Sources of drugs, Dosage forms and routes of administration, mechanism of action, Combined effect of drugs, Factors modifying drug action, tolerance and

Pharmacokinetics. Absorption, Distribution, Metabolism and Excretion of drugs,

Principles of Basic and Clinical pharmacokinetics, Adverse Drug Reactions and

treatment of poisoning, ADME drug interactions, Bioassay of Drugs and Biological Standardization, Discovery and development of new drugs.

UNIT II: Pharmacology of Peripheral Nervous System:

- a.
- b. Neurohumoral transmission (autonomic and Somatic)

Parasympathomimetics, Parasympatholytics, Sympathomimetics, Adrenergic

- c. Receptor and neuron blocking agents, Ganglionic, stimulants and blocking agents.

Neuromuscular blocking Agents.

- d. Local anesthetic Agents.

UNIT III: Pharmacology of Central Nervous System:

a)

- b) Neurohumoral transmission in the C.N.S.

General Anesthetics.

c)

- d) Alcohols and disulfiram.

Sedatives, hypnotics, Anti-anxiety agents and Centrally acting muscle relaxants.

UNIT IV: Psychopharmacological agents (anti-psychotics) antidepressants anti maniacs and hallucinogens.

Anti-epileptics drugs. Anti-Parkinsonian Drugs.

UNIT V: Analgesics, Antipyretics, Anti-inflammatory and Anti-gout drugs.

Narcotic analgesics and antagonists. C.N .S. stimulants.

Drug Addiction and Drug Abuse.

BP-354 Pharmacology I Practicals

Practicals 4 hrs / week

1. Introduction to Experimental Pharmacology : Preparation of different solutions for experiments.

Drug dilutions, use of molar and w/v solutions in experimental pharmacology. Common laboratory animals and anesthetics used in animal studies. Commonly used instruments in experimental pharmacology. some common and standard techniques.

Bleeding and intravenous injection, intragastric administration. Procedures for rendering animals unconscious- stunning of rodents, pithing of frogs, chemical euthanasia.

2. Experiments on intact preparations

Study of different routes of administration of drugs in mice/rats. To study the effect of hepatic microsomal enzyme inhibitors and induction on the pentobarbitone sleeping time in mice.

3. Experiments on Central Nervous system: Recording of spontaneous motor activity, stereotypy, analgesia, anticonvulsant activity, anti- inflammatory activity, and muscle relaxant activity of drugs using simple experiments. .

4. Effects of autonomic drugs on rabbit's eye.



Effects of various agonists and antagonists and their characterization using isolated preparations like frog's rectus abdominis muscle " and isolated ileum preparations of rat, guinea pig and rabbit.

Use of computer simulated CDs or Video cassettes for pharmacology practical where possible.

#### BOOKS RECOMMENDED :

1. Ghosh, MN; Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta.
2. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi.
3. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi.
4. Barar F.S.K: Text Book of Pharmacology, Interpoint, New Delhi.
5. Goodman & Gilman, The Pharmacological basis of Therapeutics, Editors: J.G. Hardman, L.E. Limbird, P.B. Molinos, R.W. Ruddon and A.G. Gil, Pergamon press.
6. Katzung, B.G. Basic & Clinic Pharmacology, Prentice Hall, International..
7. Rang MP, Dale MM, Ritter JM, Pharmacology Churchill Livingstone.
8. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
9. Satoskar & Bhandarkar; Pharmacology & Pharmacotherapeutics., Popular Prakashan Pvt. Ltd. Bombay.
10. Singh, Saundar, Essentials of Pharmacology; Academia Publishers, Delhi.
11. Sheffield Biocscience Programs, U.K., ISBN 1-874758-02-6

#### BP-305 Pharmaceutical Engineering-I

Theory 3 hours/week

UNIT I: Unit Operations: Introduction, basic laws.

Fluid Flow: Types of flow, Reynold's number, Viscosity, Concept of boundary layer, basic equations of fluid flow, valves, flow meters, manometers and measurement of flow and pressure.

#### Material Handling Systems

- a. Liquid handling - Different types of pumps
- b. Gas handling-Variou types of fans, blowers and compressors.
- c. Solid handling-Bins, Bunkers, Conveyers, Air transport.

. UNIT II: Filtration and Centrifugation: Theory of filtration, filter aids, filter media, industrial filters including filter press, rotary filter, edge filter, etc. Factors affecting filtration, mathematical problems on filtration,

optimum cleaning cycle in batch filters. Principles of centrifugation, industrial centrifugal filters, and centrifugal sedimenters.

UNIT III: Crystallization: Characteristics of crystals like-purity, size, shape, geometry, habit, forms size and factors affecting them, Solubility curves and calculation of yields. Material and heat balances around Swenson Walker Crystallizer. Supersaturation theory and its limitations, Nucleation mechanisms, crystal growth. Study of various types of Crystallizer, tanks, agitated batch, Swenson Walker, Single vacuum, circulating magma and crystal Crystallizer, Caking of crystals and its prevention. Numerical problems on yields.

UNIT IV: Dehumidification and Humidity Control: Basic concepts and definition, wet bulb and adiabatic saturation temperatures, Psychrometric chart and measurement of humidity, application of humidity measurement in pharmacy, equipments for dehumidification operations.

Refrigeration and Air Conditioning: Principal and applications of refrigeration and air conditioning.

UNIT V: Material of Construction: General study of composition, corrosion, resistance, Properties and applications of the materials of construction with special reference to stainless steel and glass.

Industrial Hazards and Safety Precautions: Mechanical, Chemical, Electrical, fire and dust hazards. Industrial dermatitis, Accident records etc.

BP-355

Practicals      3 hrs / week

1. Measurement of flow of fluids and their pressure, determination number and calculation of Frictional losses.
2. Evaluation of filter media, determination of rate of filtration and study of factors affecting filtration.
3. Experiments to demonstrate applications of centrifugation.
4. Thermometers and psychrometric charts.
5. Determination of humidity - use of Dry Bulb and Wet Bulb.
6. Elementary Knowledge of Engineering Drawing - Concept of orthographic and isometric views of elevation and third angle projection. Notation and abbreviation used in engineering drawing.
7. Basic Engineering Drawing Practice - Bolts, nuts, rivetted fronts, screws, worn screws as per specification.
8. Drawing of simple pharmaceutical machinery parts.

#### BOOKS RECOMMENDED

1. Badger W.L. and Banchero J.T. Introduction to Chemical Engineering Mc Graw Hill International Book Co., London.
2. Perry R.H. & Chilton C.H. Chemical Engineers Handbook, Mc Graw Kogakusha Ltd.
3. McCabe W.L. and Smith J.C. Unit Operation of Chemical Engineering Mc Graw Hill International Book Co., London.
4. Sambhamurthy, Pharmaceutical Engineering, New Age Publishers.

5. Gavhane, K.A. "Unit Opeation-I", Nirali Prakashan.

B.Pharm Semester VI

BP-306 Pharmacology-II

Theory 3 hours/week

UNIT I Pharmacology of Cardiovascular System:

- a) Digitalis and cardiac glycosides.
- b) Antihypertensive drugs.
- c) Anti angina and Vasodilator drugs, including calcium channel blockers and beta Adrenergic antagonists.
- d) Anti arrhythmic drugs
- e) Anti-hyperlipedemic drugs
- f) Drugs used in the therapy of shock.

UNIT II Drugs Acting on the Hemopoietic System:

- a) Hematinics.
- b) Anticoagulants, Vitamin K and hemostatic agents.
- c) Fibrinolytic and anti-platelet drugs.
- d) Blood and plasma volume expanders.

UNIT III 3. Drugs actinon urinarysystem:

- a) Fluid and electrolyte balance
- b) Diuretics

UNIT IV. Autocoids :

- a) Histamine, 5-HT and their antagonists.
- b) Prostaglandins, thromboxanes and leukotrienes.
- c) Pentagastrin, Cholecystokinin, Angiotensin, Bradykinin and Substance P.

Drugs Acting on the Respiratory System:

- UNIT V
- a) Anti-asthmatic drugs including bronchodilators.
  - b) Anti-tussives and expectorants.

c) Respiratory stimulants.

BP-356 Pharmacology-II Practicals 3 hrs / week

1. Experiments on Isolated Preparations:

- a) To record the concentration response curve (CRC) of acetylcholine using rectus abdominis muscle preparation of frog.
- b) To study the effects of physostigmine and d-tubocurarine on the CRC of acetylcholine using rectus abdominis muscle preparation of frog.
- c) To record the CRC of 5-HT on rat fundus preparation.
- d) To record the CRC of histamine on guinea pig ileum preparation.
- e) To record the CRC of noradrenaline on rat anococcygeus muscle preparation.
- f) To record the CRC of oxytocin using rat uterus preparation.

2. Pharmacology of Cardiovascular System:

- a) To study the ionotropic and chronotropic effects of drugs on isolated frog heart.
- b) To study the effects of drugs on normal and hypodynamic frog heart.

3. Blood Pressure of anaesthetized Dog/Cat/Rat : To demonstrate the effects of various drugs on the B.P. and respiration including the Vasomotor Reversal of Dale and nicotinic action of acetylcholine.

BOOKS RECOMMENDED :

1. Ghosh, MN; Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta.
2. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi.
3. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi.
4. Barar FSK : Text Book of Pharmacology, Interprint, New Delhi.
5. Goodman & Gilman, The Pharmacological basis of Therapeutics, Editors:-JG Hardman, Le Limbird, PB Molinoss, RW Ruddon & AG Gil, Pergamon Press.
6. Katzung, B.G. Basic & Clinical Pharmacology, Prentice Hall, International.
7. Laurence, DR & Bannet PN; Clinical Pharmacology, Churchill Livingstone.
8. Rang MP, Date MM, Riter JM, Pharmacology Churchill Livingstone.
9. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
10. Satoskar & Bhandarkar; Pharmacology & Pharmacotherapeutics, Popular Prakashan Pvt.

Ltd., Bombay.

11. Craig, C.R. and Stitzel, R.R., Modern Pharmacology, Little Brown and Co., 1994.
12. Sheffield Bioscience Programms, U.K., ISBN,1-874758-02-6

BP-307 Pharmacognosy -III

Theory 3hrs / week

UNIT I Study of the biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of following groups of drugs containing glycosides :

- (i) Saponins :Liquorice,ginseng, dioscorea, sarsaparilla, and senega.
- (ii) Cardioactive sterols: Digitalis, squill, strophanthus and thevetia.

UNIT II Anthraquinone cathartics: Aloe, senna,rhubarb and cascara. Others:Psoralea, Ammi majus, Ammi visnaga,gentian, saffron, chirata, quassia.

UNIT III. Studies of traditionaldrugs, common vernacular names, botanical sources, morphology, chemical nature of chief constituents, pharmacology

,categories and common uses and marketed formulations of following indigenous drugs:

Amla, Kantkari, Satavari, Tylophora,Bhilawa, Kalijiri, Bach, Rasna, Punamava, Chitrack, Apamarg, Gokhru

UNIT IV. Shankhapushpi, Brahmi, Adusa, Arjuna, Ashoka, Methi,Lahsun, Palash, Guggal, Gymnema, Shilajit, Nagarmotha andNeem.

UNIT V. The holistic concept of drug administration in traditional systems of medicine. Introduction to ayurvedic preparations like Arishtas ,Asvas, Gutikas, Tailas, Chumas, Lehyas and Bhasmas.

BP-357 Pharmacognosy - III Practicals 3 hrs / week

1. Identification of crude drugs listed in theory.
2. Microscopic study of some important glycoside containing crude drugs as outlined above. Study of powdered drugs.
3. Standardization of some traditional drug formulations.

#### SUGGESTED PRACTICALS

1. Morphology and microscopy (powder) of Liquorice along with its chemical tests.

2. Morphology of Aloe and chemical tests on Aloe-extracts.
  3. Morphology and microscopy (powder) of Rhubarb
  4. Morphology of Psoralia, Ammimaius, Saffron and Chirata.
  5. Morphology of Amla, Kantkari, Shatavari and Vach.
  6. Morphology of Punarnava, Apamarg, Gokhru, and Shankhpushpi.
  7. Morphology of Brahmi, Methi, Lehsun and Palash.
  8. a) Morphology of Nagarmotha and Neem.
- b) Identification Tests for Guggul lipids.
9. To study the following standards)
    - a) Loss on drying. b) Extractive values.
    - c) Ash values.
    - d) pH of 1% solution, in water and alcohol of any Ayurvedic formulation (solid) available in the market.
  10. To perform above studies (exp. 10) in any liquid Ayurvedic formulation.
  11. Preparation of medicated oil.

#### PROJECT WORK

A report on marketed preparations based on traditional drugs mentioned in theory.

#### BOOKS RECOMMENDED :

1. Kokate C.K. "Practical Pharmacognosy" Vallabh Prakashan, New Delhi.
2. Wallis T.E. "Analytical Microscopy" J&A Churchill Ltd., London.
3. Trease, G.E., & Evans, W.C., Evans, W.C., "Pharmacognosy" Bailliere Tindall east Baorne, U.K.
4. Tyler V.E. et al : "Pharmacognosy" Lea & Febiger, Philadelphia.
5. Wallis. T.E. "Text Book of Pharmacognosy" J&A Churchill Ltd. London.
6. Qadry J.S., " Pharmacognosy" B.S.Shah Prakashan.
7. Medicinal plants of India I&II, Indian council of Medical Research, New Delhi.
8. Nadkarni A.K. Indian Materia Medica 1-2, Popular Prakashan (P) Ltd. Bombay.
9. Atal C.K. & Kapur BM. "Cultivation & utilization of Medicinal plants, RRL, Jammu.
10. Indian Herbal Pharmacopoeia, vol. I&II, ICMR & RRL, Jammu.
11. The wealth of India, Raw Materials (All volumes) Council of Scientific & Industrial Research, New Delhi.

12. Compendium of Indian Medicinal Plants I-IV, Rastogi & Malhotra.
13. Indian Ayurvedic Pharmacopoeia, Govt. of India.
14. Kokate CK, Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan.
15. Mohammed Ali, " Pharmacognosy & Plant Cultivation"

BP-308 Hospital Pharmacy

Theory 3 hrs / week

UNIT I: Organization and Structure: Organization of a hospital and hospital pharmacy, Responsibilities of a hospital pharmacist, Pharmacy and therapeutic committee, Budget preparation and Implementation.

Hospital Formulary: Contents, preparation and revision of hospital formulary.

UNIT II: Drug Store Management and Inventory Control:

- (a) Organization of drug store, Types of materials stocked, storage conditions.
- (b) Purchase and Inventory Control principles, purchase procedures, Purchase order, Procurement and stocking.

UNIT III: Drug distribution Systems in Hospitals:

- (a) Out-patient dispensing, methods adopted.
- (b) Dispensing of drugs to in-patients. Types of drug distribution systems. Charging policy, labeling.
- (c) Dispensing of drugs to ambulatory patients.
- (d) Dispensing of controlled drugs.

UNIT IV: Central Sterile Supply Unit and their Management: Types of materials for sterilization, packing of materials prior to sterilization, sterilization equipments, Supply of sterile materials.

Manufacture of Sterile and Nonsterile Products: Policy making of manufacturable items, demand and costing, personnel requirements, manufacturing practice, Master formula Card, production control, manufacturing records.

UNIT IV: Drug Information Services: Sources' of Information on drugs, disease, treatment schedules, procurement of information, Computerized services (e.g., MEDLINE), Retrieval of information, Medication error.

Records and Reports: Prescription filling, drug profile, patient medication profile, cases on drug interaction and adverse reactions, idiosyncratic cases etc.

BP-358 Hospital Pharmacy Practicals

Practicals 3 hrs / week

1. Experiments based on sterilization of various types of materials used in hospitals.
2. Practicals designed on the use of computers in Drug Information Centre, prescription filling, documentation of information on drug interaction.

3. Experiments to illustrate handling of radiopharmaceutical products, measurement of radioactivity.

#### BOOKS RECOMMENDED

1. Hasan, Hospital Pharmacy, Lea & Febiger, Philadelphia.
2. Merchant H.S. and Qadry J.S. Text Book of Hospital Pharmacy, B.S. Shah Prakashan, Ahmedabad.

#### BP-309 Pharmaceutical Engineering -II

Theory 3 hrs / week

UNIT I: Stoichiometry: Unit processes material and energy balances, molecular units,

mole fraction, tie substance, gas laws, mole volume, primary and secondary quantities, equilibrium state, rate process, steady and unsteady states, dimensionless equations, dimensionless formulae, dimensionless groups, different types of graphic representation, mathematical problems.

UNIT II: Heat Transfer: Source of heat, heat transfer, steam and electricity as heating media, determination of requirement of amount of steam/electrical energy, steam pressure, Boiler capacity, Mathematical problems on heat transfer.

Evaporation: Basic concept of phase equilibria, factor affecting evaporation, evaporators, film evaporators, single effect and multiple effect evaporators, Mathematical problems on evaporation.

UNIT III: Distillation: Rault's law, phase diagrams, volatility; simple steam and flash distillations, principles of rectification, Mc. Cabe Thiele method for calculations of number of theoretical plates, Azeotropic and extractive distillation. Mathematical problems on distillation.

Drying: Moisture content and mechanism of drying, rate of drying and time of drying calculations; classification and types of dryers, dryers used in pharmaceutical industries. special drying methods. Mathematical problems on drying.

UNIT IV: Size Reduction and Size Separation: Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mills including ball mill, hammer mill, fluid energy mill etc.

Mixing: Theory of mixing, solid-solid, solid-liquid and liquid-liquid mixing equipments.

UNIT V: Automated Process Control Systems: Process variables, temperature, pressure, flow, level and vacuum and their measurements. Elements of automatic process control and introduction to automatic process control systems. Elements of computer aided manufacturing (CAM).

Reactors and fundamentals of reactors design for chemical reactions.

#### BP-359 Pharmaceutical Engineering -II Practicals

Practicals 3 hrs/ week

1. Determination of overall heat transfer coefficient.
2. Determination of rate of evaporation.
3. Experiments based on steam, extractive and azeotropic distillations.



4. Determination of rate of drying, free moisture content and bound moisture content.
5. Experiments to illustrate the influence of various parameters on the rate of drying.
6. Experiments to illustrate principles of size reduction, Laws governing energy and power requirements of size Reduction.
7. Experiments to illustrate solid-solid mixing, determination of mixing efficiency using different types of mixers.

#### BOOKS RECOMMENDED :

1. Badger W.L. and Banchero J.T. Introduction to Chemical Engineering Mc Graw Hill International Book Co., London.
2. Perry R.H. & Chilton C.H. Chemical Engineers Handbook, Mc Graw Kogakusha Ltd.
3. McCabe W.L. and Smith J.C. Unit Operation of Chemical Engineering Mc Graw Hill International Book Co., London.
4. Gavhane, K.A. "Unit Operation-II", Nirali Prakashan.
5. Sambhamurthi Pharmaceutical Engineering, New Age Publishers.

BP-310 Biochemistry Theory 3 hrs / week

UNIT I: Biochemical organization of the cell and transport processes across cell membrane.

The concept of free energy, determination of change in free energy - from equilibrium constant and reduction potential, bioenergetics, production of ATP and its biological significance.

Enzymes: Nomenclature, enzyme kinetics and its mechanism of action, mechanism of inhibition, enzymes and iso-enzymes in clinical diagnosis.

Co-enzymes: Vitamins as co-enzymes and their significance. Metals as co-enzymes and their significance.

UNIT II: Carbohydrate Metabolism: Conversion of polysaccharide to glucose-1-phosphate, Glycolysis and fermentation and their regulation, Gluconeogenesis and glycogenolysis, Metabolism of galactose and galactosemia, Role of sugar nucleotides in biosynthesis, and Pentosephosphate pathway.

The Citric Acid Cycle: Significance, reactions and energetic of the cycle, Amphibolic role of the cycle, and Glyoxalic acid cycle.

Lipids Metabolism : Oxidation of fatty acids, oxidation & energetic,  $\alpha$ -oxidation,  $\omega$ -oxidation, Biosynthesis of ketone bodies and their utilization. Biosynthesis of saturated and unsaturated fatty acids, Control of lipid metabolism, Essential fatty acids & eicosanoids (prostaglandins, thromboxanes and leukotrienes), phospholipids, and sphingolipids.

UNIT III: Biological Oxidation : Redox-potential, enzymes and co-enzymes involved in oxidation reduction & its control, The respiratory chain, its role in energy capture and its control, Energetics of oxidative phosphorylation, Inhibitors of respiratory chain and oxidative phosphorylation Mechanism of oxidative phosphorylation.

Nitrogen & Sulphur Cycle : Nitrogen fixation. ammonia assimilation, nitrification and nitrate assimilation, Sulphate activation. sulphate reduction. Incorporation of sulphur in organic compounds, Release of sulphur from organic compounds.

#### UNIT IV:

Metabolism of Ammonia and Nitrogen Containing Monomers: Nitrogen balance. Biosynthesis of amino acids. Catabolism of amino acids. Conversion of amino acids to specialized products, Assimilation of ammonia. Urea. cycle, metabolic disorders of urea cycle. Metabolism of sulphur containing amino acids. Porphyrin biosynthesis. formation of bile pigments. hyperbilirubinemia. Purine biosynthesis. Purine nucleotide interconversion. Pyrimidine biosynthesis. and Formation of deoxyribonucleotides.

#### UNIT V: Biosynthesis of Nucleic Acids: Brief introduction of genetic organization of the

mammalian genome, alteration and rearrangements of genetic material,

Biosynthesis of DNA and its replication. Mutation. Physical & chemical mutagenesis / carcinogenesis. DNA repair mechanism. Biosynthesis of RNA. Genetic Code and Protein Synthesis: Genetic code. Components of protein synthesis. and Inhibition of protein synthesis. Brief account of genetic engineering and polymerase chain reactions.

Regulation of gene expression

BP-360 Biochemistry Practicals

Practicals 3 hrs / week

1. Preparation of standard buffers (citrate, phosphate and carbonate) and measurement of pH.
2. Titration curve for amino acids.
3. Separation of amino acids by two dimensional paper chromatography and gel electrophoresis.
4. The separation of lipids by TLC.
5. Separation of serum proteins by electrophoresis on cellulose acetate.
6. Quantitative estimation of amino acids.
7. Quantitative estimation of proteins.
8. The identification of c-terminal amino acids of a protein.
9. The determination of glucose by means of the enzyme glucose. oxidase.
10. The isolation and assay of glycogen from the liver and skeletal muscle of rats.
11. Enzymatic hydrolysis of glycogen by. alpha- and beta-amylases.
12. The isolation and determination of RNA and DNA.
13. Effect of temperature on the activity of alpha - amylase.

14. Estimation of SGOT, SGPT, ALP and BRN in the serum

BP-311 Pharmaceutical Management

Theory 3 hours/week

UNIT I: Concept of Management: Administrative Management (Planning, Organizing, Staffing, Directing and Controlling), Entrepreneurship development, Operative Management (Personnel, Materials, Production, Financial, Marketing, Time/space, Margin/Morale). Principles of Management (Co-ordination, Communication, Motivation, Decision-making, leadership, Innovation, Creativity, Delegation of Authority / Responsibility, Record Keeping). Identification of key points to give maximum thrust for development and perfection.

UNIT II: Accountancy: Principles of Accountancy, Ledger posting and book entries, preparation of trial balance, columns of a cash book, Bank reconciliation statement, rectification of errors, Profits and loss account, balance sheet, purchase, keeping and pricing of stocks, treatment of cheques, bills of exchange, promissory notes and hundies, documentary bills.

Economics: Principles of economics with special reference to the laws of demand and supply, demand schedule, demand curves, labor welfare, general principles of insurance and inland and foreign trade, procedure of exporting and importing goods.

UNIT III: Pharmaceutical Marketing: Functions, buying, selling, transportation, storage, finance, feedback, information, channels of distribution, wholesale, retail, departmental store, multiple shop and mail order business.

Salesmanship: Principles of sales promotion, advertising, ethics of sales, merchandising, literature, detailing. Recruitment, training, evaluation, compensation to the pharmacist.

UNIT IV: Market Research:

(a) Measuring & Forecasting Market Demands-Major concept in demand measurement, Estimating current demand, Geodemographic analysis, Estimating industry sales, Market share & Future demand.

(b) Market Segmentation & Market Targeting.

UNIT V: Materials Management: A brief exposure or basic principles of materials management-major areas, scope, purchase, stores, inventory control and evaluation of materials management.

Production Management: A brief exposure of the different aspects of Production Management-Visible and Invisible inputs, Methodology of Activities, Performance Evaluation Technique, Process-Flow, Process Knowhow, Maintenance Management.

BP312 Elective/seminar (Literature Review)

Theory 2hrs/week

Any one "ELECTIVE " may be taken from the following specific areas of Pharmaceutical Discipline like:

Quality Assurance,

Medicinal Plant Biotechnology , Packaging Technology, Medicinal Chemistry,

Pharmaceutical Industrial Management, Microbiology.

B.Pharm Semester VII

BP-401 Pharmaceutics - V (Pharmaceutical Technology--II)

Theory 3 hrs /week

UNIT I: Capsules: Advantages and disadvantages of capsule dosage form, material for production of hard gelatin capsules, size of capsules, method of

capsule filling,

soft gelatin, capsule shell and capsule content, importance of base absorption and minimum/gm factors in soft capsules, quality control, stability testing and storage of capsule dosage forms.

UNIT II: Micro-encapsulation: Types of microcapsules, importance of microencapsulation

in pharmacy, microencapsulation by phase separation, coacervation, multi orifice, spray drying, spray congealing, polymerization complex emulsion, air suspension

Technique, coating pan and other techniques, evaluation of micro capsules.

a) UNIT III: Tablets:

Formulation of different types of tablets, granulation, technology on large-scale by various techniques, physics of tablets making, different types of tablet

b) Compression machinery and the equipments employed evaluation of tablets.

Coating of Tablets : Types of coating, film forming materials, formulation of

coating solution, equipments for coating, coating process, evaluation of coated tablets.

c) Stability kinetics and quality assurance.

a) UNIT IV: Parenteral Products:

Preformulation factors, routes of administration, water for injection, pyrogenicity, non aqueous vehicles, isotonicity and methods of its adjustment

b)

c) Formulation details, containers and closures and selection.

Prefilling treatment, washing of containers and closures, preparation of solution

and suspensions, filling and closing of ampoules, vials, infusion fluids, lyophilization & preparation of sterile powders, equipment for large scale

d) manufacture and evaluation of parenteral products.

Aseptic Techniques-source of contamination and methods of prevention, Design

e) of aseptic area, Laminar flow bench services and maintenance.

Sterility testing of pharmaceuticals.

UNIT V: Packaging of Pharmaceutical Products: Packaging components, types, specifications and methods of evaluation, stability aspects of packaging, choice of containers, legal and other official requirements for containers, package testing.

BP-451

3 hrs / week

Pharmaceutical Technology--II Practicals

1. Experiments to illustrate preparation, stabilization, physical and biological evaluation of pharmaceutical products like powders, capsules, tablets, parenterals, micro capsules, surgical dressing etc.
2. Evaluation of materials used in pharmaceutical packaging.

BP-402 Pharmaceutical Chemistry VII

Theory 3 hrs / week

UNIT I: Chemical and spectral approaches to simple molecules of natural origin, Concept of stereoisomerism taking examples of natural products.

UNIT II: Chemistry, biogenesis and pharmacological activity of medicinally important monoterpenes, sesquiterpenes, diterpenes, and triterpenoids.

Carotenoids:  $\alpha$ -carotenoids,  $\beta$ -carotenes, vitamin A, Xanthophylls of medicinal importance.

UNIT III: Glycosides : Chemistry and biosynthesis of digitoxin, digoxin, hecogenin, sennosides, diosgenin and sarasapogenin.

UNIT IV: Alkaloids: Chemistry, biogenesis and pharmacological activity of atropine and related compounds; quinine, reserpine, morphine, papaverine, ephedrine, ergot and vinca alkaloids.

UNIT V: Chemistry and biogenesis of medicinally important lignans and quassanoids, flavonoids. Chemistry and therapeutic activity of penicillin, streptomycin and tetracyclines.

BP-452 Pharmaceutical Chemistry VII Practicals

3 hrs / week

- i) Laboratory experiments on isolation, separation, purification of various groups of chemical constituents of pharmaceutical significance.
- ii) Exercises on paper and thin layer chromatographic evaluations of herbal drug constituents.

BP-403 Pharmaceutics-VI (Dosage Form Design) 3 hrs / week

Theory

UNIT I: Preformulation studies:

- a) Study of physical properties of drug like physical form, particle size, shape, density, wetting dielectric constant. Solubility, dissolution and organoleptic property and their effect on formulation, stability and bioavailability.
- b) Study of chemical properties of drugs like hydrolysis, oxidation, reduction, racemization, polymerization etc., and their influence on formulation and stability of products.
- c) Study of pro-drugs in solving problems related to stability, bioavailability and elegance of formulations.

UNIT II: Design, development and process validation methods for pharmaceutical operations involved in the production of pharmaceutical products with special reference to tablets, suspensions.

UNIT III: Stabilization and stability testing protocol for various pharmaceutical products.

UNIT IV: Performance evaluation methods

- a) In-vitro dissolution studies for solid dosage forms methods, interpretation of dissolution data.
- b) Bioavailability studies and bioavailability testing protocol and procedures.
- c) In-vivo methods of evaluation and statistical treatment.

UNIT V: GMP and quality assurance, Quality audit. Design, development, production and evaluation of controlled released formulations.

BP-453 Pharmaceutics-VI (Dosage Form Design Practicals) 3 hrs / week

1. Preformulation studies including drug-excipient compatibility studies, effect of stabilizers, preservatives etc. in dosage form design.
2. Experiments demonstrating improvement in bioavailability through prodrug concept.
3. Stability evaluation of various dosage forms and their expiration dating.
4. Dissolution testing and data evaluation for oral solid dosage forms.

6. In -vivo bioavailability evaluation from plasma drug concentration and urinary excretion curves.
7. Design, development and evaluation of controlled release formulation

BP-404 Biopharmaceutics and Pharmacokinetics

Theory 3 hrs / week

UNIT I: Introduction to Biopharmaceutics and Pharmacokinetics and their role in formulation development and clinical setting.

UNIT II: Biopharmaceutics

- 2.1. Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion and pinocytosis).
- 2.2. Factors influencing absorption - Physicochemical, physiological and pharmaceutical.
- 2.3. Drug distribution in the body, plasma protein binding.

UNIT III: Pharmacokinetics :

- 3.1. Significance of plasma drug concentration measurement. 3.2. Compartment model-Definition and Scope.
- 3.3. Pharmacokinetics of drug absorption - Zero order and first order absorption rate constant using Wagner - Nelson and Loo- Reigelman method.
- 3.4. Volume of distribution and distribution coefficient.
- 3.5. Compartment kinetics - One compartment and two compartment models. Determination of pharmacokinetic parameters from plasma and urine data after drug administration by intravascular and o'al route.
- 3.6. Curve fitting (method of Residuals), regression procedures.
- 3.7. Clearance concept, Mechanism of renal clearance, clearance ratio, determination of renal clearance.
- 3.8. Extraction ratio, hepatic clearance, biliary excretion, Extrahepatic circulation.
- 3.9. Non-linear pharmacokinetics with special reference to one compartment model after 1. V drug administration, Michaelis Menten Equation, detection of non- linearity (Saturation mechanism).

UNIT IV: Clinical Pharmacokinetics:

- 4.1. Definition and scope
- 4.2. Dosage adjustment in patients with and without renal and hepatic failure.
- 4.3. Design of single dose bio-equivalence study and relevant statistics.
- 4.4. Pharmacokinetic drug interactions and their significance in combination therapy.

UNIT V: Bioavailability and bioequivalence :

- 5.1. Measures of bioavailability, C<sub>max</sub>, t<sub>max</sub>, and Area Under the Curve (AUC).
- 5.2. Design of single dose bioequivalence study and relevant statistics.
- 5.3. Review of regulatory requirements for conduction of bioequivalent studies.

BP-454 Biopharmaceutics and Pharmacokinetics Practicals      3hrs / week

1. Experiments designed for the estimation of various pharmacokinetic parameters with given data.
2. Analysis of biological specifications for drug content and estimation of the pharmacokinetic parameters.
3. In vitro evaluation of different dosage forms for drug release.
4. Absorption studies - in- vitro and in -situ.
5. Statistical treatment of pharmaceutical data.

BP-405

Pharmacognosy - IV

Theory 3 hrs / week

UNIT I: Systematic study of source, cultivation, collection, processing, commercial

varieties, chemical constituents, substitutes, adulterants, uses, diagnostic

macroscopic and microscopic features and specific chemical tests of following

a) alkaloid containing drugs:

Pyridine - piperidine: Tobacco, areca and lobelia.

b)

c) Tropane: Belladonna, hyoscyamus, datura, duboisia, coca and withania

Quinoline and isoquinoline : Cinchona, ipecac, opium.

d)

e) Indole : Ergot, rauwolfia, catharanthus, nux-vomica and physostigma

Imidazole: Pilocarpus

f)

g) Steroidal: Veratrum and kurchi

Alkaloidal amine: Ephedra and colchicum.

h)



i) Glycoalkaloid: Solanum.

Purines: Coffee, tea and cola.

UNIT II: Role of medicinal and aromatic plants in national economy.

UNIT III: Biological sources, preparation, identification tests and uses of the enzymes: Diastase, papain, pepsin, trypsin, pancreatin.

UNIT IV: General techniques of biosynthetic studies and basic metabolic pathways.

introduction to biogenesis of secondary metabolites of pharmaceutical importance.

UNIT I: Iant bitters and sweeteners; Introduction, classification and study of different chromatographic methods and their applications in evaluation of herbal drugs.

BP-455 Pharmacognosy – IV Practicals

Practicals      3 hrs /week

- i) Identification of crude drugs listed above.
- ii) Microscopic study of characters of eight - selected drugs given in theory in entire and powdered form.
- iii) Chemical evaluation of powdered drugs and enzymes.
- iv) Chromatographic studies of some herbal constituents.

BP-406 Clinical Pharmacy and Therapeutics

Theory 3 hrs / week

UNIT I: Introduction to Clinical Pharmacy.

UNIT II: Basic Concepts of Pharmacotherapy.

a) Clinical Pharmacokinetics and individualization of Drug Therapy. b) Drug Delivery Systems and their Biopharmaceutic & Therapeutic

Considerations.

- c) Drug Use During Infancy and in the Elderly (Pediatrics & Geriatrics). d) Drug use during Pregnancy.
- c) Drug induced Diseases.
- d) The Basics of Drug Interactions.
- g) General Principles of Clinical Toxicology"
- h) Interpretation of Clinical Laboratory Tests.

UNIT III: Important Disorders of Organ Systems and their Management:

- a) Cardiovascular Disorders-Hypertension, Congestive Heart Failure, Angina, Acute Myocardial Infarction, Cardiac arrhythmias.
- b) CNS Disorders: Epilepsy, Parkinsonism, Schizophrenia, Depression. c) Respiratory Disease-Asthma.
- d) Gastrointestinal Disorders-Peptic ulcer, Ulcerative colitis, Hepatitis, Cirrhosis.
- e) Endocrine Disorders-Diabetes mellitus and Thyroid Disorders.
- f) Infectious Diseases-Tuberculosis, Urinary Tract Infection, Enteric Infections, Upper Respiratory Infections.
- g) Hematopoietic Disorders-Anemias.
- h) Joint and Connective Tissue Disorders-Rheumatic Diseases, Gout and Hyperuricemia.
- i) Neoplastic Diseases- Acute Leukaemias, Hodgkin's disease.

UNIT IV: Therapeutic Drug Monitoring

UNIT V: Concept of Essential Drugs and Rational Drug use.

B.Pharm Semester VIII

BP407 24 credits

Industrial Training & Project Work

The Students of B.Pharm VIII Semester will undergo Industrial Training and Project Work at a reputed Pharmaceutical Manufacturing Facility.

- ☐ The Industrial Project Duration will extend from 1st January till 15th May.
- ☐ The student has to submit a Letter of Joining the Training within first 15 days to HOD, School of Pharmacy, LU.
- ☐ The student shall need to submit Monthly Attendance Report and Progress Report during the entire duration of the Project Work endorsed by the Industrial Guide.
- ☐ The student will be allocated one internal guide from amongst the faculty of School of Pharmacy by the HOD and one Industrial guide (external) by the Industry/Company where he/she is doing the project work.
- ☐ The student shall remain in continuous contact of the Internal Guide pertaining to the discussions about the progress of training and project work. The Internal Guide will monitor the student activities and shall maintain proper documentation. The student should get the consent of the Internal Guide about the approval of the Title of the Project Work.
- ☐ The student has to submit an Industrial Research Project Report in hard bound form (04 copies) on or before the 7th June for evaluation. The project report will be concise and focusing on the problem and its outcomes along

with observations and results. It should be printed on single side, A4 size bond paper incorporating figures, graphs, spectras wherever necessary.

- ☐ The student shall showcase the work at seminars/conferences with due permission from Industry and Institute. The student shall publish the work in consultation with internal, external guides and HOD, School of Pharmacy, LU.
- ☐ Soon after submission of the Project Report it shall be evaluated at School of Pharmacy by an external expert and the HOD on various research and academic criterias along with a Project Submission Presentation by the student in front of the Evaluation Committee.



D. Pharma			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	DP 101	Pharmaceutics-I	3	0	0	3
2	DP102	Pharmaceutical Chemistry	3	0	0	3
3	DP 103	Pharmacognosy	3	0	0	3
4	DP 104	Biochemistry and Clinical Pathology	3	0	0	3
5	DP 105	Human Anatomy and Physiology	3	0	0	3
6	DP 106	Health Education and Community Pharmacy	3	0	0	3
7	PD 191A	Hobby Club	0	1	0	1
PRACTICAL						
1	DP 151	Pharmaceutics-I Practical	0	0	4	3
2	DP 152	Pharmaceutical Chemistry Practical	0	0	3	2
3	DP 153	Pharmacognosy Practical	0	0	3	2
4	DP 154	Biochemistry and Clinical Pathology Practical	0	0	2	1
5	DP 155	Human Anatomy and Physiology Practical	0	0	2	1
Total			18	1	14	28

D.Pharma			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	DP 201	Pharmaceutics-II	3	0	0	3
2	DP202	Pharmaceutical Chemistry-II	4	0	0	4
3	DP 203	Pharmacology and Toxicology	3	0	0	3
4	DP 204	Pharmaceutical Jurisprudence	2	0	0	2
5	DP 205	Drug Store and Business Management	3	0	0	3
6	DP 206	Hospital and Clinical Pharmacy	3	0	0	3
7	PD151	Basics of computer fundamentals	2	0	0	2
PRACTICAL						
1	DP 251	Pharmaceutics-II Practical	0	0	4	3
2	DP 252	Pharmaceutical Chemistry-II Practical	0	0	3	2
3	DP 253	Pharmacology Practical	0	0	2	1
4	DP 256	Hospital and Clinical Pharmacy Practical	0	0	2	1
Total			20	0	11	27

### SYLLABUS FOR D. PHARM

SYLLABUS (as per PCI Education Regulations 1991) DIPLOMA IN PHARMACY (PART-I)

DP 101 PHARMACEUTICS-I

Theory (75 hours)

1. Introduction of different dosage forms. Their classification with examples-their relative applications. Familiarisation with new drug delivery systems.
2. Introduction to Pharmacopoeias with special reference to the Indian Pharmacopoeia.
3. Metrology—Systems of weights and measures. Calculations including conversion from one to another system. Percentage calculations and adjustments of products. Use of alligation method in calculations, Isotonic solutions.
4. Packing of Pharmaceuticals—Desirable features of a container—types of containers. Study of glass and plastics as materials for containers and rubber as material for closures-their merits and demerits. Introduction to aerosol packaging.
5. Size reduction Objectives, and factors affecting size reduction, methods of size reduction—Study of Hammer mill, Ball mill, Fluid Energy Mill and Disintegrator.
6. Size separation—Size separation by sifting. Official Standard for powders. Sedimentation methods of size separation. Construction and working of cyclone separator.
7. Mixing and Homogenisation—Liquid mixing and powder mixing, Mixing of semisolids, Study of Silverson Mixer—Homogeniser, Planetary Mixer; Agitated powder mixer; Triple Roller Mill; Propeller Mixer, Colloid Mill and Hand Homogeniser. Double cone mixer.
8. Clarification and Filtration-Theory of filtration, Filter media; Filter aids and selection of filters. Study of the following filtration equipments—Filter Press, Sintered Filters, Filter Candles, Metafilter
9. Extraction and Galenicals—
  - (a) Study of percolation and maceration and their modification, continuous hot extraction—Applications in the preparation of tinctures and extracts.
  - (b) Introduction to Ayurvedic dosage forms.
10. Heat processes Evaporation—Definition Factors affecting evaporation-Study of evaporating still and Evaporating Pan.
11. Distillation—Simple distillation and Fractional distillation; Steam distillation and vacuum distillation. Study of vacuum still, preparation of Purified Water I.P. and water for injection I.P. Construction and working of the still used for the same.

12. Introduction to drying processes—Study of Tray Dryers: Fluidized Bed Dryer, Vacuum Dryer and Freeze Dryer.

13. Sterilization—Concept of sterilization and its differences from disinfection-Thermal resistance of micro—organisms. Detailed study of the following sterilization process.

- (i) Sterilization with moist heat,
- (ii) Dry heat sterilization,
- (iii) Sterilization by radiation,
- (iv) Sterilization by filtration and
- (v) Gaseous sterilization.

Aseptic techniques. Application of sterilization processes in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.

14. Processing of Tablets-Definition; Different types of compressed tablets and their properties. Processes involved in the production of tablets; Tablets excipients; Defects in tablets. Evaluation of Tablets; Physical Standards including Disintegration and Dissolution. Tablet coating—sugar coating; film coating, enteric coating and microencapsulation (Tablet coating may be dealt in an elementary manner.)

15. Processing of Capsules—Hard and soft gelatin capsules; different sizes capsules; filling of capsules; handling and storage of capsules, Special applications of capsules.

16. Study of immunological products like sera vaccines, toxoids & their preparations.

DP 151 PRACTICAL (100 hours)

Preparation (minimum number stated against each) of the following categories illustrating different techniques

involved.

- |    |                       |   |
|----|-----------------------|---|
| 1. | Aromatic waters       | 3 |
| 2. | Solutions             | 4 |
| 3. | Spirits               | 2 |
| 4. | Tinctures             | 4 |
| 5. | Extracts              | 2 |
| 6. | Creams                | 2 |
| 7. | Cosmetic preparations | 3 |

- |     |   |   |
|-----|---|---|
| 8.  | Capsules                                  | 2 |
| 9.  | Tablets                                   | 2 |
| 10. | Preparations involving sterilization      | 2 |
| 11. | Ophthalmic preparations                   | 2 |
| 12. | Preparations involving aseptic techniques | 2 |

Books Recommended : (Latest editions)

1. Remington's Pharmaceutical Sciences. 2. The Extra Pharmacopoeia-Martindale.

## DP 102 PHARMACEUTICAL CHEMISTRY

Theory (75 hours)

1. General discussion on the following inorganic compounds including important physical and chemical properties, medicinal and Pharmaceutical uses, storage conditions and chemical incompatibility.

(A) Acids, bases and buffers Boric acid\*, Hydrochloric acid, strong ammonium hydroxide, Calcium hydroxide, Sodium hydroxide and official buffers.

(B) Antioxidants—Hypophosphorous acid, Sulphur dioxide, Sodium bisulphite, Sodium metabisulphite, Sodium thiosulphate, Nitrogen and Sodium Nitrite.

(C) Gastrointestinal agents--

(i) Acidifying agents Dilute hydrochloric acid.

(ii) Antacids-Sodium bicarbonate, Aluminium hydroxide gel, Aluminium Phosphate, Calcium carbonate, Magnesium carbonate, Magnesium trisilicate, Magnesium oxide, Combinations of antacid preparations.

(iii) Protectives and Adsorbents-Bismuth subcarbonate and Kaolin.

(iv) Saline Cathartics-Sodium potassium tartrate and Magnesium sulphate.

(D) Topical Agents-

(i) Protectives-Talc, Zinc Oxide, Calamine, Zinc stearate, Titanium dioxide, Silicone polymers.

(ii) Antimicrobials and Astringents—Hydrogen peroxide\*, Potassium permanganate, Chlorinated lime, Iodine, Solutions of Iodine, Povidone-iodine, Boric acid, Borax. Silver nitrate, Mild silver protein, Mercury, Yellow mercuric oxide, Ammoniated mercury.

(iii) Sulphur and its compounds—Sublimed sulphur precipitated sulphur, selenium sulphide.

(iv) Astringents:-Alum and Zinc Sulphate.

- (E) Dental Products—Sodium Fluoride, Stannous Fluoride, Calcium carbonate, Sodium metaphosphate, Dicalcium phosphate, Strontium chloride, Zinc chloride.
  - (F) Inhalants—Oxygen, Carbon dioxide, Nitrous oxide.
  - (G) Respiratory stimulants—Ammonium Carbonate.
  - (H) Expectorants and Emetics—Ammonium chloride , \*Potassium iodide, Antimony potassium tartrate.
  - (I) Antidotes-Sodium nitrate.
2. Major Intra and Extracellular electrolytes-
- (A) Electrolytes used for replacement therapy-Sodium chloride and its preparations, Potassium chloride and its preparations.
  - (B) Physiological acid-base balance and electrolytes used-Sodium acetate, Potassium acetate, Sodium bicarbonate injection, Sodium citrate, Potassium citrate, Sodium lactate injection, Ammonium chloride and its injection.
  - (C) Combination of oral electrolyte powders and solutions.
3. Inorganic Official compounds of Iron, Iodine, and, Calcium Ferrous Sulfate and Calcium gluconate.
4. Radio pharmaceuticals and Contrast media-Radio activity-Alpha, Beta and Gamma Radiations, Biological effects of radiations, Measurement of radio activity, G. M. Counter Radio isotopes their uses, storage and precautions with special reference to the official preparations.

Radio opaque Contrast media—Barium sulfate.

5. Quality control of Drugs and Pharmaceuticals-Importance of quality control, significant errors, methods used for quality control, sources of impurities in Pharmaceuticals, Limit tests for Arsenic, chloride, sulphate, Iron and Heavy metals.
6. Identification tests for cations and anions as per Indian Pharmacopoeia.

DP 152 PRACTICAL (75 hours)

- 1. Identification tests for inorganic compounds particularly drugs and pharmaceuticals.
- 2. Limit test for chloride, sulfate, Arsenic, Iron and Heavy metals.
- 3. Assay of inorganic Pharmaceuticals involving each of the following methods of compounds marked with (\*) under theory.
  - a. Acid-Base titrations (at least 3)
  - b. Redox titrations (One each of Permanganometry and iodimetry)



- c. Precipitation titrations (at least 2)
- d. Complexometric titrations (Calcium and Magnesium)

Book recommended (Latest editions)

Indian Pharmacopoeia.

## DP103 PHARMACOGNOSY

Theory (75 hours)

1. Definition, history and scope of Pharmacognosy including indigenous system of medicine.
2. Various systems of classification of drugs of natural origin.
3. Adulteration and drug evaluation; significance of Pharmacopoeial standards.
4. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.
5. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.
  - (a) Laxatives: Aloes, Rhubarb, Castor oil, Ispaghula, Senna.
  - (b) Cardiotonics-Digitalis, Arjuna.
  - ® Carminatives & G.I. regulators-Umbelliferous fruits, Coriander, Fennel, Ajowan, Cardamom Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.
  - (d) Astringents—Catechu.
  - (e) Drugs acting on nervous system-Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux vomica.
  - (f) Antihypertensives-Rauwolfia.
  - (g) Antitussives-Vasaka, Tolu balsam, Tulsi.
  - (h) Antirheumatics-Guggul, Colchicum.
  - (i) Antitumour-Vinca.
  - (j) Antileprotics-Chaulmoogra Oil.
  - (k) Antidiabetics –Pterocarpus, Gymnema, Sylvestro.
  - (l) Diuretics—Gokhru, Punarnava.
  - (m) Antidysentrics-Ipecacuanha

- (n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.
  - (o) Antimalarials—Cinchona.
  - (p) Oxytocics-Ergot.
  - (q) Vitamines-Shark liver Oil and Amla.
  - ® Enzymes-Papaya, Diastase, Yeast.
  - (s) Perfumes and flavouring agents-Peppermint Oil, Lemon Oil, Orange Oil, Lemon grass Oil, Sandalwood.
  - (t) Pharmaceutical aids-Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.
  - (u) Miscellaneous-Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhpusphi, Pyrethrum, Tobacco.
6. Collection and preparation of crude drug for the market as exemplified by Ergot, opium, Rauwolfia, Digitalis, Senna.
7. Study of source, preparation and identification of fibres used in sutures and surgical dressings—cotton, silk, wool and regenerated fibre.
8. Gross anatomical studies of Senna, Datura, Cinnamon, Cinchona, Fennel, Clove, Ginger, Nuxvomica & Ipecacuanha.

#### DP153 PRACTICAL (75 hours)

- 1. Identification of drug by morphological characters.
- 2. Physical and chemical tests for evaluation of drugs wherever applicable.
- 3. Gross anatomical studies (t.s) of the following drugs: Senna, Datura, Cinnamon, Cinchona, Coriander, Fennel, Clove, Ginger, Nuxvomica, Ipecacuanha.
- 4. Identification of fibres and surgical dressings.

#### DP104 BIOCHEMISTRY AND CLINICAL PATHOLOGY

##### Theory (50 hours)

- 1. Introduction to biochemistry.
- 2. Brief chemistry and role of proteins, polypeptides and amino acids, classification, Qualitative tests, Biological value, Deficiency diseases.
- 3. Brief chemistry and role of Carbohydrates, Classification, qualitative tests, Diseases related to carbohydrate metabolism.

4. Brief chemistry and role of Lipids, Classification, qualitative tests. Diseases related to lipids metabolism.
5. Brief chemistry and role of Vitamins and Coenzymes.
6. Role of minerals and water in life processes.
7. Enzymes : Brief concept of enzymic action. Factors affecting it. Therapeutic and pharmaceutical importance.
8. Brief concept of normal and abnormal metabolism of proteins, carbohydrates and lipids.
9. Introduction to pathology of blood and urine.
  - (a) Lymphocytes and Platelets, their role in health and disease.
  - (b) Erythrocytes Abnormal cells and their significance.
  - (c) Abnormal constituents of urine and their significance in diseases.

DP 154 PRACTICAL (75 hours)

1. Detection and identification of Proteins, Amino acids, Carbohydrates and lipids.
2. Analysis of normal and abnormal constituents of Blood and Urine (Glucose, Urea, Creatine, creatinine, cholesterol, alkaline phosphatase, acid phosphatase, Bilirubin, SGPT, SGOT, Calcium, Diastase, Lipase).
3. Examination of sputum and faeces (microscopic and staining).
4. Practice in injecting drugs by intramuscular, subcutaneous and intravenous routes. Withdrawal of blood samples.

DP105 HUMAN ANATOMY AND PHYSIOLOGY

THEORY (75 hours)

1. Scope of Anatomy and Physiology.

Definition of various terms used in Anatomy

2. Structure of cell, function of its components with special reference to mitochondria and microsomes.
3. Elementary tissues of the body. i.e epithelial tissue, muscular tissue, connective tissue and nervous tissue.
4. Structure and function of skeleton. Classification of joints and their function, Joint disorder.
5. Composition of blood, functions of blood elements. Blood group and coagulation of blood. Brief information regarding disorders of blood.

6. Name and functions of lymph glands.
7. Structure and functions of various parts of the heart. Arterial and venous systems with special reference to the names and positions of main arteries and veins. Blood pressure and its recording. Brief information about cardiovascular disorders.
8. Various parts of respiratory system and their functions. Physiology of respiration.
9. Various parts of urinary system and their functions, structure and functions of kidney. Physiology of Urine formation. Pathophysiology of renal diseases and oedema.
10. Structure of skeletal muscle. Physiology of muscle contraction, Names, position, attachments and functions of various skeletal muscles. Physiology of neuromuscular junction.
11. Various parts of central nervous system, brain and its parts, functions and reflex action. Anatomy and Physiology of autonomic nervous system.
12. Elementary knowledge of structure and functions of the organs of taste, smell, ear, eye and skin. Physiology of pain.
13. Digestive system; names of the various parts of digestive system and their functions. Structure and functions of liver, physiology of digestion and absorption.
14. Endocrine glands and Hormones. Locations of the glands, their hormones and functions. Pituitary, thyroid, Adrenal and Pancreas.
15. Reproductive system -Physiology and Anatomy of Reproductive system.

DP155 PRACTICAL (50 hours)

1. Study of the human skeleton.
2. Study with the help of charts and models of the following systems and organs:
  - (a) Digestive system.
  - (b) Respiratory system.
  - (c) Cardiovascular system.
  - (d) Urinary system.
  - (e) Reproductive system.
  - (f) Nervous system.
  - (g) Eye.
  - (h) Ear.

3. Microscopic examination of epithelial tissue, cardiac muscle, smooth muscle, skeletal muscle. Connective tissue and nervous tissues.
4. Examination of blood films for TLC, DLC and malarial parasite.
5. Determination of clotting time of blood, erythrocyte sedimentation rate and Hemoglobin value.
6. Recording of body temperature, pulse, heart rate, blood pressure and ECG.

DP 106 HEALTH EDUCATION AND COMMUNITY PHARMACY

Theory (50 hours)

1. Concept of health –Definition of physical health, mental health, social health, spiritual health determinants of health, indicators of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.
2. Nutrition and health –Classification of foods requirements, disease induced due to deficiency of proteins, Vitamins and minerals-treatment and prevention.
3. Demography and family planning –Demography cycle, fertility, family planning, contraceptive methods, behavioural methods, natural family planning method, chemical method, mechanical methods, hormonal contraceptives, population problem of India.
4. First aid –Emergency treatment in shock, snake-bite, burns poisoning, heart disease, fractures and resuscitation methods. Elements of minor surgery and dressings.
5. Environment and health-Sources of water supply, water pollution, purification of water, health and air, noise light-solid waste disposal and control-medical entomology, arthropod borne diseases and their control, rodents, animals and diseases.
6. Fundamental principles of microbiology classification of microbes, isolation, staining techniques of organisms of common diseases.
7. Communicable diseases –Causative agents, modes of transmission and prevention.
  - (a) Respiratory infections –Chicken pox, measles. Influenza, diphtheria, whooping cough and tuberculosis.
  - (b) Intestinal infections: Poliomyelitis. Hepatitis. Cholera. Typhoid, Food poisoning, Hookworm infection.
  - (c) Arthropod borne infections-plague, Malaria, Filariasis.

- (d) Surface infections-Rabies, Trachoma, Tetanus, Leprosy.
- (e) Sexually transmitted diseases ---Syphilis. Gonorrhoea. AIDS.
- 8. Non-communicable diseases-Causative agents, prevention, care and control; Cancer, Diabetes, Blindness, Cardiovascular diseases.
- 9. Epidemiologyâ€“ Its scope, methods, uses, dynamics of disease transmission, immunity and immunization: Immunological products and their dose schedule. Principles of disease control and prevention, hospital acquired infection, prevention and control. Disinfection, types of disinfection, disinfection procedures, for faeces, urine, sputum, room linen, dead-bodies, instruments.

## DP201 PHARMACEUTICS II

Theory (75 hours)

### 1. Dispensing Pharmacy:

- (i) Prescriptions-Reading and understanding of prescription; Latin terms commonly used (Detailed study is not necessary), Modern methods of prescribing, adoption of metric system. Calculations involved in dispensing.
- (ii) Incompatibilities in Prescriptions-Study of various types of incompatibilities-physical, chemical and therapeutic.
- (iii) Posologyâ€“Dose and Dosage of drugs, Factors influencing dose, Calculations of doses on the basis of age, sex and surface area. Veterinary doses.

### 2. Dispensed Medications:

(Note: A detailed study of the following dispensed medication is necessary. Methods of preparation with theoretical and practical aspects, use of appropriate containers and closures. Special labelling requirements and storage conditions should be high-lighted).

- (i) Powders-Types of powders-Advantages and disadvantages of powders, Granules, Cachets and Tablet triturates. Preparation of different types of powders encountered in prescriptions. Weighing methods, possible errors in weighing, minimum weighable amounts and weighing of material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance.
- (ii) Liquid Oral Dosage Forms:

(a). Monophasic—Theoretical aspects including commonly used vehicles, essential adjuvant like stabilizers, colourants and flavours, with examples.

Review of the following monophasic liquids with details of formulation and practical methods.

Liquids for internal administration    Liquids for external administration or  
used on mucus membranes.

Mixtures and concentrates    Gargles

Syrups Mouth washes

Throat-paints Douches

Elixirs Ear Drops

Nasal drops & Sprays Liniments Lotions.

(b) Biphasic Liquid Dosage Forms:

(i)    Suspension (elementary study)    Suspensions containing diffusible solids and liquids and their preparations.

Study of the adjuvants used like thickening agents, wetting agents, their necessity and quantity to be incorporated.

Suspensions of precipitate forming liquids like, tinctures, their preparations and stability. Suspensions produced by chemical reaction. An introduction to flocculated, non-flocculated suspension system.

(ii)    Emulsions—Types of emulsions, identification of emulsion system, formulation of emulsions, selection of emulsifying agents. Instabilities in emulsions. Preservation of emulsions.

(iii)    Semi-Solid Dosage Forms:

(a)    Ointments—Types of ointments, classification and selection of dermatological vehicles. Preparation and stability of ointments by the following processes:

(i)    Trituration (ii) Fusion (iii) Chemical reaction (iv) Emulsification.

(b)    Pastes--- Difference between ointments and pastes, bases of pastes. Preparation of pastes and their preservation.

(c)    Jellies—An introduction to the different types of jellies and their preparation.

(d)    An elementary study of poultice.

(e)    Suppositories and pessaries—Their relative merits and demerits, types of suppositories, suppository bases, classification, properties, Preparation and packing of suppositories. Use of suppositories for drug absorption.

(iv) Dental and Cosmetic Preparations:

Introduction to Dentrifices, Facial cosmetics, Deodorants, Antiperspirants, Shampoos, Hair dressing and Hair removers.

(v) Sterile Dosage Forms:

(a) Parenteral dosage forms—Definitions, General requirements for parenteral dosage forms. Types of parenteral formulations, vehicles, adjuvants, processing, personnel, facilities and Quality control. Preparation of Intravenous fluids and admixtures—Total parenteral nutrition, Dialysis fluids.

(b) Sterility testing, Particulate matter monitoring—Faulty seal packaging.

(c) Ophthalmic Products—Study of essential characteristics of different ophthalmic preparations. Formulation additives, special precautions in handling and storage of ophthalmic products.

DP251 PHARMACEUTICS II PRACTICAL (100 hours)

Dispensing of at least 100 products covering a wide range of preparations such as mixtures, emulsions, lotions, liniments, E.N.T, preparations, ointments, suppositories, powders, incompatible prescriptions etc.

Books recommended :(Latest editions)

1. Indian Pharmacopoeia.
2. British Pharmacopoeia.
3. National Formularies (N.F.I, B.N.F)
4. Remington's Pharmaceutical Sciences.
5. Martindale Extra Pharmacopoeia.

DP202 PHARMACEUTICAL CHEMISTRY II

Theory (100 hours)

1. Introduction to the nomenclature of organic chemical systems with particular reference to heterocyclic system containing up to 3 rings.
2. The Chemistry of following Pharmaceutical organic compounds, covering their nomenclature, chemical structure, uses and the important Physical and Chemical properties (Chemical structure of only those compounds marked with asterisk (\*)).

The stability and storage conditions and the different type of Pharmaceutical formulations of these drugs and their popular brand names.



Antiseptics and Disinfectants-Proflavine, \* Benzalkoniumchloride, Cetrimide, Chlorocresol\*, Chloroxylene, Formaldehyde solution, Hexachlorophene, Liquified phenol, Nitrofurantoin.

Sulfonamides-Sulfadiazine, Sulfaguanidine\*, Phthalysulfathiazole, Succinylsulfathiazole, Sulfadimethoxine, Sulfamethoxypridazine, Sulfamethoxazole, co-trimoxazole, Sulfacetamide\*.

Antileprotic Drugs-Clofazimine, Thiambutosine, Dapsone\*, Solapsone.

Anti-tubercular Drugs-Isoniazid\*, PAS\*, Streptomycin, Rifampicin, Ethambutol\*, Thiacetazone, Ethionamide, Cycloserine, Pyrazinamide\*.

Antiamoebic and Anthelmintic Drugs- Emetine, Metronidazole\*, Halogenated hydroxyquinolines, diloxanidefuroate, Paramomycin Piperazine\*, Mebendazole, D.E.C\*.,

Antibiotics-Benzyl Penicillin\*, Phenoxy methyl Penicillin\*, Benzathine Penicillin Ampicillin\*, Cloxacillin, Carbenicillin, Gentamicin, Neomycin , Erythromycin , Tetracycline, Cephalixin, Cephaloridine , Cephalothin, Griseofulvin , Chloramphenicol.

Antifungal agents-Undecylenic acid, Tolnaftate, Nystatin, Amphotericin, Hamycin.

Antimalarial Drugs-Chloroquine\*, Amodiaquine, Primaquine, Proguanil, Pyrimethamine\*, Quinine, Trimethoprim.

Tranquilizers-Chlorpromazine\*, Prochlorperazine, TrifluoPerazine, Thiothixene, Haloperidol\*, Triperidol, Oxypertine, Chlordiazepoxide, Diazepam\*, Lorazepam, Meprobamate.

Hypnotics-Phenobarbitone\*, Butobarbitone, Cyclobarbitone, Nitrazepam, Glutethimide\*, Methypylone, Paraldehyde, Triclofos sodium.

General Anaesthetics-Halothane\*, Cyclopropane\*, Diethyl ether\*, Methohexital sodium, Thiopental sodium, Trichloroethylen.

Antidepressant Drugs-Amitriptyline, Nortriptyline, Imipramine \*, Phenelzine, Tranylcypromine. Analeptics-Theophylline, Caffeine\*, Coramine\*, Dextroamphetamine.

Adrenergic Drugs-Adrenaline\*, Noradrenaline, Isoprenaline\*, Phenylephrine Salbutamol, Terbutaline, Ephedrine

\*, Pseudoephedrine.

Adrenergic Antagoins-Tolazoline, Propranolol\*, Practolol.

Cholinergic Drugs-Neostigmine\*, Pyridostigmine, Pralidoxime, Pilocarpine, Physostigmine\*.

Cholinergic Antagonists-Atropine\*, Hysocine, Homatropine, Propantheline\*, Benztrophine, Tropicamide, Biperiden.\*

Diuretic Drugs-Furosemide\*, Chlorothiazide, Hydrochlorothaizide\*, Benzthiazide, Urea\*, Mannitol \*, Ethacrynic Acid.

Cardiovascular Drugs-Ethyl nitrite\*, Glyceryl trinitrate, Alpha methyl dopa, Guanethidine, Clofibrate, Quinidine. Hypoglycemic Agents-Insulin, Chlorpropamide\*, Tolbutamide, Glibenclamide, Phenformin \*, Metformin.

Coagulants and Anti-Coagulants-Heparin, Thrombin, Menadione\*, Bishydroxycoumarin, Warfarin Sodium. Local Anaesthetics-Lignocaine\*, Procaine\*, Benzocaine.

Histamine and Anti-histaminic Agents-Histamine, Diphenhydramine\*, Promethazine, Cyproheptadine, Mepyramine, Pheniramine, Chlorpheniramine\*.

Analgesics and Anti-pyretics-Morphin, Pethidine\*, Codeine, Methadone, Aspirin\*, Paracetamol\*, Analgin, Dextropropoxyphene, Pentazocine.

Non-steroidal anti-inflammatory Agents-Indomethacin\*, phenylbutazone\*, Oxyphenbutazone, Ibuprofen, Thyroxine and Antithyroids-Thyroxine\*, Methimazole, Methylthiouracil, Propylthiouracil.

Diagnostic Agents-Iopanoic Acid, Propyliodone, Sulfobromophthalein. Sodium indigotindisulfonate, Indigo Carmine, Evans blue, Congo Red, Fluorescein Sodium .

\*Anticonvulsants, cardiac glycosides, Antiarrhythmic antihypertensives & vitamins.

Steroidal Drugs-Betamethazone, Cortisone, Hydrocortisone, prednisolone, Progesterone, Testosterone, Oestradiol, Nandrolone.

Anti- Neoplastic Drugs-Actinomycins, Azathioprine, Busulphan, Chlorambucil, Cisplatin cyclophosphamide, Daunorubicin hydrochloride, Fluorouracil, Mercaptopurine, Methotrexate, Mytomycin.

Books Recommended :(Latest editions)

1. Pharmacopoeia of India.
2. British Pharmaceutical Codex.
3. Martindale The Extra Pharmacopoeia.

#### DP252 PHARMACEUTICAL CHEMISTRY II PRACTICAL (75 hours)

1. Systematic qualitative testing of organic drugs involving Solubility determination, melting point and boiling point, detection of elements and functional groups (10 compounds).
2. Official identification test for certain groups of drugs included in the I.P like barbiturates, sulfonamides, phenothiazine, Antibiotic etc (8 compounds).
3. Preparation of three simple organic preparations.

DP203 PHARMACOLOGY & TOXICOLOGY Theory (75 hours)

1. Introduction to Pharmacology, scope of Pharmacology.
2. Routes of administration of drugs, their advantages and disadvantages.
3. Various processes of absorption of drugs and the factors affecting them, Metabolism, distribution and excretion of drugs.
4. General mechanism of drugs action and the factors which modify drug action.
5. Pharmacological classification of drugs. The discussion of drugs should emphasise the following aspect: (i) Drugs acting on the Central Nervous System:
  - (a) General anaesthetics, adjunction to anaesthesia, intravenous anaesthetics.
  - (b) Analgesic antipyretics and non-steroidal anti-inflammatory drugs, Narcotic analgesics, Antirheumatic and antigout remedies, Sedatives and Hypnotics, Psychopharmacological agents, anti convulsants, analeptics.
  - (c) Centrally acting muscle relaxants and anti parkinsonism agents
  - (ii) Local anaesthetics.
  - (iii) Drug acting on autonomic nervous system.
    - (a) Cholinergic drug, Anticholinergic drugs, anti cholinesterase drugs.
    - (b) Adrenergic drugs and adrenergic receptor blockers.
    - (c) Neurones blockers and ganglion blockers.
    - (d) Neuromuscular blockers, drugs used in myasthenia gravis.
  - (iv) Drugs acting on eye, mydriatics, drugs used in glaucoma.
  - (v) Drugs acting on respiratory system-Respiratory stimulants, Bronchodilators, Nasal decongestants, Expectorants and Antitussive agents.
  - (vi) Antacids, Physiological role of histamine and serotonin, Histamine and Antihistamines, Prostaglandins.
  - (vii) Cardio Vascular drugs, Cardiotonics, Antiarrhythmic agents, Antianginal agents, Antihypertensive agents, Peripheral Vasodilators and drugs used in atherosclerosis.
  - (viii) Drugs acting on the blood and blood forming organs. Haematinics, Coagulants and anti Coagulants, Haemostatics, Blood substitutes and plasma expanders.

- (ix) Drugs affecting renal function-Diuretics and antidiuretics.
- (x) Hormones and hormone antagonists-hypoglycemic agents, Antithyroid drugs, sex hormones and oral contraceptives, corticosteroids.
- (xi) Drugs acting on digestive system-Carminatives, digestants Bitters, Antacids and drugs used in Peptic ulcer, purgatives, and laxatives, Antidiarrhoeals, Emetics, Antiemetics, Anti-spasmodics.

Chemotherapy of microbial disease ;Urinary antiseptics, Sulphonamides, Penicillins, Streptomycin, Tetracyclines and other antibiotics, Antitubercular agents, Antifungal agents, antiviral drugs, antileprotic drugs.

- 6. Chemotherapy of protozoal diseases Anthelmintic drugs.
- 7. Chemotherapy of cancer.
- 8. Disinfectants and antiseptics.

A detailed study of the action of drugs on each organ is not necessary.

#### DP253 PHARMACOLOGY PRACTICAL (50 hours)

The first six of the following experiments will be done by the students while the remaining will be demonstrated by the teacher.

- 1. Effect of  $K^+$ ,  $Ca^{++}$ , acetylcholine and adrenaline on frog's heart.
- 2. Effect of acetylcholine on rectus abdominis muscle of Frog and guinea pig ileum.
- 3. Effect on spasmogens and relaxants on rabbits intestine.
- 4. Effect of local anaesthetics on rabbit cornea.
- 5. Effect of mydriatics and miotics on rabbits eye.
- 6. To study the action of strychnine on frog.
- 7. Effect of digitalis on frog's heart.
- 8. Effect of hypnotics in mice.
- 9. Effect of convulsants and anticonvulsant in mice or rats.
- 10. Test for pyrogen.
- 11. Taming and hypnosis potentiating effect of chlorpromazine in mice/rats.
- 12. Effect of diphenhydramine in experimentally produced asthma in guinea pigs.

## DP204 PHARMACEUTICAL JURISPRUDENCE Theory (50 hours)

1. Origin and nature of Pharmaceutical legislation in India, its scope and objectives. Evolution of the "Concept of Pharmacy" as an integral part of the Health Care System.
2. Principles and significance of Professional Ethics. Critical study of the code of Pharmaceutical Ethics drafted by Pharmacy Council of India.
3. Pharmacy Act, 1948-The General study of the Pharmacy Act with special reference to Education Regulations, working of State and Central Councils, constitution of these councils and functions, Registration procedures under the Act.
4. The Drugs and Cosmetics Act, 1940â€”General study of the Drugs and Cosmetics Act and the Rules thereunder. Definitions and salient features related to retail and wholesale distribution of drugs. The powers of Inspectors, the sampling procedures and the procedure and formalities in obtaining licences under the rule. Facilities to be provided for running a Pharmacy effectively. General study of the Schedules with special reference of schedules C, C1, F, G, J, H, P and X and salient features of labelling and storage condition of drugs.
5. The Drug and Magic Remedies (Objectionable Advertisement) Act, 1945-General study of the Act Objectives, special reference to be laid on Advertisements. Magic remedies and objectionable and permitted advertisements- disease which cannot be claimed to be cured.
6. Narcotic Drugs and Psychotropic Substances Act, 1985-A brief study of the act with special reference to its objectives, offences and punishment.
7. Brief introduction to the study of the following acts.
  1. Latest Drugs (Price Control) Order in force.
  2. Poisons Act 1919 (as amended to date)
  3. Medicinal and Toilet Preparations (Excise Duties) Act, 1995 (as amended to date)
  4. Medical Termination of Pregnancy Act, 1971 (as amended to date)

## BOOKS RECOMMENDED (Latest edition)

Bare Acts of the said laws published by Government.

## DP205 DRUG STORE AND BUSINESS MANAGEMENT Theory (75 hours)

### Part-I Commerce (50 hours)

1. Introduction-Trade, Industry and Commerce, Functions and subdivision of Commerce, Introduction of Elements of Economics and Management.
2. Forms of Business Organisations.
3. Channels of Distribution.
4. Drug House Management-Selection of Site, Space Lay-out and legal requirements.

Importance and objectives of Purchasing, selection of suppliers, credit information, tenders, contracts and price determination and legal requirements thereto.

Codification, handling of drug stores and other hospital supplies.

5. Inventory Control-objects and importance, modern techniques like ABC, VED analysis, the lead time, inventory carrying cost, safety stock, minimum and maximum stock levels, economic order quantity, scrap and surplus disposal.

6. Sales Promotion, Market Research, Salesmanship, qualities of a salesman, Advertising and Window Display.

7. Recruitment, training, evaluation and compensation of the pharmacist.

- 8 Banking and Finance Service and functions of the bank, Finance Planning and sources of finance.

#### Part-II Accountancy (25 hours)

1. Introduction to the accounting concepts and conventions, Double entry Book keeping, Different kinds of accounts.
2. Cash Book.
3. General Leger and Trial Balance.
4. Profit and Loss Account and Balance Sheet.
5. Simple technique of analysing financial statements.

Introduction to Budgeting.

Books Recommended (Latest edition)

Remington's Pharmaceutical Sciences.

#### DP206 HOSPITAL AND CLINICAL PHARMACY Theory (75 hours)

Part-I :Hospital Pharmacy:

1. Hospitals Definition, Function, Classifications based on various criteria, organisation, Management and Health delivery system in India.
2. Hospital Pharmacy:
  - (a) Definition
  - (b) Functions and objectives of Hospital Pharmaceutical services.
  - (c) Location, Layout, Flow chart of material and men.
  - (d) Personnel and facilities requirements including equipments based on individual and basic needs.
  - (e) Requirements and abilities required for Hospital pharmacists.
3. Drug Distribution system in Hospitals:
  - (a) Out-patient services
  - (b) In-patient services-(a) types of services (b) detailed discussion of unit Dose system, Floor ward stock system, Satellite pharmacy services, Central sterile services, Bed Side Pharmacy.
4. Manufacturing:
  - (a) Economical considerations, estimation of demand.
  - (b) Sterile manufacture-large and small volume parenterals, facilities, requirements, layout production planning, man-power requirements.
  - (c) Non-sterile manufacture-Liquid orals, externals-bulk concentrates.
  - (d) Procurement of stores and testing of raw materials.
5. Nomenclature and uses of surgical instruments and Hospital Equipments and health accessories.
6. P.T.C (Pharmacy Therapeutic Committee), Hospital Formulary System and their organisation, functioning, composition.
7. Drug Information service and Drug Information Bulletin.
8. Surgical dressing like cotton, gauze, bandages and adhesive tapes including their pharmacopoeial tests for quality. Other hospital supply e.g I.V sets B.G sets, Ryals tubes, Catheters, Syringes etc.
9. Application of computer in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retail pharmacy establishments.

## Part-II : Clinical Pharmacy.

1. Introduction to Clinical Pharmacy Practice-Definition, scope.



2. Modern dispensing aspects-Pharmacists and Patient counselling and advice for the use of common drugs, medication history.
3. Common daily terminology used in the Practice of Medicine.
4. Disease, manifestation and pathophysiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardiovascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension.
5. Physiological parameters with their significance .
6. Drug Interactions:
  - (a) Definition and introduction.
  - (b) Mechanism of Drug Interaction.
  - (c) Drug-drug interaction with reference to analgesics, diuretics, cardiovascular drugs, Gastro-intestinal agents, Vitamins and Hypoglycemic agents.
  - (d) Drug-food interaction.
7. Adverse Drug Reactions.:
  - (a) Definition and Significance.
  - (b) Drug-induced diseases and Teratogenicity.
8. Drugs in Clinical Toxicity-Introduction, general treatment of poisoning, systematic antidotes. Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturate, Organophosphours poisons.
9. Drug dependences, Drug abuse, addictive drugs and their treatment, complications.
10. Bioavailability of drugs, including factors affecting it.

Books recommended (Latest editions)

1. Remington's Pharmaceutical Sciences.
2. Martindale The Extra Pharmacopoeia

DP256 HOSPITAL AND CLINICAL PHARMACY PRACTICAL (50 hours)

1. Preparation of transfusion fluids.



2. Testing of raw materials used in (1).
3. Evaluation of surgical dressings.
4. Sterilization of surgical instruments, glass ware and other hospital supplies.
5. Handling and use of data processing equipments.

