



SCHEMES & SYLLABUS
ACADEMIC SESSION 2016-17



*Dr. Pragati
Kapur*

Scheme for B.Arch.

B.Arch.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR-101A	Principles of Architecture - I	2	0	0	2
2	AR-102A	History of Architecture - I	2	0	0	2
3	AR-103A	Building Materials and Processes - I	2	0	0	2
4	AR-104A	Architectural Psychology	2	0	0	2
5	CEA101A	Environmental Science and Ecology	2	0	0	2
6	CEA102A	Structures in Architecture - I	2	0	0	2
PRACTICAL						
1	AR-155A	Basic Design and Visual Arts - I	0	0	6	3
2	AR-156A	Architectural Drawing and Graphics - I	0	0	6	3
3	AR-157A	Building Construction Technology - I	0	0	6	3
4	AR-158A	Model Making Workshop - I	0	0	4	2
5	AR-159A	Computer Applications in Architecture - I	0	0	4	2
6	PD-193	Effective Communication	0	1	0	1
7	PD-191A	HOBBY CLUB	0	1	0	1
Total			12	2	26	27

B.Arch.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR-110A	Principles of Architecture - II	2	0	0	2
2	AR-111A	History of Architecture - II	2	0	0	2
3	AR-112A	Building Materials and Processes - II	2	0	0	2
4	AR-113A	Sociology in Architecture	2	0	0	2
5	CEA103A	Structures in Architecture - II	2	0	0	2
PRACTICAL						
1	AR-164A	Basic Design and Visual Arts - II	0	0	6	3
2	AR-165A	Architectural Drawing and Graphics - II	0	0	6	3
3	AR-166A	Building Construction Technology - II	0	0	6	3
4	AR-167A	Model Making Workshop - II	0	0	4	2
5	AR-168A	Computer Application in Architecture - II	0	0	4	2
6	PD-192A	Hobby Club	0	1	0	1
Total			10	1	26	24

B.Arch.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR-201A	History of Architecture-III	2	0	0	2
2	AR-202A	Building Services-I	2	0	0	2
3	AR-203A	Building Sciences	2	0	0	2
4	CE-211A	Structures in Architecture-III	2	0	0	2
PRACTICAL						
1	AR-254A	Basic Design and Visual Arts-III	0	0	6	3
2	AR-255A	Architectural Design-I	2	0	6	5
3	AR-256A	Building Construction Technology-III	0	0	6	3
4	AR-257A	Computer Applications in Architecture-III	0	0	4	2
5	CE-260A	Surveying	0	0	4	2
6	PD292	Effective Communication	0	1	0	1
Total			10	1	26	24

B.Arch.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR-210A	History of Architecture-IV	2	0	0	2
2	AR-211A	Building Services-II	2	0	0	2
3	BA-250A	Principles of Management	2	0	0	2
4	CE-212A	Structures in Architecture-IV	2	0	0	2
5	AR-221A/ AR-222A (Elective)	Vernacular Architecture/Energy Efficient Architecture	2	0	0	2
PRACTICAL						
1	AR-264A	Basic Design and Visual Arts-IV	0	0	6	3
2	AR-265A	Architectural Design-II	2	0	6	5
3	AR-266A	Building Construction Technology-IV	0	0	6	3
4	AR-267A	Computer Applications in Architecture-IV	0	0	4	2
5	PD293A	Intra and Inter Personal Skills	0	1	0	1
Total			12	1	22	24

B.Arch.			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR301A	Principles of Human Settlements I	2	0	0	2
2	AR302A	Building Services III	2	0	0	2
3	CE311A	Structures in Architecture - V	2	0	0	2
4	AR303A	Estimation and Costing	2	0	0	2
5	AR304A	Landscape Architecture	2	0	0	2
PRACTICAL						
1	AR356A	Architectural Design III	2	0	6	5
2	AR357A	Architectural Detailing I	0	0	2	1
3	AR358A	Working Drawing-I	0	0	4	2
4	AR359A	Building Construction and Technology-V	0	0	4	2
5	AR354A	Site Planning and Landscape Design	0	0	6	3
Total			12	0	22	23

B.Arch.			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR311A	Principles of Human Settlements II	2	0	0	2
2	AR312A	Building Services IV	2	0	0	2
3	CE312A	Structures in Architecture - VI	2	0	0	2
4	AR313A	Specification of Works	2	0	0	2
5	AR314A	Project Planning and Management	2	0	0	2
PRACTICAL						
1	AR361A	Architectural Design IV	2	0	8	6
2	AR362A	Architectural Detailing II	0	0	4	2
3	AR363A	Working Drawing-II	0	0	6	3
4	AR364A	Building Construction and Technology-VI	0	0	4	2
Total			12	0	22	23

B.Arch.			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR-401A	Professional Practice I	2	0	0	2
2	AR-403A	Advanced Services	2	0	0	2
3	AR-404A	Design Research Method	2	0	0	2
4	AR-431A/ AR-432A (Elective)	Interior Design/Construction Management	2	0	0	2
5	AR-435A/AR- 436A (Elective)	Sustainable Architecture/Urban and Regional Planning	2	0	0	2
PRACTICAL						
1	AR-456A	Architectural Design V	2	0	10	7
2	AR-457A	Advanced Building Construction & Services	0	0	6	3
3	AR-458A	Advanced Structural Design and Systems	0	0	4	2
Total			12	0	20	22

B.Arch.			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR-4501A	Professional Practice II	2	0	0	2
2	AR-4502A	Urban Design	2	0	0	2
3	AR-4503A	Building Economics	2	0	0	2
4	AR-4505A	Town Planning	2	0	0	2
5	Elective (AR- 4541A/AR- 4542A)	Architectural Conservation /Intelligent Systems	2	0	0	2
PRACTICAL						
1	AR-4556A	Architectural Design VI	2	0	16	10
2	AR-459	Dissertation	0	0	8	4
Total			12	0	24	24

B.Arch.			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR-5410	Professional Office Training	0	0	0	16
2	AR-580	Thesis	0	0	0	8
Total			0	0	0	24

B.Arch.			Semester			X
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AR - 511A	Seminar	4	0	0	4
2	AR-535A / AR-536A	Real Estate Management / Disaster Management (Elective-IV)	2	0	0	2
PRACTICAL						
1	AR - 581	Thesis	0	0	28	24
Total			6	0	28	30

Scheme for B.Arch.

DETAILED SYLLABUS

1st YEAR

AR101A	PRINCIPLES OF ARCHITECTURE - I	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

- 1. 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.
- 2. 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.
- 3. 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;
- 4. ANALYSIS OF BUILDINGS:** Analysis of architectural buildings through literature reviews and case studies, based on the functional, aesthetic and structural parameters.

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

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

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

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

- 1. 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.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. 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.

TEXT BOOK

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

REFERENCE BOOKS

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

AR104A	ARCHITECTURAL PSYCHOLOGY	L T P	Cr
		2 0 0	2

OBJECTIVE: This course is aimed at helping the student understand the built environment by providing a look at architecture within the framework of human sciences: how does 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.

- 1. 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.

2. **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.

3. **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.

4. **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

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

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.

AR155A	BASIC DESIGN & VISUAL ARTS - I	L T P	Cr
		0 0 6	3

OBJECTIVE: 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.

EXERCISES

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 BOOK

Ching, Francis D. K., "Architecture: Form, Space, and Order", Wiley and Sons, 2007.

REFERENCE BOOKS

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

AR103A	BUILDING MATERIALS AND PROCESSES - I	L T P	Cr
		2 0 0	2

AR156A	ARCHITECTURAL DRAWING & GRAPHICS - I	L T P	Cr
		0 0 6	3

OBJECTIVE 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 and understanding the drawing conventions and symbols used in them.

EXERCISES

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.

REFERENCE BOOKS

1. Bhatt, N.D., “Engineering Drawing: Plane and Solid Geometry”, Charotar Publishing House, 2006
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.

AR157A	BUILDING CONSTRUCTION TECHNOLOGY - I	L T P	Cr
		0 0 6	3

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

EXERCISES

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.

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

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

AR158A	MODEL MAKING WORKSHOP - I	L T P	Cr
		0 0 2	1

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

EXERCISES

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.

REFERENCE BOOKS

1. Raghuwanshi, B.S., "A Course in Workshop Technology - Vol. I and II", Dhanpat Rai and Co, 2001.
2. Hazra and Chaudhary, "Workshop Technology - Vol. I and II", Asian Book Comp, 1998.

AR159A	COMPUTER APPLICATIONS IN ARCHITECTURE - I	L T P	Cr
		0 0 2	1

OBJECTIVE: 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.

EXERCISES

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.

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, 2000.
5. Mansfield, R., "The Compact Guide to Microsoft Office", BPB Publishers, 1994

CEA101A	ENVIRONMENTAL SCIENCE AND ECOLOGY	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

1. **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.
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, conflict 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. **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.
4. **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.
5. **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, Saradar 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”, New Age International Publishers, 2004.

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.

CEA102A	STRUCTURES IN ARCHITECTURE - I	L T P	Cr
		2 0 0	2

OBJECTIVE

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.

1. **MODULE 1: 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.
2. **MODULE 2: 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
3. **MODULE 3: SHEAR FORCE AND BENDING MOMENT:** Beams, Shear Force and Bending Moment, Moment of Resistance, SF and BM diagrams for simple cases
4. **MODULE 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
5. **MODULE 5: 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 BOOK

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

AR110A	PRINCIPLES OF ARCHITECTURE-II	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

1. **FACTORS INFLUENCING ARCHITECTURE:** Climate, topography, materials, economics, socio-cultural and technological influences etc
2. **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.
3. **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.
4. **VERNACULAR AND RURAL ARCHITECTURE:** Introduction to vernacular and rural architecture and its characteristics; rural environment and its architectural considerations; study of exemplary cases.
5. **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.

Note: Assignments could be in the form of seminars on case studies of architectural projects.

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

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, Harmonds worth, 1971

AR111A	HISTORY OF ARCHITECTURE - II	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

1. **ANCIENT ARCHITECTURE:** Early Indian architecture up to 3rd century A.D; Indus valley civilization; study of Mohenjodaro and Harrapan architecture and planning; Vedic architecture of India; Vastu purush mandala and other canons of Hindu architecture.
2. **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.
3. **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.
4. **BUDDHIST ARCHITECTURE IN INDIA:** Development and characteristic features; stupas; Buddhist order- Ashoka pillars; Chaityas; rock cut architecture; Viharas etc
5. **JAIN ARCHITECTURE IN INDIA:** Development and characteristic features; Jain temple architecture etc

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 BOOK: Brown, Percy, “Indian Architecture – Vol I and II”, Apt Books, 1990

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., 2006
4. Maheshwari and Garg, “Ancient Indian Architecture”, CBS, 2003.

AR112A	BUILDING MATERIALS AND PROCESSES – II	L T P	Cr
		2 0 0	2

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

1. **GLASS:** Types of glass (plate, tinted, heat absorbing etc); structural glass bricks and glasscrete; fiber glass and glass wool etc; properties, varieties and uses.
2. **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.

3. **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.
4. **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.
5. **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.

AR113A	SOCIOLOGY IN ARCHITECTURE	L T P	Cr
		2 0 0	2

OBJECTIVE A large proportion of our human experience and social interaction occurs in the buildings in which we live and work. This course examines how architectural forms both influence and react to socio-cultural phenomena. Also, sociology informs architecture in all phases of the design process, including the pre-design and programming, design, construction, and post-construction phases. Therefore, students of architecture can use this sociological perspective to enhance building design.

1. **INTRODUCTION TO SOCIOLOGY:** Man and his social and physical environment; social groups and social structure; utility and relation with architecture;
2. **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.
3. **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

4. **SOCIAL ASPECT OF PHYSICAL ENVIRONMENT:** Its implications and limitations in buildings; neighborhood planning; slum improvements and city fabric.
5. **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. Prakasa Rao, 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.

AR-164A	BASIC DESIGN AND VISUAL ARTS - II	L T P	Cr
		0 0 6	3

OBJECTIVE: 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.

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.

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. Ching, Francis D. K., “Architectural Graphics”, Van Nostrand Reinhold, 2003

AR-165A	ARCHITECTURAL DRAWING & GRAPHICS -II	L T P	Cr
		0 0 6	3

OBJECTIVE 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 and understanding the drawing conventions and symbols used in them.

EXERCISES

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.

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

AR-166A	BUILDING CONSTRUCTION TECHNOLOGY - II	L T P	Cr
		0 0 6	3

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

EXERCISES

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

TEXT BOOK: Rangwala, S. C., "Building Construction", Charotar Publishing House, 2007

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.

AR-167A	MODEL MAKING WORKSHOP - II	L T P	Cr
		0 0 3	2

2009.

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

EXERCISES

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.

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

-AR- 168A	COMPUTER APPLICATIONS IN ARCHITECTURE - II	L T P	Cr
		0 0 3	2

OBJECTIVE: 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.

EXERCISES

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

REFERENCE BOOKS

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

CEA-103A	STRUCTURES IN ARCHITECTURE - II	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

1. **MODULE 1: BENDING STRESSES IN BEAM:** Introduction, Theory of Simple bending, assumptions in the theory, illustrative examples.
2. **MODULE 2: DEFLECTION OF BEAMS:** Deflection in simply supported beams and cantilever beams; double integration method and area moment method, illustrative examples.
3. **MODULE 3: ANALYSIS OF STRESS:** Introduction, principal stresses and principal planes, maximum shear stress, circular diagram for stresses, Mohr’s circle, illustrative examples.
4. **MODULE 4: 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.
5. **MODULE 5: 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 BOOK : Ramamrutham S. and Narayan R., “Strength of Materials”, Dhanpat Rai and Sons, 2010

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

IInd YEAR

AR-201A	HISTORY OF ARCHITECTURE - III	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

1. 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.

2. 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.

3. 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.

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.

5. 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 BOOK

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

REFERENCE BOOKS

1. Grover,S, “The Architecture of India (Islamic)”, Vikas Publishing House Pvt. Ltd., New Delhi, 1981.
2. Michell, G. “Architecture of the Islamic World (its history and social meaning)”, Thames and Hudson, London, 1978.
3. Hillenbrand, Robert, “Islamic Architecture, Form, Function and Meaning”, Edinburgh University Press, 1994.
4. Nath, R., “History of Mughal Architecture”, Abhinav Publicaitons, New Delhi, 1985

AR-202A	BUILDING SERVICES - I	L T P	Cr
		2 0 0	2

OBJECTIVE: Building Services are the dynamics in a static structure, providing movement, communications, facilities and comfort. As they are unavoidable and absolutely necessary, it is imperative that architects and all those who are concerned with the construction of buildings have a knowledge and appreciation of the subject.

1. **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.
2. **HOT WATER SUPPLY:** Direct and indirect systems of hot water supply, their components and equipments used for the same; insulation of piping work and safety devices; solar heating.
3. **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;
4. **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.
5. **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 BOOK:Rangwala, S.C., “Water Supply and Sanitary Engineering”, Charotar publishing house.

REFERENCE BOOKS

- 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

AR-203A	BUILDING SCIENCES	L T P	Cr
		2 0 0	2

OBJECTIVE 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.

1. **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
2. **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.
3. **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.
4. **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.
5. **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 BOOK: Koenigsberger & Ingersol, “Manual of Tropical Housing and Building: Climatic Design”, Universities Press, 2010

REFERENCE BOOKS

1. Evans, M., “Housing, Climate and Comfort”, Architectural Press, 1980
2. Arvind Krishan et al, “Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings”, Tata McGraw Hill, 1999.
3. Givoni, B., “Man, Climate and Architecture”, Elsevier Publishing Company Limited, 1969.
4. Watson & Labs, “Climatic Design”, Mcgraw Hill, NewYork, 1983.

AR-254A	BASIC DESIGN & VISUAL ARTS - III	L T P	Cr
		0 0 6	3

OBJECTIVE: This course intends to offer the students with a sound background in design skills by understanding Design as a fundamental creative action. It centers on improving inventiveness through practicing certain recognized techniques & exercises in creativity and tries to draw inspiration from and establish parallels between other creative arts and architecture.

1. To critically analyze simple man-made objects to understand the underlying concepts in their design. Studies to understand function, aesthetic relationship and anthropometrics.
2. Exercises to understand the relationship between form and function.
3. To study activities and their relationship with spaces and function.
4. Exercises on the study and application of anthropometrics information. e.g. Detail study of a small building with activity - space analysis, circulation pattern and furniture layout.
5. Exercises on Reorganization of an existing space / room for a given activity (which is different from the existing use).
6. Abstracting natural forms to generate design for a small structure.
7. Exercises on exploration of structure as a generator of form and to study the role of geometry and material as a source of inspiration for architectural creativity.
8. To study Interior elements as generators of design.
9. To study and explore the role of Fantasy, Imagination and Reality in Design.

10. To understand and explore the role of Experience and Memory in Design.

REFERENCE BOOKS

1. Wallschlaeger, C and Snyder, S.B., “Basic Visual Concepts and Principles for Artists, Architects and Designers”, McGraw Hill, 1992.
2. Laseau, P, “Graphic Thinking For Architects and Designers”, John Wiley and Sons, 2001
3. Antoniadis, “Poetics in Architecture : Theory of Design”
4. Cappleman & Kordan, “Foundations in Architecture: An Annotated Anthology of Beginning design projects”, Van Nostrand Reinhold, New York.
5. Zelanski & Fisher, “Design Principles & Problems” , 2nd Ed, Thomson & Wadsworth, USA,1996

AR-255A	ARCHITECTURAL DESIGN - I	L T P	Cr
		2 0 6	5

OBJECTIVE 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.

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.

AR-256A	BUILDING CONSTRUCTION TECHNOLOGY -III	L T P	Cr
		0 0 6	3

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

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.

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

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

AR-257A	COMPUTER APPLICATIONS IN ARCHITECTURE - III	L T P	Cr
		0 0 2	1

OBJECTIVE: Communicating design concepts and project status to clients, regulators, and colleagues can be challenging. This course will enable the students to understand the basics of Photoshop, the professional image-editing standard, permitting the student groundbreaking new creative options to realize their vision and an unprecedented level of customization to streamline their workflow.

EXERCISES

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

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

CE-211A	STRUCTURES IN ARCHITECTURE - III	L T P	Cr
		2 0 0	2

OBJECTIVE

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.

1. **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.
2. **MODULE 2: CONNECTIONS:** Welded and riveted connections—types of failure; design of welded and riveted connections for members subjected to axial forces
3. **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.
4. **MODULE 4: BEAMS:** Principal Stresses, allowable stresses, General specifications, Design of laterally supported beams.
5. **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 BOOK : Ramachandra .S, “Design of Steel Structures Vol. I”, Standard publication, New Delhi, 1992

REFERENCE BOOKS

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

CE-260A	SURVEYING	L T P	Cr
		0 0 4	2

OBJECTIVE 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.

EXERCISES

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.

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

AR-210A	HISTORY OF ARCHITECTURE - IV	L T P	Cr
		2 0 0	2

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

1. 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.

2. 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.

3. 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.

4. 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.

5. 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 BOOK

Sarbjit Bahga et al, "Modern Architecture in India", Galgotia Publishing Company, New Delhi.

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

AR- 211A	BUILDING SERVICES - II	L T P	Cr
		2 0 0	2

OBJECTIVE: To create awareness about the importance of electrical services in buildings and to develop technical and practical knowledge in these services.

1. **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.
2. **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.
3. **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.
4. **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
5. **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 BOOK: Evans, "Daylight in Architecture", McGraw - Hill Book Company, New York, 1981.

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.

AR- 221A	VERNACULAR ARCHITECTURE	L T P	Cr
		2 0 0	2

OBJECTIVE: To expose the students to traditional architecture of the various parts of the country and impart knowledge of the planning aspects, materials used in construction, constructional details and settlement planning of the settlements in various parts of the country.

1. **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
2. **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.
3. **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.
4. **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
5. **INFLUENCE ON MODERN ARCHITECTURE:** Examples from the works of Frank Lloyd Wright, Green Broken & HasanFathy, GeofferyBawa; possible applications of vernacular architectural techniques today.

TEXT BOOK:Cooper, "Traditional buildings of India", Thames and Hudson Ltd., London

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. Tillotsum, 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.

AR- 222A	ENERGY EFFICIENT ARCHITECTURE	L T P	Cr
		2 0 0	2

OBJECTIVE: A growing global concern for the conservation of energy & environment has led to the importance on sustainable habitats as a key solution to growing urban concerns. 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 .

- 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.
- 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 & 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.
- 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.
- 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.
- 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 BOOK: Majunder, Mili "Energy Efficient Building in India", Thomson Press, New Delhi, 2001

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

AR- 264A	BASIC DESIGN & VISUAL ARTS - IV	L T P	Cr
		0 0 6	3

OBJECTIVE: The course Basic design and Visual Arts intends to acquaint the students with various drawing principles and artistic techniques; how to sketch and draw at all stages of the design process to enable effective visualization and presentation.

EXERCISES:

ARCHITECTURAL RENDERING AND PRESENTATION TECHNIQUES

- To undertake outdoor Sketching (Buildings, building elements, group of buildings, buildings in landscapes) in pencils and pen & ink.
- To learn painting in water colour in outdoor to learn more of foliage for using effectively in architectural drawings.

3. To gain a brief knowledge of anatomy for learning human proportions and scale.
4. To learn various rendering techniques for architectural drawings in various mediums like pencil, ink, pastels and water colours.
5. To learn various presentation techniques: Cut-outs, Spray painting, collage etc.

ARCHITECTURAL PHOTOGRAPHY

1. General introduction to the art of photography; concept of color; concepts of lighting, distance, visual angle, frames, media.
2. To learn about the types of camera, properties and priorities.
3. To learn about photographic techniques and terms like Exposure, Aperture, Speed etc.
4. To learn about Photographic films and film processing (color, black and white), printing techniques and developing with introduction to learning basic dark room techniques.
5. To learn the art of composition, colour balance, aesthetic, light control, proportion, scaling and perspective through photography.

REFERENCE BOOKS:

1. Evans, Ray, "Drawing and Painting Architecture", Van Nostrand Reinhold Company, 1983.
2. Goodman Sue & Porter Tom., "Designer Primer", Butter Worth Architecture, London, 1988.
3. Calbo Angrill Muntsa & Plana Sicilia Manel, "How to Paint Buildings", Waston Guptill publications, New York, 1991.
4. Schulz, Adrian, "Architectural Photography: Composition, Capture, and Digital Image Processing", Rocky Nook, 2009.

AR-265A	ARCHITECTURAL DESIGN - II	L T P	Cr
		2 0 6	5

OBJECTIVE 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.

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.

AR-266A	BUILDING CONSTRUCTION TECHNOLOGY - IV	L T P	Cr
		0 0 6	3

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

EXERCISES

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 prepare drawings on Precast components i.e. masonry blocks, hollow blocks, jallis, shelving units, slabs and pre-stressed units
8. To draw a section through a five storied building showing all components.
9. To study mild steel roof trusses and details of roof coverings and gutters.
10. To study the principles of temporary works such as shuttering, centering, scaffolding and form work.

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.

AR-267A	COMPUTER APPLICATIONS IN ARCHITECTURE - IV	L T P	Cr
		0 0 4	2

OBJECTIVE The objective of introducing this course is to promote computer knowledge and applications in architecture. This course will familiarize the students to the concepts of parametric modeling, or BIM, through Autodesk REVIT or similar software, and will enable them to create Computer Aided rendered Architectural Drawings in 3D.

EXERCISES

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.

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

BA- 250A	PRINCIPLES OF MANAGEMENT	L T P	Cr
		2 0 0	2

OBJECTIVE

The field of architecture requires overall planning, coordination and control of a project from inception to completion. In essence, an architect is both a designer and a manager. This course intends to acquaint the students with various concepts of management which will be very basic to appreciate the subject.

1. **INTRODUCTION:** Meaning of management, definitions of management, characteristics of management, management vs. administration; management: art, science and profession; importance of management; Fayol's principles of management; the management functions; interrelationship of managerial functions.
2. **FORMS:** Forms of organizational structure (line, line & staff, functional); delegation of authority; centralization & decentralization. **GROUPS:** Formal & informal groups; stages in team development, empowerment concept, significance; changing nature of managerial work; outsourcing.
3. **STAFFING:** Nature and significance of staffing; human resource management- functions of human resource management; human resource planning; process of human resource planning; recruitment, selection; promotion-seniority vs. merit.

4. **MARKETING MANAGEMENT:** Marketing management–definition of marketing, marketing concept, objectives and functions of marketing; marketing mix (basics of 4Ps of marketing); difference between goods and services; steps of personal selling.
5. **FINANCIAL MANAGEMENT:** Introduction of financial management; objectives of financial management; functions and importance of financial management; brief introduction to the concept of capital structure and various sources of finance. **CORPORATE SOCIAL RESPONSIBILITY:** Corporate social responsibility–meaning; responsibility towards different stakeholders; ethics in management – meaning; factors effecting ethical choices.

TEXT BOOK: Chhabra T. N., “Principles and Practice of Management”, Dhanpat Rai Publishers, 2008

REFERENCE BOOKS

1. Aggarwal R. D., “Organization and Management”, Tata McGraw Hill, 1995
2. Prasad L. M., “Principles and Practice of Management”, Sultan Chand & Sons, 2005
3. Harold, Koontz and O’Doneell Cyril, “Management”, McGraw Hill, 1968
4. Sherlekar S. A., “Marketing Management”, Himalaya Publishing House, 2009
5. Pandey I. M., “Financial Management”, Vikas Publishing House, New Delhi, 2005
6. Stoner James A. F. and Freeman R. Edward, “Management”, 6th Edition, Prentice Hall of India, 2000
7. Prasad L. M., “Organizational Behavior”, Sultan Chand & Sons, 2008
8. Singh & Chhabra, “Business Organization & Management”, Dhanpat Rai Publishers

CE-212A	STRUCTURES IN ARCHITECTURE - IV	L T P	Cr
		2 0 0	2

OBJECTIVE

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.

1. 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.

2. **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.

3. **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.

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

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

footings; combined footings, illustrative examples.

TEXT BOOK: Ramamrutham, S. "Design of Reinforced concrete structures", Dhanpat Rai & Sons, New Delhi, 1996.

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.

IIIrd YEAR

AR-301A	PRINCIPLES OF HUMAN SETTLEMENTS-I	L T P	Cr
		2 0 0	2

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

1. **INTRODUCTION:** Human Settlement Science - objective, scope & relationship with architecture; man's role in designing and developing settlements; various factors influencing development of settlements.
2. **SETTLEMENT PLANNING IN ANCIENT INDIA:** 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.
3. **PLANNING IN THE PRE INDEPENDENT INDIA:** Contribution of Mughal and British; typical Muslim city in India, bazaar based traditional city; British colonial city.
4. **MODERN PLANNING PRINCIPLES:** Ebenezer Howard - Garden city movement, Patrick Geddes, Dr.C.A.Doxiades, LeCorbusier, Soria Y Mata - Linear city Clarence, A. Perry - The neighbourhood concept.
5. **URBAN & RURAL SETTLEMENTS:** 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.

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

AR-302A	BUILDING SERVICES - III	L T P	Cr
		2 0 0	2

OBJECTIVE - This course is intended to integrate the knowledge of mechanical services in building

- 1. INTRODUCTION:** Introduction of mechanical services, it's 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.
- 2. VERTICAL TRANSPORTATION:** 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.
- 3. L.P.G / BIO-GAS INSTALLATIONS:** Their location and layouts in residential and non-residential buildings.
- 4. FIRE SAFETY:** 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.
- 5. FIRE RESISTANCE OF BUILDINGS:** 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.

REFERENCE BOOKS

- Jain. V.K., "Design and Installation of Services in Building complexes & High Rise Buildings", Khanna Tech. Publishers, New Delhi, 1986.
- Croome, D.J., & Roberts, B.M., "Air conditioning and Ventilation of Buildings", Pragamon Press, Oxford, 1981.
- Tricomi, Ernest, "ABC's of air conditioning", H. W. Sams, 1970
- Faber, Kell, Martin, "Heating and air conditioning of buildings", Architectural Press, 1984.
- "National Building Code", Bureau of Indian Standards, 2005.

AR-303A	ESTIMATION AND COSTING	L T P	Cr
		2 0 0	2

OBJECTIVE: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.

- 1. 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.
- 2. METHODS OF APPROXIMATE ESTIMATING:** Built up or carpet area method,cubic contents, method and numbers system, current rates in Delhi-NCR for approximate estimating.
- 3. DETAILED ESTIMATE ON ITEM RATE BASIS:** 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.
- 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 contractor's interim and final certificate.
- 5. DETAILED ESTIMATE OF PROJECT:** Taking of Quantities for civil work of load bearing wall structure and R. C. C. Frame Building and preparation of abstract; use of computers for the same.

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

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.

AR-304A	LANDSCAPE ARCHITECTURE	L T P	Cr
		2 0 0	2

OBJECTIVE: Landscape architecture is the profession committed to the creation of meaningful and enjoyable outdoor places and to the sustainable management of our environment. The design of outdoor spaces is vital to create a complete environment for the users. We are seeing an increase in the usage of outdoor areas as extensions of interior places or 'outdoor rooms' in the residential scene. This course intends to build an understanding of Landscape Architecture to compliment Architectural Design.

- 1. INTRODUCTION OF LANDSCAPE ARCHITECTURE AND MAJOR GARDEN STYLES:**
Introduction to ecology, interdependence of various systems in the biosphere; study of ecosystems in urban & rural habitats; introduction to architecture and environment related issues; introduction to landscape architecture, scope and role in architecture & planning; the landscape elements, major revolution in landscape architecture, study of works of pioneers of various revolutions. Study of Major garden styles:
Hindu, Buddhist, Mughal, Japanese, Italian, Renaissance etc; their design philosophy, structure components and planting design; history, development, features elements and types.
- 2. LANDSCAPE DESIGN PROCESS:** Factors to be considered, components involved; designing and execution of proposal : analysis of site, identification of functional requirements, site development by exploiting mutual forms etc; introduction to major and minor landscape elements, role of landscape elements in landscape design; preparation of technical data sheets.

3. **PLANT MATERIALS AND LANDFORMS:** Study of plant material and preparation and herbarium; plant material - characteristic features; introduction to planting design; Landform: modification, alteration, accentuation, grading etc
4. **URBAN LANDSCAPE:** Basic principles and elements of urban landscape; introduction to street furniture; modification of site topography, grading, methods of estimating earth volumes / layout of drainage & other utilities, layout of roads & pedestrian paths, materials & construction of paving, creation & maintenance of water bodies, selection of plant materials & their care, method of planting.
5. **LANDSCAPE ASSESSMENT THROUGH CASE STUDY:** Introduction to landscape assessment & planning. Field identification of minimum 20 common Indian trees and 25 common Indian shrubs; study of contemporary landscape architecture; study of work of major landscape architects

REFERENCE BOOKS

- Motloch, J.L., "Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991.
- Bring, M, "Japanese Gardens: Design & Meaning", McGraw Hill Book Co., New York, 1981
- Geoffrey & Jellicoe, "The Landscape of
- Simonds, J. Landscape Architecture: "A Manual of Site Planning and Design" McGraw-Hill, 1998
- McHarg, Ian, "Design with Nature", John
- Lyall, Sutherland. "Designing Thames and Hudson, the New 1991

AR-354A	SITE PLANNING & LANDSCAPE DESIGN	L T P	Cr
		0 0 6	3

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

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.

REFERENCE BOOKS

1. Simonds, J.O., "Earthscape: A Manual of Environmental planning", McGraw Hill Book Co., New York, 1978.
2. John Ormsbee Simonds, "Landscape Architecture: A manual of site planning & design", McGraw Hill, 1961.
3. Kevin Lynch, "Site Planning", MIT Press, Cambridge, MA. 1957.
4. Thomas H. Russ, "Site Planning and Design Handbook" Pearson Education, 2002.
5. William M. Marsh, "Environmental Analysis for Land Use and Site Planning", McGraw-Hill, 1978.

AR-356A	ARCHITECTURAL DESIGN - III	L T P	Cr
		2 0 6	5

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

DESIGN OF A MULTI-FUNCTIONAL PUBLIC BUILDING IN THE URBAN SETTING:

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, spa resort, 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.

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 Pub. Co., 1981

4. Zevi, Bruno, "Modern Language of Architecture", Da Capo Press, 1994
5. Yoshinobu Ashihara "Exterior design in Architecture", Van Nostrand Reinhold, 1981.

AR- 357A	ARCHITECTURAL DETAILING - I	L T P	Cr
		0 0 2	1

OBJECTIVE This course is designed to encourage students to apply the knowledge of their building construction classes in providing working details of their own designs. The course acts as a bridge between architectural design, working drawings and building construction courses.

EXERCISES

1. To design a Door and a window design and give construction details of joinery, material used etc.
2. To design a Staircase and provide details of balustrade fixing, materials used etc.
3. To design and give construction details for Furniture Design: - Counters of various types for enquiry, bar and bank, room divider furniture, built in ward robe etc.
4. Other relevant details to be decided by the faculty in charge.

REFERENCE BOOKS

1. Ballast, "Interior Detailing: Concept to Construction", John Wiley & Sons, 2010.
2. McKay, W.B., "Building Construction Volume I, II, III and IV", Longmans, UK, 1955.
3. Ching, Francis D. K., Adams, Cassandra, "Building Construction Illustrated", Wiley & Sons, Incorporated, John.
4. Chudley, Roy, "Construction Technology", Longman, 2005.
5. Arora, S.P. & Bindra, S.P., "The text book of Building Construction", Dhanpat Rai Publications, 2009.

AR- 358A	WORKING DRAWING-I	L T P	Cr
		0 0 4	2

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

EXERCISES:

1. To prepare working drawings of a Load Bearing Wall Structure for Design Problem done during preceding years, indicating to appropriate scale.
2. Foundation Plans
3. Working Floor Plans
4. Working Sections.
5. Working Elevations
6. Working Details.
7. To prepare a municipal corporation drawing of the same.

Note: Use of computers is not recommended

REFERENCE BOOKS:

1. Wakita, Linde & bakhoum. "The Professional Practice of Architectural Working Drawings", John Wiley & Sons, 2011.
2. Liebing, Ralph W. "Architectural Working Drawings", John Wiley & Sons, 1999.
3. Styles & Bichard, "Working Drawings Handbook", Taylor & Francis, 2004.
4. Stitt, "Working Drawing Manual", McGraw-Hill Professional, 1998.

AR-359A	BUILDING CONSTRUCTION & TECHNOLOGY-V	L T P	Cr
		0 0 4	2

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

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: Rangwala, S. C., "Building Construction", Charotar Publishing House, 2007.

REFERENCE BOOKS

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

CE-311A	STRUCTURES IN ARCHITECTURE - V	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

- MODULE 1: DETERMINATE AND INDETERMINATE STRUCTURES:** Definitions, Degree of Redundancy and Examples, Externally Indeterminate Structures, Internally Indeterminate Structures, Difference between determinate and indeterminate structures, Indeterminacy of truss beams, Portal Frames
- MODULE 2: WORKING STRESS METHOD:** 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
- MODULE 3: LIMIT STATE METHOD:** 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)
- MODULE 4: ELEMENTS OF SOIL MECHANICS:** 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
- MODULE 5: FOUNDATION ENGINEERING:** 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 BOOK

- 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.

REFERENCE BOOKS

- Ramamrutham S. and Narayan R., "Theory of structures", Dhanpat Rai and sons, 2010.
- Punmia R.C., Jain Ashok kumar Dr., Jain Arun Kumar, "Soil Mechanics and Foundations".
- Dr. Ramchandra Dr. & Gehlot Virendra "Design of Steel Structures".
- Jain Ashok K. "Reinforced Concrete Structures".

AR-311A	PRINCIPLES OF HUMAN SETTLEMENT - II	L T P	Cr
		2 0 0	2

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

1. **BASIS FOR PLANNING:** 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.
2. **EVOLUTION OF PLANNING THEORY:** Aim and objects of planning; understanding planning as a social, economic, political, technical and environmental process of shaping of living environment.
3. **PLANNING PROCESS:** 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.
4. **PROBLEMS FACED BY A TYPICAL CITY:** 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.
5. (a) **INTERNAL SPATIAL STRUCTURE:** Concentric theory, Sector theory, Multi nuclei theory, Inverse concentric theory; pattern of settlements in a region and their major function; Satellite towns.
(b) **NEW TOWNS:** Development of new towns and cities. Study of new towns in India such as Chandigrah, Bhubaneshwar, Gandhinagar and Navi Mumbai.

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

AR- 312A	BUILDING SERVICES - IV	L T P	Cr
		2 0 0	2

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

- 1. INTRODUCTION TO ACOUSTICS:** 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.
- 2. SOUND ABSORBING MATERIALS:** 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.
- 3. CONSTRUCTIONAL AND PLANNING MEASURES** for good acoustical design; Acoustical defects and remedies, Sound application systems, Case studies for the above aspects.
- 4. ACOUSTICAL DESIGN OF AUDITORIUMS:** 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.
- 5. NOISE:** 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.

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.

AR- 313A	SPECIFICATIONS OF WORKS	L T P	Cr
		2 0 0	2

OBJECTIVE: To acquaint students with methodology of writing specifications with reference to building trades, materials, workmanship and performance of different items of work and introducing the students to specifications as an integral part of contract document for building projects.

- 1. INTRODUCTION:** Importance of specification in the building activities, method of writing correct order and

sequence of use of materials; art of writing specifications of material along with emphasis on the quality of the materials and proper sequence of construction works; use of Indian Standard specification and P.W.D specifications.

2. **SPECIFICATION FORMING PART OF BUILDING CONTRACT:** Method of specification writing : trade wise practice and Item of completed works; establishment for project and their insistence for compliance with specification with reference to contract document; specification for handing over the site; standard clauses/ instructions for various items of work for the contractor, owner, architect, sub- contractor; explanation of extra items, their necessity and other items created for change of specifications.
3. Primary consideration for selection of material for various applications; specification of basic materials required 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 . 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.
4. Specification of works for a residential building- load-bearing type and/ or R.C.C framed type , 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

Specification for demolition work, temporary construction like sheds, exhibition stalls, gateways, etc. Study of proprietary building materials along with manufactures specification, trade name of such materials;
5. **APPLICATION IN DRAFTING SPECIFICATION:** Load bearing structure; R. C. C. frame structure; Steel frame structure.

REFERENCE BOOKS

1. Indian Standard Specifications.
2. C.P.W.D. Specifications and schedule of rate analysis.
3. Watson, Donald A., "Specification Writing for Architects and Engineers", 1964.
4. Willis C. J., Willis, Andrew, "Specification Writing: For Architects and Surveyors", John Wiley & Sons, 1997.

AR-314A	PROJECT PLANNING & MANAGEMENT	L T P	Cr
		2 0 0	2

OBJECTIVE: Project managers have the responsibility of the planning, execution and closing of any project, typically relating to construction industry and architecture.

1. Introduction, need and importance of management. Principles, theories, concepts, approaches, Role of manager.
Project Management Acquiring projects. Scope of work and liasoning, Feasibility studies, project proposal and reports, financial facilities.
2. Construction Management planning, monitoring and controlling.
3. Planning techniques, Bar chart, CPM, PERT. softwares in management, Selecting appropriate specification, manpower, technology, etc
4. Financial Management, Value of work and cash flow costing and life cycle costing, Time, Value of money.
5. Organization and staffing purpose of organizing, Human resources management. motivation and productivity.

AR-361A	ARCHITECTURAL DESIGN - IV	L T P	Cr
		2-0-8	6

OBJECTIVE:

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.

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.

REFERENCE BOOKS:

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

AR-362A	ARCHITECTURAL DETAILING-II	L T P	Cr
		0-0-4	2

• **OBJECTIVE**

This course is designed to encourage students to apply the knowledge of their building construction classes in providing working details of their own designs. The course acts as a bridge between architectural design, working drawings and building construction courses.

- To design and give working details of a 2.4m X 1.8m Toilet with both Indian style and European WCs- sanitary fixtures, drainage layout, traps, pipes, sunken slabs etc.
- To design and give working details of a 3.0m x 3.0m modular Kitchen – traps and drainage layout/ details, fixing of channels, chimneys and built in cooking range etc.
- To design a false ceiling for a café and provide working details of the same.
- Other relevant details to be decided by the faculty in charge.

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.

Chudley, Roy, "Construction Technology", Longman, 2005.

Arora, S.P. & Bindra, S.P., "The text book of Building Construction", Dhanpat

Rai Publications, 2009.

AR-363A	WORKING DRAWING-II	L T P	Cr
		0-0-6	3

OBJECTIVE

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.

EXERCISES

To prepare working drawings of a Frame Structure for Design problem done during preceding years, indicating to appropriate scale

1. Working Floor Plans.
2. Working Sections.
3. Working Elevations.
4. Working Details.
5. Services layouts.
6. To prepare a municipal corporation drawing of the same.

Note: Use of computers is encouraged.

REFERENCE BOOKS

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

AR-364A	BUILDING CONSTRUCTION AND TECHNOLOGY- VI	L T P	Cr
		0-0-4	2

OBJECTIVE

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

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).

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

CEA-312A	STRUCTURES IN ARCHITECTURE - VI	L T P	Cr
		2 0 0	2

OBJECTIVE: 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.

EXERCISES

1. Method of analysis of different type of structures (Complex and composite).
2. Design of continuous RCC and steel beams. Design of box and complex girder.
3. Effect of wind and seismic forces on different elements of Multi storied structure.
4. Concepts for design of shear walls and service core.
5. Basic concepts for design of prefabricated structures, different forces acting on the elements.

TEXT BOOKS:

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

REFERENCE BOOKS

1. RamamruthamS.and Narayan R., "Theory of structures", Dhanpat Rai and sons, 2010.
2. Punmia R.C., Jain Ashok kumar Dr., Jain Arun Kumar, "Soil Mechanics and Foundations".
3. Dr. Ramchandra Dr. &GehlotVirendra "Design of Steel Structures"..
4. Jain Ashok K. "Reinforced Concrete Structures".

IVth YEAR

AR-401A	PROFESSIONAL PRACTICE-1	L T P	Cr
		2 0 0	2

OBJECTIVE

To expose the students to the various problems and issues encountered in the normal course of architectural practice & teach them the methods of legal redressal. To develop understanding of the duties and liabilities of an architect along with knowledge of bye-laws that relate to the building & the environment in the Indian context.

- 1. ARCHITECT'S ROLE & OFFICE MANAGEMENT :**
Social Role / Social Responsibilities of Architects. Management of an architects office; elementary accountancy required for the same; Office set up and Admnistration Filling and recording of letters and drawings; Nature of partnership; registration of firm and dissolution; Practice Procedure and conduct; membership of professional organisation.
- 2. ARCHITECT'S REGISTRATION ACT :** 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.
- 3. 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.
- 4. EASEMENTS & ARBITRATION :** Definition, types of Easements, acquisition, protection and extinction of easements – Need for Arbitration, arbitration agreement, role of arbitrators, umpire etc, excepted matters, arbitral award.
- 5. ARCHITECTURAL COMPETITIONS & LEGISLATIONS BUILDING BYE-LAWS :** Regulations governing the conduct of competitions; open & closed competitions; appointment & duties of Assessors; instructions to participants; award of premium. 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

TEXTBOOKS

1. R H..Namavati, "Professional practice", 7th ed, lakshmi book depot, mumbai, 1997.
2. Handbook of professional Documents published by the Council of Architecture.

REFERENCE BOOKS

1. Hand book on Professional Practice by I. I. A, Image systems, Mumbai, 1998.

AR-403A	ADVANCED SERVICES	L T P	Cr
		2 0 0	2

OBJECTIVE: 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

- 1. 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

2. **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.
3. **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.
4. **WATER SUPPLY** : Basic planning for water supply ; Calculation of capacity for sumps and water tanks ; Skip stage pumping etc., ; Rainwater harvesting methods.

4.1 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.

5. **SEWAGE DISPOSAL** : Sanitation arrangements in high rise structures ; Service floors ; Ducts and vertical shafts ; Waste treatment etc.,

5.1 GARBAGE DISPOSAL : In context to hotels, hospitals and multistoried residential properties

TEXT BOOKS

1. Stein Reynolds Mc Guinness, “ Mechanical and Electrical equipment for buildings – vol 1 & 2”, John Wiley & sons

REFERENCE BOOKS

1. Francisco Asensio Cerver ,” The architecture of Skyscrapers”, Hearst Book International, New York, 1997
2. Bennetts Ian & others,”Tall building structural systems”
3. Proceedings of the council for tall buildings – vol 1

AR-431A	INTERIOR DESIGN	L T P	Cr
		2 0 0	2

choose to know

1. **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
2. **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.
3. **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

4. **INTERIOR LANDSCAPING** : Elements like rocks, plants, water, flowers, fountains, paving, artifacts, etc.; their physical properties; effects on spaces and design values.
5. **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.
6. **DESIGN PROJECTS**- Residential, Commercial and Office Interiors.

AR-432A	CONSTRUCTION MANAGEMENT	L T P	Cr
		2 0 0	2

1. **THEORY & OBJECTIVES OF CONSTRUCTION MANAGEMENT:** Introduction, Common Sense, Perception, Illusion and Imagination, Definition of Key Terms Used in construction Management. Objectives and significance of construction management; Function of construction management
2. **CONSTRUCTION PROJECT:** Definition, objectives and the resources used by projects, Project Life Cycle and project life cycle phases, Project Environment, Overview of project procurement methods, Project Delivery & Production Process.
3. **CONSTRUCTION MANAGEMENT PROCESSES** : Production of a Work Breakdown Structure (WBS), Quantitative Analysis & Research Methodology, scope management, communication and integration management , Construction Programme, time management, financial management,
4. **SITE ORGANISATION** : Preparation of a Construction Method, Factor influencing selection and design Site Management, Construction Quality Management, Materials management ,Risk management, health and safety, HR management, Procurement ,Value Engineering, Construction Methods & Technology, Construction project Management tools.
5. **PROJECT PROCUREMENT AND BIDDING PROCESSES:** application of construction project management during the bid and award phases of project life cycle, study of various procurement guidelines such as World Bank, ADB, CPWD and MES etc, preliminary discussion on various types of international and national contract forms, contract for procurement of professional services.

TEXT BOOKS

1. Srinath, L.S., "PERT and CPM - Principles and Applications", Affiliated East - West Press Pvt. Ltd., New Delhi, 1989.

REFERENCES

1. Stevens, James. D., "Techniques for Construction Network Scheduling", McGraw - Hill Publishing

Company, New York, 1990.

- Mukhopadhyay, S.P., "Project Management for Architects and Civil Engineers", Firma KLM Pvt. Ltd., Calcutta, 1981.

AR-435A	SUSTAINABLE ARCHITECTURE	L T P	Cr
		2 0 0	2

- Introduction to the ideas, issues and concepts of sustainable Architecture, global environment and the built environment, principles of environmentally and ecologically supportive architecture
- Study of sustainable architecture, use of energy, materials, health and global environment as related to the construction and operation of buildings
- Sustainable and conservation practices – water conservation, sewerage treatment, solid waste treatment, economics and management
- Low energy design, hybrid systems, modeling and simulation of energy systems, integration of PV and wind systems in the building.
- 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.

Note : The sessional will be oriented towards live case studies and modeling

AR-456A	ARCHITECTURAL DESIGN - V	L T P	Cr
		2 0 10	7

OBJECTIVE

- 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.

CONTENTS

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.

AR-457A	ADVANCED BUILDING CONSTRUCTION & SERVICES	L T P	Cr
		0 0 6	3

OBJECTIVE: 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.

CONTENTS: CONSTRUCTION:

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. Francies D.K.Ching – *Building Construction illustrated*. VNR, 1975.

AR-458A	ADVANCED STRUCTURAL DESIGN SYSTEMS	L T P	Cr
		0-0-4	2

OBJECTIVE: To introduce the basic concepts of Space Frames, Shells and folded plates and tensilestructures. 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.

- MODULE 1: SHELLS:** General Understanding of shell behavior, Historical Perspective and Modern dayuse, Thick and Thin shells, Membrane Stresses in Thin shells, Geometry of shell, Meridian stress.
SPACE FRAMES: General Understanding, Space structures against Plain Structures, Examples
- 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
- MODULE 3: VIRENDREL GIRDER :** General Understanding as an architectural/structural element,
- MODULE 4: DESIGN OF VIRENDREL GIRDER:** design of Cross Sectional dimensions of Vierendrel Girder, Examples and Modern Day Use
- 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

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

REFERENCE BOOKS

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

AR-404A	DESIGN RESEARCH METHOD	L T P	Cr
		2 0 0	2

OBJECTIVE

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. 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.

1. **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.

2. **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.

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

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

5. **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.

AR-436A	Urban and Regional Planning	L T P	Cr
		2 0 0	2

1. Basic components of urban areas and Regions.
2. Role and working of Urban and Regional planning at different levels like national level, state level, district level etc.
3. Different planning theories and models.
4. 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.
5. Detailed survey and preparation of questionnaire for land use, socioeconomic, Transportation planning etc.

AR-4501A	PROFESSIONAL PRACTICE-II	L T P	Cr
		2 0 0	2

OBJECTIVE

OBJECTIVE

To familiarise students with the legal, economic and social issues related to professional practice. Emphasis will be on the ethical dimension governing professional conduct in serving the client/society.

1. **ACQUISITION** : General principals of land acquisition with reference to norms of compensation; Purpose of acquisition.
2. **VALUATION & VALUATION REPORT** : 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.
3. **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.
4. **TENDERS** : Types of tenders and tenders document, tender draft notices and invitation of tenders, Procedure for opening and selection of tenders., Analysis and report to owner, Work order.
5. **CONTRACT** : Type of contracts and contract documents, detailed knowledge about various conditions of contract and specially about : Earnest Money, Security Deposit, Retention Money, Mobilisation Fund, Bank Guarantee, Architect's Instructions, Clerk of works, Variation and extras, Defects after completion, Certificates and payments, Insurance and fire Insurance, liquidate damage.

TEXTBOOKS

1. Dutta B.N., Estimating and Costing in Civil Engineering, UBS Publishers Distributors Ltd, New Delhi, 1992.

REFERENCE BOOKS

1. Hand book on Professional Practice by I. I. A, Image systems, Mumbai, 1998.

AR-4502A	URBAN DESIGN	L T P	Cr
		2 0 0	2

OBJECTIVE

The introduction to the course of Urban design enables 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.

1. **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.
2. **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.
3. **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
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
5. **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.

AR-4503A	BUILDING ECONOMICS	L T P	Cr
		2 0 0	2

OBJECTIVE: To develop an understanding among the students regarding management of physical and human resources including evaluation techniques pertaining to a business organization in general and specific to construction industry.

1 Management of Physical and Human Resources

2 Elementary concept of economics

Introduction to economics- Definitions, Needs & Wants, Nature & Scope of Economics.

Division of economics – Micro Economics-Scarcity, Utility - Marginal, Total & Average. Laws of Demand and Supply. Macro Economics-Economic system in India.

3 Economics in relation to architecture, engineering and other sciences

Meaning and scope of building economics, Issues and challenges associated with building projects. Building Efficiency, Building Life-cycle. Costs and Benefits of Building - Monetary and Non Monetary.

4 Project Financing Equity, Financing Institutions in Financing Process, Interim Finance and Permanent Financing, Bank Loan - Simple Interest and Compound Interest. Types of Mortgage, Lease Arrangements.

5 Economic performance of building

Decision Making using techniques of economic performance to measure tangible and non-tangible issues - Cost-Benefit Analysis, Incremental Analysis and Multi-criteria Analysis.

REFERENCE BOOKS

1. Modern Economic theory - K.K. Dewett.
2. Economic for Engineers – M.L. Gupta.
3. Micro – economic theory – Samuelson.
4. Building Economics for Architects – T. Mann



AR-4505A		TOWN PLANNING	L T P	Cr
			2 0 0	2

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.

CONTENTS:

- | | | |
|----|---|---|
| 1. | Introduction to Principles and Techniques: | Town planning and architecture, role of a town Planner |
| 2. | 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 |
| 3. | 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. |
| 4. | Case study | Case study of New Extension of Cities such as Navi Mumbai, Naya Raipur, Noida, Greater Noida, etc |
| 5. | Traffic and transportation planning: | Traffic and urban environment, Traffic design Elements, Traffic control devices, road intersection |

AR-4541A		ARCHITECTURAL CONSERVATION	L T P	Cr
			2 0 0	2

INTRODUCTION:

The increased urbanization in the Indian cities and unplanned development has paved a way of severe threat to the immense built heritage that has been inherited by us. Our cities are losing identities with this kind of development which shows no respect to our past. Architects as the builders of the society have a crucial role to play in this process. With an increased awareness about heritage, there is a need to develop expertise in this field. This course will aim at a holistic approach that focuses on architectural conservation that will enable architects to handle the challenges of conservation at various levels.

OBJECTIVES:

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

Unit 1: HISTORY, THEORY & PHILOSOPHY OF CONSERVATION –

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

Unit 2: 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: 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: MANAGEMENT OF HISTORIC SITES & CULTURAL HERITAGE:

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

Unit 5: ORGANISATIONS & CHARTERS:

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

Text Books:

1. Conservation of Historic Buildings: Sir Bernard M. Feilden, Routledge; 3 edition.
2. Guidelines for Conservation: Sir Bernard M. Feilden, Architectural Press, London.
3. Historic Towns & Heritage Zones (1988): A.G.K. Menon and B.K. Thapar, Indian National Trust for Art and Cultural Heritage INTACH, New Delhi

Reference Books:

1. Managing Our Cultural Property: Xavier Graffe, 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. Shyam Chainani, 2007. Urban Design Research Institute.

AR-4542A	INTELLIGENT SYSTEM	L T P	Cr
		2 0 0	2

Control systems for various buildings services, and Types of controllers.
Preparation of necessary drawings for installing control systems,
Integrated building management system, Remote monitoring and management,
Home automation,
Developments in service control systems

AR-4556A	ARCHITECTURAL DESIGN - VI	L T P	Cr
		2 0 16	10

OBJECTIVE

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 requirements 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.

DESIGN FOR TRAVEL AND SPORTS: Contemporary transportation terminals and stadiums are large buildings 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, Mc Graw 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

AR459	DISSERTATION	L T P	Cr
		0-0-8	4

Objective of Course:

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.

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

Vth YEAR

AR-511A	SEMINAR	L T P	Cr
		4-0-0	4

Objective of Course:

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.

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.

AR-535A	REAL ESTATE MANAGEMENT	L T P	Cr
		2 0 0	2

OBJECTIVE: 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**.

- **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.
- **LEGAL FRAMEWORK FOR REAL ESTATE:** Statutory Approvals and NOCs, Law & Regulations in real estate Industry and its compliance.
- **LAND PRICING AND REAL ESTATE MARKETS:** Land valuation techniques, subsidies, type of development, Real estate market and property analysis.

- **CASE STUDY:** Real estate project formulation, Transfer or Sale of the property and deeds Contracts and agreements , REIT (real estate investment trust)
- **ANALYSIS :** Physical and economic analysis of real estate projects.

AR-536A	DISASTER MANAGEMENT	L T P	Cr
		200	2

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

1. **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.
2. **INTRODUCTION TO NATURAL DISASTERS :** Understanding the effects of natural calamities such as floods, tropical cyclones, earthquakes, landslides, heat waves , droughts & Tsunami.
3. **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.
4. (a) **STRATEGIES FOR DISASTER PREVENTION & MITIGATION :** Pre disaster, emergency, transition, and recovery. Disaster management plan, Natural crisis management committee [NCCM], State crisis management group [SCMG].
(b) **REPAIRS AFTER DISASTER :** Seismic repairs & retrofitting of damaged and undamaged buildings.
5. (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.Cony 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,

AR- 581	THESIS	L T P	Cr
		0 0 28	24

OBJECTIVE

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.

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,*

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		ELECTIVE I*	2	1	0	3
PRACTICAL						
1	MAR-611	Design studio (climate responsive design).	2	0	8	6
Total			12	5	8	21

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
PRACTICAL						
1	MAR-621	Advance design studio (advance building design).	2	0	8	6
Total			10	3	8	17

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
Total			12	3	16	23

M. Arch.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MAR-721	Architecture thesis.	2	0	28	16
Total			2	0	28	16

Scheme for M.Arch.

Course of study

COURSE DESCRIPTIONS

FIRST SEMESTER

MAR-611 : DESIGN STUDIO (CLIMATE RESPONSIVE DESIGN)

ASSIGNMENT

Climatic Zones:

1. Hot & Dry – Jodhpur
2. Warm & Humid – Kolkata
3. Composite – Bhopal
4. Moderate – Bangalore
5. 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 –
 - i) Surrounding context, connectivity etc
 - ii) Surrounding shadow analysis
 - iii) 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

MAR-612 : ARCHITECTURE PHILOSOPHY:

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.

Reference Books:-

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

MAR-613 :VIRTUAL ARCHITECTURE AND COMPUTATIONAL ANALYSIS:

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.

MAR-614 : RESEARCH METHODOLOGY &TECHNIQUES:

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.

LITERATURE RESEARCH AND REVIEW

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.

CONDUCT OF CASE STUDIES

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.

PRESENTATION TECHNIQUES

Presentation, Available Media Options, Introduction to scholarly writing; writing and publishing a paper; writing and presenting a conference / Seminar Paper; presentation of scientific research.

MAR-615 : ADVANCED BUILDING SERVICES

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

Topic -1 Water supply and Plumbing systems in high rise buildings and complex structures

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.

Topic -2 Sanitation and Waste disposal systems in high rise buildings and complex structures

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

Topic -3 Mechanical & Communication systems

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.

Topic-4 Electrical & HVAC

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.

Topic-5 Acoustics Design

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.

Topic-6 Fire protection and prevention

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

REFERENCE BOOKS:-

Handbook of designing & installing of services in high rise building complexes by Er.V K Jain ,Khanna publisher

MAR-616 : SUSTAINABLE ARCHITECTURE* ELECTIVE I

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.

- Introduction to Sustainable Development and Architecture
- Sustainable Building Materials and Technology –
- Ecology and Environmental Management
- Climatology and Building Physics
- Sustainable Architecture - Historical and Community Perspectives
- Energy Efficient Building Design – Theory and Technologies
- Sustainable building materials and technology
- Building Services and Waste Management
- Water Management
- Sustainable Neighbourhood Planning and Urban Design

MAR-617 :ENERGY EFFICIENT ARCHITECTURE *ELECTIVE II

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 & façade articulation & appropriate use of building materials in historic buildings.

SOLAR ENERGY & BUILDING

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.

PASSIVE SOLAR HEATING

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.

PASSIVE COOLING CONCEPTS

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.

OVERALL DESIGN CONCEPTS

Land form & orientation – Vegetation & Pattern – Water Bodies – Open Space & Built form - Plan form & Elements – Roof form – Fenestration pattern & Configuration – Building envelope & finishes.

SECOND SEMESTER

MAR-621 : ADVANCE DESIGN STUDIO (ADVANCE BUILDING DESIGN)

ASSIGNMENT:

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

MAR-622 : ARCHITECTURE AND CRITICAL THEORY:

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.

INTRODUCTION

Architectural theory and practice. Relation between theory and practice. Traditions in architectural theory. Critical Theory. Qualities and challenges of critical theory.

POWER AND BUILT ENVIRONMENT

Forms of power. Power and knowledge.

CONTEMPORARY CITIES

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.

CASE STUDIES

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.

MAR-623 : ADVANCE MATERIAL AND TECHNOLOGY IN ARCHITECTURE:

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.

CONCEPTUAL UNDERSTANDING OF VARIOUS LARGE SPAN STRUCTURES.

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.

STUDY OF ADVANCE BUILDING MATERIALS

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 Block 1 above. Market survey and collection of information about the materials.

CONCEPTUAL UNDERSTANDING OF HIGH RISE BUILDINGS

Conceptual Understanding of High rise buildings in normal and adverse conditions considering topography of the site, water-logging, marine structures, 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 studies of such structures and reporting.

CONCEPTUAL UNDERSTANDING OF PRE-FABRICATION IN BUILDING CONSTRUCTION. CONCEPT OF MODULAR CO-ORDINATION

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.

MAR-624 : ADVANCED ARCHITECTURAL ILLUMINATION SYSTEM AND DESIGN:

ILLUMINATING ENGINEERING

Units

Lamp & Luminaire Photometry

Light Loss Factors

Lighting Calculations – Point to Point; Surface to Point; Surface to Surface

The Lumen Method

DAY LIGHTING

Solar Position

Daylight Availability

Daylight Delivery Systems

Glazing Materials

Performance Metrics

Modelling of Day lighting Systems & Electric Lighting Integration

CONTROLS

Switching & Dimming

Code Requirements

Occupancy Sensors

Scene Controls

Communicating Control Intent

Control Protocols

Emergency Lighting

MAR-625 : ARCHITECTURAL ARBITRATION ,LAWS & LEGISLATIONS :

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.

THE ARCHITECT IN ARBITRATION

- 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.

THE ARCHITECT AND THE CONTRACTOR

THE ARCHITECT AND THE CLIENT

THE ARCHITECT AND THE CLIENT

THE ARCHITECT AND THE LAW

THIRD SEMESTER

MAR-711 : ADVANCE DESIGN STUDIO(URBAN REDEVELOPMENT)

ASSIGNMENT:

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. Vocational 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.

MAR-712 : ISSUES IN ARCHITECTURE AND URBANISM:

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.

MAR-713 : PLANNING TYPOLOGY:

Introduction of Various Types of Planning at Various Levels in Urban and Regional Planning

- **REGIONAL PLANNING AND URBAN PLANNING:** History, Theory of Settlement and Principle of settlement. Content of Regional Planning with Examples. Urbanization, Introduction of Master Planning Process, Land Use Plan, Metropolitan Planning
- **LOCAL AREA PLANNING AND AUXILIARY PLANNING:** Introduction, Zoning & Principle of Sector Planning. UDPFI Guideline for Town Planning Schemes. Principle and Planning for Industrial Town, Satellite Town, Primacy of City
- **DISASTER MANAGEMENT PLANNING:** Type of Disaster, Natural and Manmade Disaster, Strategies and planning methodology for Disaster Management in Urban Development and planning.
- **ENVIRONMENTAL PLANNING:** Natural resource management & integrated land use. Planning for Waste Management. Planning for Protection of Environment.
- **INFRASTRUCTURE PLANNING:** Infrastructure systems. Goals and Indicator in Physical Planning. Techniques and Principle for Planning of Physical Infrastructure i.e Water Supply, Sewerage, Drainage and Transportation.

MAR-714 : REAL ESTATE & FINANCIAL MANAGEMENT:

To enable the students understand the concept of Real Estate management and to give an overview of the Real Estate Market to the students

REAL ESTATE DEVELOPMENT & PROJECT FINANCING

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.

URBAN POLICY & REAL ESTATE MARKETS

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.

CORPORATE REAL ESTATE ASSET MANAGEMENT

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.

COMMERCIAL REAL ESTATE APPRAISAL

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.

MAR-715 : HOUSING:

To understand strategies adopted in Mass Housing projects of various nature and issues related to Design considerations.

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:

Mass housing project for higher income group or combinations of income groups in Urban areas.

Mass housing project for Slum Improvement schemes by Government or private organization.

Mass housing project for Old Age people.

Rehabilitation / transit accommodation /camps for people affected by natural disasters like earthquake, floods, refugees, or other disasters.

MAR-716 : ENVIRONMENTAL LAWS AND LEGISLATIONS:

Public Health and Safety: Remedies under law of torts, law of crimes and other common law remedies.

The Constitution of India: Salient features, Fundamental Rights and Directive Principles of State Policy, Writ petitions, Public Interest Litigations Environmental laws and legislations: Water Act, 1974, Air Act, 1981, Environment Protection Act, 1986, Energy Conservation Act, 2001, Public Liability Insurance Act, 1991. Environmental Notifications: 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 Waste (M&H) Rules, 2000.

FOURTH SEMESTER

MAR-721 ARCHITECTURAL THESIS



Scheme for B.Sc. Hons. (Chemistry)

B.Sc. Hons.(Chemistry)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA-110	Algebra-I	4	0	0	4
2	BCS-110	Basics of Computer Science & Application	4	0	0	4
3	BPH-110	Basic Concepts of Mechanics	4	0	0	4
4	BPH-111	Vibrations and Waves	4	0	0	4
5	BCH-110	Inorganic Chemistry – I	4	0	0	4
6	BCH-120	Physical Chemistry – I	4	0	0	4
7	BEN-101	Communication Skill-I	3	0	0	3
8	BPH-160	Basic Concepts of Mechanics Lab	0	0	2	1
9	BPH-161	Vibrations and Waves Lab	0	0	2	1
10	BCH-160	Inorganic Chemistry – I Lab	0	0	2	1
11	BCH-170	Physical Chemistry – I Lab	0	0	2	1
Total			27	0	8	31

B.Sc. Hons.(Chemistry)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA-112	Differential equation-I	4	0	0	4
2	BMA-113	Probability & statistics	4	0	0	4
3	BPH-112	Basic Electronics	4	0	0	4
4	BPH-113	Electricity and Magnetism	4	0	0	4
5	BCH-122	Organic Chemistry – I	4	0	0	4
6	BCH-115	Physical Chemistry – II	4	0	0	4
7	BEN-102	Communication Skill-II	3	0	0	3
8	BPH-162	Basic Electronics Lab	0	0	2	1
9	BPH-163	Electricity and Magnetism Lab	0	0	2	1
10	BCH-172	Organic Chemistry – I Lab	0	0	2	1
11	BCH-165	Physical Chemistry – I Lab	0	0	2	1
Total			27	0	8	31

B.Sc. Hons.(Chemistry)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-222	Organic Chemistry –II	4	0	0	4
2	BCH-219	Physical Chemistry –III	4	0	0	4
3	BCH-221	Inorganic Chemistry –II	4	0	0	4
4	BCH-212	Environmental Chemistry & Biochemistry	4	0	0	4
5	BPH-210	Quantum Mechanics	4	0	0	4
6	BMA-210	Complex Analysis	4	0	0	4
7		PDP	0	1	0	1
8	BCH-272	Organic Chemistry –II Lab	0	0	2	1
9	BCH-269	Physical Chemistry –III Lab	0	0	2	1
10	BCH-271	Inorganic Chemistry –II Lab	0	0	2	1
11	BCH-262	Environmental Chemistry & Biochemistry- Lab	0	0	2	1
12	BPH-260	Quantum Mechanics Lab	0	0	2	1
Total			24	1	10	30

B.Sc. Hons.(Chemistry)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-213	Inorganic Chemistry –III	4	0	0	4
2	BCH-225	Organic Chemistry –III	4	0	0	4
3	BCH-223	Physical Chemistry-IV	4	0	0	4
4	BPH-211	Optics	4	0	0	4
5	BMA-215	Special Functions and Integral Transforms	4	0	0	4
6	CE-101	EVS	2	0	0	2
7	BCH-263	Inorganic Chemistry –III Lab	0	0	2	1
8	BCH-264	Organic Chemistry –III Lab	0	0	2	1
9	BCH-265	Physical Chemistry-IV Lab	0	0	2	1
10	BPH-261	Optics Lab	0	0	2	1
Total			22	0	8	26

B.Sc. Hons.(Chemistry)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-324	Inorganic Chemistry –IV	4	0	0	4
2	BCH-325	Organic Chemistry-IV	4	0	0	4
3	BCH-321	Physical Chemistry-V	4	0	0	4
4	BCH-315	Analytical Chemistry-I	4	0	0	4
5	BCH-374	Inorganic Chemistry –IV Lab	0	0	2	1
6	BCH-375	Organic Chemistry-IV Lab	0	0	2	1
7	BCH-371	Physical Chemistry-IV Lab	0	0	2	1
8	BCH-363	Analytical Chemistry –I Lab	0	0	2	1
Total			16	0	8	20

B.Sc. Hons.(Chemistry)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCH-326	Inorganic Chemistry –V	4	0	0	4
2	BCH-327	Organic Chemistry-V	4	0	0	4
3	BCH-328	Physical Chemistry-V	4	0	0	4
4	BCH-326	Physical Chemistry-V	4	0	0	4
5	BCH-320	Analytical Chemistry-I	4	0	0	4
6	BCH-321	Computational Chemistry	4	0	0	4
7	BCH-376	Inorganic Chemistry –V Lab	0	0	2	1
8	BCH-377	Organic Chemistry-V Lab	0	0	2	1
9	BCH-378	Physical Chemistry-V Lab	0	0	2	1
10	BCH-370	Analytical Chemistry-I Lab	0	0	2	1
Total			24	0	8	28

Syllabus For B.Sc. (CHEMISTRY)

Semester – I

INORGANIC CHEMISTRY-I

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). Preparation and properties of some important compounds - sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate.

UNIT-2: CHEMISTRY OF NOBLE GASES

Occurrence and uses 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.

UNIT-4: CARBON FAMILY

Catenation, carbides, fullerenes, fluorocarbons, silicates (structural aspects), silicones- general methods of preparations, properties and uses. Silicon tetrachloride, silicates, zeolites.

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, (PCl_3 , PCl_5); Structures of oxides and oxoacids of nitrogen and

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

INORGANIC CHEMISTRY LAB-I:

(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 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.

PHYSICAL CHEMISTRY- I

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,.

Unit-2 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-3 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,

UNIT-4 LIQUID STATE

Structure of liquids, properties of liquids- surface tension, viscosity, vapor pressure, Refractive Index and Types of Crystals.

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:

- 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).

PHYSICAL CHEMISTRY LAB-I

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).

Semester – II

ORGANIC CHEMISTRY – I

Unit-I

Basics of Organic Chemistry

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.

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-II

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-III

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/ AntiMarkownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical).

Unit-IV

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.

Unit-V

Aromatic Hydrocarbons

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups.

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.

ORGANIC CHEMISTRY LAB- II

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)
4. 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)
5. 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)

PHYSICAL CHEMISTRY II

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, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.

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, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions. Adiabatic flame temperature, explosion temperature.

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

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, concept of fugacity. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Coupling of exoergic and endoergic reactions. 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 . Le Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase

Unit-V

Solutions and Colligative Properties:

Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Excess thermodynamic functions.

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)

PHYSICAL CHEMISTRY LAB- II

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 Δ of benzoic acid in water and determination of H .

Any other experiment carried out in the class.

Reference Books

- Khosla, B. D.; Garg, V. C. & Gulati, A., *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).
- Athawale, V. D. & Mathur, P. *Experimental Physical Chemistry* New Age International: New Delhi (2001).

Semester - III

INORGANIC CHEMISTRY-II

Unit-I

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.

Unit-II

Acids and Bases

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-III

Chemistry of *s* and *p* Block Elements:

Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Complex formation tendency of *s* and *p* block elements. Hydrides and their classification ionic, covalent and interstitial. Basic beryllium acetate and nitrate. Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses. Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes and graphitic compounds, silanes, Oxides and oxoacids of nitrogen, Phosphorus and chlorine. Peroxo acids of sulphur, interhalogen compounds, polyhalide ions, pseudohalogens and basic properties of halogens.

Unit-IV

Noble Gases:

Occurrence and uses, rationalization of inertness of noble gases, Clathrates; preparation and properties of XeF₂, XeF₄ and XeF₆; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF₂). Molecular shapes of noble gas compounds (VSEPR theory).

Unit-V

Inorganic Polymers:

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes, and polysulphates.

Reference Books:

- Lee, J.D. *Concise Inorganic Chemistry*, ELBS, 1991.
- Douglas, B.E; Mc Daniel, D.H. & Alexander, J.J. *Concepts & Models of Inorganic Chemistry 3rd Ed.*, John Wiley Sons, N.Y. 1994.
- Greenwood, N.N. & Earnshaw. *Chemistry of the Elements*, Butterworth-Heinemann. 1997.
- Cotton, F.A. & Wilkinson, G. *Advanced Inorganic Chemistry*, Wiley, VCH, 1999.
- Miessler, G. L. & Donald, A. Tarr. *Inorganic Chemistry 4th Ed.*, Pearson, 2010.

Shriver & Atkins, *Inorganic Chemistry 5th Ed.*

INORGANIC CHEMISTRY LAB -II

(A) Iodo / Iodimetric Titrations

- (i) Estimation of Cu(II) and $K_2Cr_2O_7$ using sodium thiosulphate solution (Iodimetrically).
- (ii) Estimation of (i) arsenite and (ii) antimony in tartar-emetic iodimetrically
- (iii) Estimation of available chlorine in bleaching powder iodometrically.

(B) Inorganic preparations

- (i) Cuprous Chloride, Cu_2Cl_2
- (ii) Preparation of Manganese(III) phosphate, $MnPO_4 \cdot H_2O$
- (iii) Preparation of Aluminium potassium sulphate $KAl(SO_4)_2 \cdot 12H_2O$ (Potash alum) or Chrome alum.

Reference Books:

- Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS. 1978

ORGANIC CHEMISTRY-II

Unit-I

Chemistry of Halogenated Hydrocarbons:

Alkyl halides: Methods of preparation, nucleophilic substitution reactions – S_N1 , S_N2 and S_Ni mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.

Aryl halides: Preparation, including preparation from diazonium salts. nucleophilic aromatic substitution; S_NAr , Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions. Organometallic compounds of Mg and Li – Use in synthesis of organic compounds.

Unit-II

Alcohols, Phenols, Ethers and Epoxides:

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement, *Phenols:* Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer-Tiemann and Kolbe's-Schmidt Reactions, Fries and Claisen rearrangements with mechanism;

Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and $LiAlH_4$

Unit-III

Carbonyl Compounds:

Structure, reactivity and preparation; Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzilic acid rearrangements, α haloform reaction and Baeyer Villiger oxidation, - substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV, PDC and PGC);

Addition reactions of unsaturated carbonyl compounds: Michael addition.

Active methylene compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

Unit-IV

Carboxylic Acids and their Derivatives

Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic/phthalic, lactic, malic, tartaric, citric, maleic and fumaric acids,
Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group -Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann-bromamide degradation and Curtius rearrangement.

Unit-IV

Sulphur containing compounds:

Preparation and reactions of thiols, thioethers and sulphonic acids.

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).
- Graham Solomons, T.W. *Organic Chemistry*, John Wiley & Sons, Inc

ORGANIC CHEMISTRY LAB-II

1. Functional group tests for alcohols, phenols, carbonyl and carboxylic acid group.
2. Organic preparations:
 - i. Acetylation of one of the following compounds: amines (aniline, *o*-, *m*-, *p*-toluidines and *o*-, *m*-, *p*-anisidine) and phenols (*n*-naphthol, vanillin, salicylic acid) by any one method:
 - a. Using conventional method.
 - b. Using green approach
 - ii. Benzoylation of one of the following amines (aniline, *o*-, *m*-, *p*-toluidines and *o*-, *m*-, *p*-anisidine) and one of the following phenols (*n*-naphthol, resorcinol, *p*-cresol) by Schotten-Baumann reaction.
 - iii. Oxidation of ethanol/ isopropanol (Iodoform reaction).
 - iv. Bromination of any one of the following:
 - a. Acetanilide by conventional methods
 - b. Acetanilide using green approach (Bromate-bromide method)
 - v. Nitration of any one of the following:
 - a. Acetanilide/nitrobenzene by conventional method
 - b. Salicylic acid by green approach (using ceric ammonium nitrate).
 - vi. Selective reduction of *meta* dinitrobenzene to *m*-nitroaniline.
 - vii. Reduction of *p*-nitrobenzaldehyde by sodium borohydride.
 - viii. Hydrolysis of amides and esters.
 - ix. Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde.
 - x. *S*-Benzylisothiuronium salt of one each of water soluble and water insoluble acids (benzoic acid, oxalic acid, phenyl acetic acid and phthalic acid).
 - xi. Aldol condensation using either conventional or green method.
 - xii. Benzil-Benzilic acid rearrangement.

The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and 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)
- 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).

PHYSICAL CHEMISTRY-III

Unit-I

Phase Equilibria:

Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonreactive and reactive systems; Clausius-Clapeyron equation and its applications to solid-liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one component systems, with applications.

Phase diagrams for systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points, solid solutions.

Three component systems, water-chloroform-acetic acid system, triangular plots.

Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications to fractional distillation of binary miscible liquids (ideal and nonideal), azeotropes, lever rule, partial miscibility of liquids, CST, miscible pairs, steam distillation.

Nernst distribution law: its derivation and applications.

Unit-II

Ionic equilibria:

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di- and triprotic acids (exact treatment). Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of acid–base indicators; selection of indicators and their limitations. Multistage equilibria in polyelectrolyte systems; hydrolysis and hydrolysis constants.

Unit-III

Catalysis:

Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces; effect of particle size and efficiency of nanoparticles as catalysts. Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis.

Unit-IV

Surface chemistry:

Physical adsorption, chemisorption, adsorption isotherms. nature of adsorbed state.

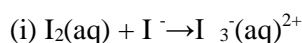
Reference Books:

- 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. *Commonly Asked Questions in Thermodynamics*. CRC Press: NY (2011).
- Zundhal, S.S. *Chemistry concepts and applications* Cengage India (2011).
- Ball, D. W. *Physical Chemistry* Cengage India (2012).

PHYSICAL CHEMISTRY PRACTICAL LAB-III

- Determination of critical solution temperature and composition of the phenol-water system and to study the effect of impurities on it.
- Phase equilibria: Construction of the phase diagram using cooling curves or ignition tube method:
 - simple eutectic and
 - congruently melting systems.
- Distribution of acetic/ benzoic acid between water and cyclohexane.
- Study the equilibrium of at least one of the following reactions by the distribution method:



- Study the kinetics of the following reactions.
 - Initial rate method: Iodide-persulphate reaction
 - Integrated rate method:
 - Acid hydrolysis of methyl acetate with hydrochloric acid.
 - Saponification of ethyl acetate.
 - Compare the strengths of HCl and H₂SO₄ by studying kinetics of hydrolysis of methyl acetate.

VI. Adsorption

- Verify the Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.

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).

Semester - IV

INORGANIC CHEMISTRY-III

Unit-

Coordination Chemistry:

Werner's theory, valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, measurement of $10 Dq$ in weak and strong fields, pairing energy, energies, factors affecting the magnitude of $10 Dq$ (Octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry Jahn-Teller theorem, square planar geometry. Qualitative aspect of Ligand field and MO Theory.

IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, polynuclear complexes, Labile and inert complexes.

Unit-II

Transition Elements:

General group trends with special reference to electronic configuration, colour, variable valency, magnetic and catalytic properties, ability to form complexes. Stability of various oxidation states and e.m.f. (Latimer & Bsworth diagrams). Difference between the first, second and third transition series.

Chemistry of Ti, V, Cr Mn, Fe and Co in various oxidation states (excluding their metallurgy).

Unit-III

Lanthanoids and Actinoids:

Electronic configuration, oxidation states, colour, spectral and magnetic properties, lanthanide contraction, separation of lanthanides (ion-exchange method only).

Unit-IV

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. Iron and its application in bio-systems, Haemoglobin; Storage and transfer of iron.

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.

INORGANIC CHEMISTRY- LAB-III

Gravimetric Analysis:

- i. Estimation of nickel (II) using Dimethylglyoxime (DMG).
- ii. Estimation of copper as CuSCN
- iii. Estimation of iron as Fe_2O_3 by precipitating iron as $\text{Fe}(\text{OH})_3$.
- iv. Estimation of Al (III) by precipitating with oxine and weighing as $\text{Al}(\text{oxine})_3$ (aluminium oxinate).

Inorganic Preparations:

- i. Tetraamminecopper (II) sulphate, $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4 \cdot \text{H}_2\text{O}$
- ii. *Cis* and *trans* $\text{K}[\text{Cr}(\text{C}_2\text{O}_4)_2 \cdot (\text{H}_2\text{O})_2]$ Potassium dioxalato diaquachromate (III)
- iii. Tetraamminecarbonatocobalt (III) ion
- iv. Potassium tris(oxalate)ferrate(III)

Chromatography of metal ions

Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions:

- i. Ni (II) and Co (II)
- ii. Fe (III) and Al (III)

Reference Book:

1. Vogel, A.I. A text book of Quantitative Analysis, ELBS 1986.

ORGANIC CHEMISTRY-III

Unit-I

Nitrogen Containing Functional Groups

Preparation and important reactions of nitro and compounds, nitriles and isonitriles.

Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction; Distinction between 1°, 2° and 3° amines with Hinsberg reagent and nitrous acid.

Diazonium Salts: Preparation and their synthetic applications.

Unit-II

Polynuclear Hydrocarbons

Reactions of naphthalene phenanthrene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene; Polynuclear hydrocarbons.

Unit-III

Heterocyclic Compounds

Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Pyrimidine, Structure elucidation of indole, Fischer indole synthesis and Madelung synthesis), Structure elucidation of quinoline and isoquinoline, Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner-Miller synthesis, Bischler-Napieralski reaction, Pictet-Spengler reaction, Pomeranz-Fritsch reaction. Derivatives of furan: Furfural and furoic acid.

Unit-IV

Alkaloids

Natural occurrence, General structural features, Isolation and their physiological action

Hoffmann's exhaustive methylation, Emde's modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine.

Unit-V

Terpenes

Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral, Neral and -terpineol.

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 1stEd.*, New Age International (P)

ORGANIC CHEMISTRY LAB-III

1. Detection of extra elements.
2. Functional group test for nitro, amine and amide groups.
3. Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols and carbonyl compounds)

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).

PHYSICAL CHEMISTRY-IV

Unit-I

Conductance-I

Wien effect, Debye-Falkenhagen effect, Walden's rules. Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance measurement: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts, (iv) conductometric titrations, and (v) hydrolysis constants of salts.

Unit-II

Electrochemistry

Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry.

Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining

(i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone, glass and $\text{SbO/Sb}_2\text{O}_3$ electrodes. Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).

Unit-III

Electrical & Magnetic Properties of Atoms and Molecules

Basic ideas of electrostatics, Electrostatics of dielectric media, Clausius-Mosotti equation, Lorenz-Laurentz equation, Dipole moment and molecular polarizabilities and their measurements. Diamagnetism, paramagnetism, magnetic susceptibility and its measurement, molecular interpretation.

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).

PHYSICAL CHEMISTRY LAB-IV

Conductometry

- I. Determination of cell constant
- II. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- III. Perform the following conductometric titrations:
 - i. Strong acid vs. strong base
 - ii. Weak acid vs. strong base
 - iii. Mixture of strong acid and weak acid vs. strong base
 - iv. Strong acid vs. weak base

Potentiometry

- I Perform the following potentiometric titrations:
 - i. Strong acid vs. strong base
 - ii. Weak acid vs. strong base
 - iii. Dibasic acid vs. strong base
 - iv. Potassium dichromate vs. Mohr's salt

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).

Semester – V

ORGANIC CHEMISTRY-IV

Unit-I

Nucleic Acids

Components of nucleic acids, Nucleosides and nucleotides; Structure, synthesis and reactions of: Adenine, Guanine, Cytosine, Uracil and Thymine; Structure of polynucleotides.

Unit-II

Amino Acids, Peptides and Proteins

Amino acids, Peptides and their classification. α -Amino Acids - Synthesis, ionic properties and reactions. Zwitterions, pK_a values, isoelectric point and electrophoresis, Study of peptides: determination of their primary structures-end group analysis, methods of peptide synthesis. Synthesis of peptides using N-protecting, C-protecting and C-activating groups -Solid-phase synthesis

Unit-III

Enzymes

Introduction, classification and characteristics of enzymes. Salient features of active site of enzymes. Mechanism of enzyme action (taking trypsin as example), factors affecting enzyme action, coenzymes and cofactors and their role in biological reactions, specificity of enzyme action (including stereospecificity), enzyme inhibitors and their importance, phenomenon of inhibition (competitive, uncompetitive and non-competitive inhibition including allosteric inhibition).

Unit-IV

Lipids

Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity.

Unit-V

Concept of Energy in Biosystems

Cells obtain energy by the oxidation of foodstuff (organic molecules). Introduction to metabolism (catabolism, anabolism).

ATP: The universal currency of cellular energy, ATP hydrolysis and free energy change. Agents for transfer of electrons in biological redox systems: NAD^+ , FAD.

Conversion of food to energy: Outline of catabolic pathways of carbohydrate- glycolysis, fermentation, Krebs cycle.

Overview of catabolic pathways of fat and protein.

Interrelationship in the metabolic pathways of protein, fat and carbohydrate. Caloric value of food, standard caloric content of food types.

Reference Books:

- Berg, J.M., Tymoczko, J.L. and Stryer, L. (2006) Biochemistry. Vth 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.

ORGANIC CHEMISTRY LAB-IV

1. Estimation of glycine by Sorenson's formalin method.
2. Study of the titration curve of glycine.
3. Estimation of proteins by Lowry's method.
4. Study of the action of salivary amylase on starch at optimum conditions.
5. Effect of temperature on the action of salivary amylase.
6. Saponification value of an oil or a fat.
7. Determination of Iodine number of an oil/ fat.
8. Isolation and characterization of DNA from onion/ cauliflower/peas.

Reference Books:

- Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.
- Arthur, I. V. *Quantitative Organic Analysis*, Pearson.

PHYSICAL CHEMISTRY- V

Unit-I

Quantum Chemistry

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; wavefunctions, 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 wavefunctions. 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-II

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). Localised and non-localised molecular orbitals treatment of triatomic (BeH_2 , H_2O) molecules. Qualitative MO theory and its application to AH_2 type molecules.

Unit-III

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.

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.

Unit-IV

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.

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).

PHYSICAL CHEMISTRY LAB -V

UV/Visible spectroscopy

- I. Study the 200-500 nm absorbance spectra of KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ (in 0.1 M H_2SO_4) and λ_{max} determine the λ_{max} values. Calculate the energies of the two transitions in different units (J molecule^{-1} , kJ mol^{-1} , cm^{-1} , eV).
- II. Study the pH-dependence of the UV-Vis spectrum (200-500 nm) of $\text{K}_2\text{Cr}_2\text{O}_7$.
- III. Record the 200-350 nm UV spectra of the given compounds (acetone, acetaldehyde, 2-propanol, acetic acid) in water. Comment on the effect of structure on the UV spectra of organic compounds.

Colourimetry

- I. Verify Lambert-Beer's law and determine the concentration of $\text{CuSO}_4/\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$ in a solution of unknown concentration
- II. Determine the concentrations of KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ in a mixture.
- III. Study the kinetics of iodination of propanone in acidic medium.
- IV. Determine the amount of iron present in a sample using 1,10-phenanthroline.
- V. Determine the dissociation constant of an indicator (phenolphthalein).
- VI. Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium

hydroxide.

VII. Analysis of the given vibration-rotation spectrum of HCl(g)

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).

Semester - VI

INORGANIC CHEMISTRY- V

Unit-I

Theoretical Principles in Qualitative Analysis (H₂S Scheme)

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-II

Organometallic Compounds

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands. Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series. Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π -acceptor behaviour 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 trialkyl aluminium (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.

Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation). Structure and aromaticity. Comparison of aromaticity and reactivity with that of benzene.

Unit-III

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-IV

Catalysis by Organometallic Compounds

Study of the following industrial processes and their mechanism:

1. Alkene hydrogenation (Wilkinsons Catalyst)
2. Hydroformylation (Co salts)
3. Wacker Process
4. Synthetic gasoline (Fischer Tropsch reaction)
5. Synthesis gas by metal carbonyl complexes

Reference Books:

Recommended Texts:

- Vogel, A.I. *Qualitative Inorganic Analysis*, Longman, 1972
- Svehla, G. *Vogel's Qualitative Inorganic Analysis*, 7th Edition, Prentice Hall, 1996-03-07.
- Cotton, F.A. G.; Wilkinson & Gaus, P.L. *Basic Inorganic Chemistry 3rd Ed.*; Wiley India,
- Huheey, J. E.; Keiter, E.A. & Keiter, R.L. *Inorganic Chemistry, Principles of Structure and Reactivity 4th Ed.*, Harper Collins 1993, Pearson, 2006.
- Sharpe, A.G. *Inorganic Chemistry*, 4th Indian Reprint (Pearson Education) 2005
- Douglas, B. E.; McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry 3rd Ed.*, John Wiley and Sons, NY, 1994.
- Greenwood, N.N. & Earnshaw, A. *Chemistry of the Elements, Elsevier 2nd Ed.*, 1997 (Ziegler Natta Catalyst and Equilibria in Grignard Solution).
- Lee, J.D. *Concise Inorganic Chemistry 5th Ed.*, John Wiley and sons 2008.
- Powell, P. *Principles of Organometallic Chemistry*, Chapman and Hall, 1988.
- Shriver, D.D. & P. Atkins, *Inorganic Chemistry 2nd Ed.*, Oxford University Press, 1994.
- Basolo, F. & Person, R. *Mechanisms of Inorganic Reactions: Study of Metal Complexes in Solution 2nd Ed.*, John Wiley & Sons Inc; NY.
- Purcell, K.F. & Kotz, J.C., *Inorganic Chemistry*, W.B. Saunders Co. 1977
- Miessler, G. L. & Donald, A. Tarr, *Inorganic Chemistry 4th Ed.*, Pearson, 2010.
- Collman, James P. et al. *Principles and Applications of Organotransition Metal Chemistry*. Mill Valley, CA: University Science Books, 1987.
- Crabtree, Robert H. *The Organometallic Chemistry of the Transition Metals. j* New York, NY: John Wiley, 2000.
- Spessard, Gary O., & Gary L. Miessler. *Organometallic Chemistry*. Upper Saddle River, NJ: Prentice-Hall, 1996.

ORGANIC CHEMISTRY LAB -IV

Qualitative semimicro analysis of mixtures containing 3 anions and 3 cations. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

CO_3^{2-} , NO_2^- , S^{2-} , SO_3^{2-} , $\text{S}_2\text{O}_3^{2-}$, CH_3COO^- , F^- , Cl^- , Br^- , I^- , NO_3^- , BO_3^{3-} , $\text{C}_2\text{O}_4^{2-}$, PO_4^{3-} , NH_4^+ , K^+ , Pb^{2+} , Cu^{2+} , Cd^{2+} , Bi^{3+} , Sn^{2+} , Sb^{3+} , Fe^{3+} , Al^{3+} , Cr^{3+} , Zn^{2+} , Mn^{2+} , Co^{2+} , Ni^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} , Mg^{2+}

Mixtures should preferably contain one interfering anion, **or** insoluble component (BaSO_4 , SrSO_4 , PbSO_4 , CaF_2 or Al_2O_3) **or** combination of anions e.g. CO_3^{2-} and SO_3^{2-} , NO_2^- and NO_3^- ,

Cl^- and Br^- , Cl^- and I^- , Br^- and I^- , NO_3^- and Br^- , NO_3^- and I^- . Spot tests should be done whenever possible.

- i. Measurement of 10 Dq by spectrophotometric method
- ii. Verification of spectrochemical series.
- iii. Controlled synthesis of two copper oxalate hydrate complexes: kinetic vs thermodynamic factors.

- iv. Preparation of acetylacetonato complexes of $\text{Cu}^{2+}/\text{Fe}^{3+}$. Find λ_{max} of the complex.
- v. Synthesis of ammine complexes of Ni(II) and its ligand exchange reactions (e.g. bidentate ligands like acetylacetonone, DMG, glycine) by substitution method.

ORGANIC CHEMISTRY-V

Unit-I

Organic Spectroscopy

General principles Introduction to absorption and emission spectroscopy.

UV Spectroscopy: Types of electronic transitions, λ_{max} , Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption; Application of Woodward Rules λ_{max} for calculation for α, β unsaturated following aldehydes, systems: ketones, carboxylic acids and esters; Conjugated dienes: alicyclic, homoannular and heteroannular; Extended conjugated systems (aldehydes, ketones and dienes); distinction between cis and trans isomers.

IR Spectroscopy: Fundamental and non-fundamental molecular vibrations; IR absorption positions of O, N and S containing functional groups; Effect of H-bonding, conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in functional group analysis.

NMR Spectroscopy: Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it; Spin – Spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple compounds.

Applications of IR, UV and NMR for identification of simple organic molecules.

Unit-II

Carbohydrates

Occurrence, classification and their biological importance. Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation;

Disaccharides – Structure elucidation of maltose, lactose and sucrose.

Polysaccharides – Elementary treatment of starch, cellulose and glycogen.

Unit-III

Dyes

Classification, Colour and constitution; Mordant and Vat Dyes; Chemistry of dyeing;

Synthesis and applications of: Azo dyes – Methyl Orange and Congo Red (mechanism of Diazo Coupling); Triphenyl Methane Dyes -Malachite Green, Rosaniline and Crystal Violet; Phthalein Dyes – Phenolphthalein and Fluorescein; Natural dyes –structure elucidation and synthesis of Alizarin and Indigotin; Edible Dyes with examples.

Unit-IV

Polymers

Introduction and classification including di-block, tri-block and amphiphilic polymers; Number average molecular weight, Weight average molecular weight, Degree of polymerization, Polydispersity Index. Polymerisation reactions -Addition and condensation -Mechanism of cationic, anionic and free radical addition polymerization; Metallocene-based Ziegler-Natta polymerisation of alkenes; Preparation and applications of plastics – thermosetting (phenol-formaldehyde, Polyurethanes) and thermosoftening (PVC, polythene); 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.

Unit-V

Pharmaceutical Compounds: Structure and Importance

Classification, structure and therapeutic uses of antipyretics: Paracetamol (with synthesis), Analgesics: Ibuprofen (with synthesis), Antimalarials: Chloroquine (with synthesis). An elementary treatment of Antibiotics and detailed study of chloramphenicol, Medicinal values of curcumin (haldi), azadirachtin (neem), vitamin C and antacid (ranitidine).

Reference Books:

- Kalsi, P. S. *Textbook of Organic Chemistry 1stEd.*, 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.
- Singh, J.; Ali, S.M. & Singh, J. *Natural Product Chemistry*, Prajati Prakashan (2010).
- Kemp, W. *Organic Spectroscopy*, Palgrave

ORGANIC CHEMISTRY LAB-V

60 Lectures

1. Extraction of caffeine from tea leaves.
2. Preparation of sodium polyacrylate.
3. Preparation of urea formaldehyde.
4. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars.
5. Qualitative analysis of unknown organic compounds containing monofunctional groups (carbohydrates, aryl halides, aromatic hydrocarbons, nitro compounds, amines and amides) and simple bifunctional groups, for e.g. salicylic acid, cinnamonic acid, nitro phenols etc.
6. Identification of simple organic compounds by IR spectroscopy and NMR spectroscopy (Spectra to be provided).
7. Preparation of methyl orange.

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).

DEPARTMENTAL ELECTIVE
ANALYTICAL METHODS IN CHEMISTRY

Unit-I

Qualitative and quantitative aspects of analysis:

Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution if indeterminate errors, statistical test of data; F, Q and t test, rejection of data, and confidence intervals.

Unit-II

Optical methods of analysis:

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument;

Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers. Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method.

Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques. Structural illustration through interpretation of data, Effect and importance of isotope substitution. *Flame Atomic Absorption and Emission Spectrometry:* Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

Unit-II

Thermal methods of analysis:

Theory of thermogravimetry (TG), basic principle of instrumentation. Techniques for quantitative estimation of Ca and Mg from their mixture.

Unit-III

Electroanalytical methods:

Classification of electroanalytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points. Techniques used for the determination of pK_a values.

Unit-IV

Separation techniques:

Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation.

Technique of extraction: batch, continuous and counter current extractions.

Qualitative and quantitative aspects of solvent extraction: extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and nonaqueous media.

Chromatography: Classification, principle and efficiency of the technique.

Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms: frontal, elution and displacement methods. Qualitative and quantitative aspects of chromatographic methods of analysis: IC, GLC, GPC, TLC and HPLC. Stereoisomeric separation and analysis: Measurement of optical rotation, calculation of Enantiomeric excess (ee)/ diastereomeric excess (de) ratios and determination of enantiomeric composition using NMR, Chiral solvents and chiral shift reagents. Chiral

Chromatographic techniques using chiral columns (GC and HPLC). Role of computers in instrumental methods of analysis.

Reference Books:

- Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed. The English Language Book Society of Longman .
 - Willard, Hobert H. et al.: Instrumental Methods of Analysis, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.
 - Christian, Gary D; Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
 - Harris, Daniel C: Exploring Chemical Analysis, Ed. New York, W.H. Freeman, 2001.
 - Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher, 2009.
 - Skoog, D.A. Holler F.J. and Nieman, T.A. Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd. Singapore.
 - Mikes, O. & Chalmes, R.A. Laboratory Hand Book of Chromatographic & Allied Methods, Elles Harwood Ltd. London.
- Ditts, R.V. Analytical Chemistry – Methods of separation

ANALYTICAL METHODS IN CHEMISTRY

I. Separation Techniques

1. Chromatography:

(a) Separation of mixtures

(i) Paper chromatographic separation of Fe^{3+} , Al^{3+} , and Cr^{3+} .

(ii) Separation and identification of the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the R_f values.

(b) Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their R_f values.

(c) Chromatographic separation of the active ingredients of plants, flowers and juices by TLC

II. Solvent Extractions:

(i) To separate a mixture of Ni^{2+} & Fe^{2+} by complexation with DMG and extracting the Ni^{2+} -DMG complex in chloroform, and determine its concentration by spectrophotometry.

(ii) Solvent extraction of zirconium with amberliti LA-1, separation from a mixture of irons and gallium.

3. Determine the pH of the given aerated drinks fruit juices, shampoos and soaps.

4. Determination of Na, Ca, Li in cola drinks and fruit juices using flame photometric techniques.

5. Analysis of soil:

(i) Determination of pH of soil.

(ii) Total soluble salt

(iii) Estimation of calcium, magnesium, phosphate, nitrate

6. Ion exchange:
(i) Determination of exchange capacity of cation exchange resins and anion exchange resins.

(ii) Separation of metal ions from their binary mixture.

(iii) Separation of amino acids from organic acids by ion exchange chromatography.

III Spectrophotometry

1. Determination of pK_a values of indicator using spectrophotometry.
- 2 Structural characterization of compounds by infrared spectroscopy.
- 3 Determination of dissolved oxygen in water.
- 4 Determination of chemical oxygen demand (COD).
- 5 Determination of Biological oxygen demand (BOD).
- 6 Determine the composition of the Ferric-salicylate/ ferric-thiocyanate complex by

Job's method.

Reference Books:

- Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed. The English Language Book Society of Longman .
- Willard, Hobert H. et al.: Instrumental Methods of Analysis, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.
- Christian, Gary D; Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
- Harris, Daniel C: Exploring Chemical Analysis, Ed. New York, W.H. Freeman, 2001.
- Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher, 2009.
- Skoog, D.A. Holler F.J. and Nieman, T.A. Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd. Singapore.
- Mikes, O. & Chalmes, R.A. Laboratory Hand Book of Chromatographic & Allied Methods, Elles Harwood Ltd. London.

DEPARTMENTAL ELECTIVE

MOLECULAR MODELLING & DRUG DESIGN

Unit-I

Introduction to Molecular Modelling:

Introduction. Useful Concepts in Molecular Modelling: Coordinate Systems. Potential Energy Surfaces. Molecular Graphics. Surfaces. Computer Hardware and Software. The Molecular Modelling Literature.

Unit-II

Force Fields:

Fields. Bond Stretching. Angle Bending. Introduction to nonbonded interactions. Electrostatic interactions. van der Waals Interactions. Hydrogen bonding in Molecular Mechanics. Force Field Models for the Simulation of Liquid Water.

Unit-III

Energy Minimization and Computer Simulation:

Minimization and related methods for exploring the energy surface. Non-derivative method, First and second order minimization methods. Computer simulation methods. Simple thermodynamic properties and Phase Space. Boundaries. Analyzing the results of a simulation and estimating Errors.

Unit-IV

Molecular Dynamics & Monte Carlo Simulation:

Molecular Dynamics Simulation Methods. Molecular Dynamics using simple models. Molecular Dynamics with continuous potentials. Molecular Dynamics at constant temperature and pressure. Metropolis method. Monte Carlo simulation of molecules. Models used in Monte Carlo simulations of polymers.

Unit-V

Structure Prediction and Drug Design:

Structure prediction - Introduction to comparative Modeling. Sequence alignment. Constructing and evaluating a comparative model. Predicting protein structures by 'Threading', Molecular docking. Structure based de novo ligand design, Drug Discovery – Chemoinformatics – QSAR.

Reference Books:

- A.R. Leach, Molecular Modelling Principles and Application, Longman, 2001.
- J.M. Haile, Molecular Dynamics Simulation Elementary Methods, John Wiley and Sons, 1997.
- Satya Prakash Gupta, QSAR and Molecular Modeling, Springer - Anamaya Publishers, 2008.

MOLECULA MODELLING & DRUG DESIGN PRACTICAL

- Compare the optimized C-C bond lengths in ethane, ethene, ethyne and benzene. Visualize the molecular orbitals and ethene, of ethyne, etha benzene and π bond sp² hybridization.
- (a) Perform a conformational analysis of butane. (b) Determine the enthalpy of isomerization of *cis* and *trans* 2-butene.
- Visualize the electron density and electrostatic potential maps for LiH, HF, N₂, NO and CO and comment. Relate to the dipole moments. Animate the vibrations of these molecules.
- (a) Relate the charge on the hydrogen atom in hydrogen halides with their acid character. (b) Compare the basicities of the nitrogen atoms in ammonia, methylamine, dimethylamine and trimethylamine.
- (a) Compare the shapes of the molecules: 1-butanol, 2-butanol, 2-methyl-1-propanol, and 2-methyl-2-propanol. Note the dipole moment of each molecule. (b) Show how the shapes affect the trend in boiling points: (118 °C, 100 °C, 108 °C, 82 °C, respectively).
- Build and minimize organic compounds of your choice containing the following functional groups. Note the dipole moment of each compound: (a) alkyl halide (b) aldehyde (c) ketone (d) amine (e) ether (f) nitrile (g) thiol (h) carboxylic acid (i) ester (j) amide.
- (a) Determine the heat of hydration of ethylene. (b) Compute the resonance energy of benzene by comparison of its enthalpy of hydrogenation with that of cyclohexene.
- Arrange 1-hexene, 2-methyl-2-pentene, (*E*)-3-methyl-2-pentene, (*Z*)-3-methyl-2-pentene, and 2,3-dimethyl-2-butene in order of increasing stability.
- (a) Compare the optimized bond angles H₂O, H₂S, H₂Se. (b) Compare the HAH bond angles for the second row dihydrides and compare with the results from qualitative MO theory.

Note: Software: ChemSketch, ArgusLab (www.planaria-software.com), TINKER 6.2(dasher.wustl.edu/ffe), WebLab Viewer, Hyperchem, or any similar software.

Reference Books:

- A.R. Leach, Molecular Modelling Principles and Application, Longman, 2001.
- J.M. Haile, Molecular Dynamics Simulation Elementary Methods, John Wiley and Sons, 1997.
- Satya Prakash Gupta, QSAR and Molecular Modeling, Springer - Anamaya Publishers, 2008.

DEPARTMENTAL ELECTIVE

CHEMISTRY-DSE: NOVEL INORGANIC SOLIDS

Unit-I

Synthesis and modification of inorganic solids:

Conventional heat and beat methods, Co-precipitation method, Sol-gel methods, Hydrothermal method, Ion-exchange and Intercalation methods.

Unit-II

Inorganic solids of technological importance:

Solid electrolytes – Cationic, anionic, mixed Inorganic pigments – coloured solids, white and black pigments. Molecular material and fullerides, molecular materials & chemistry – one-dimensional metals, molecular magnets, inorganic liquid crystals.

Unit-III

Nanomaterials:

Overview of nanostructures and nanomaterials: classification. Preparation of gold and silver metallic nanoparticles, self-assembled nanostructures-control of nanoarchitecture-one dimensional control. Carbon nanotubes and inorganic nanowires. Bio-inorganic nanomaterials, DNA and nanomaterials, natural and antisical nanomaterials, bionano composites.

Unit-IV

Introduction to engineering materials for mechanical construction:

Composition, mechanical and fabricating characteristics and applications of various types of cast irons, plain carbon and alloy steels, copper, aluminum and their alloys like duralumin, brasses and bronzes cutting tool materials, super alloys thermoplastics, thermosets and composite materials.

Unit-V

Composite materials:

Introduction, limitations of conventional engineering materials, role of matrix in composites, classification, matrix materials, reinforcements, metal-matrix composites, polymer-matrix composites, fibre-reinforced composites, environmental effects on composites, applications of composites.

Reference Books:

- Shriver & Atkins. Inorganic Chemistry, Peter Alkins, Tina Overton, Jonathan Rourke, Mark Weller and Fraser Armstrong, 5th Edition, Oxford University Press (2011-2012)
- Adam, D.M. Inorganic Solids: An introduction to concepts in solid-state structural chemistry.

CHEMISTRY PRACTICAL LAB: NOVEL INORGANIC SOLIDS

1. Determination of cation exchange method
2. Determination of total difference of solids.
3. Synthesis of hydrogel by co-precipitation method.
4. Synthesis of silver and gold metal nanoparticles.

Reference Book:

- Fahan, *Materials Chemistry*, Springer (2004).

Scheme for B.Sc. Hons. (Mathematics)

B.Sc. Hons.(Mathematics)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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 in C++(GE-1)	4	0	0	4
5	BMA-166	Object Oriented Programming in C++(Lab)	0	0	2	1
6	PD-191A	Hobby club	0	1	0	1
Total			16	3	2	20

B.Sc. Hons.(Mathematics)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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	2
5	PD-192A	Hobby Club	0	1	0	1
Total			18	5	0	21

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
Total			24	4	0	28

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
6	BMA-228	Application of Algebra (GE-4)	5	1	0	6
7	PD-293	PDP/Interpersonal Skills	0	1	0	1
Total			23	4	2	28

B.Sc. Hons.(Mathematics)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BMA-325	Multi Variant 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	0	1	0	1
Total			20	5	0	25

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
Total			24	4	0	28

Syllabus for B.Sc. (Mathematics)

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; ϵ - δ 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 York1975.
4. Shanti Narayan, Elements of Real Analysis, S. Chand & Company, New Delhi. 5Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Company, NewDelhi.
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.
- 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)
BMA-117	Algebra	5-1-0

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)
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BMA-116	OBJECT ORIENTED PROGRAMMING IN C++	4-0-0
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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, 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 Classmembers.

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

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

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. Equation reducible to Clairaut's form.

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, Picard's 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 Longman (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} , δ -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 n th 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)
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BMA-115	ECONOMETRICS & STATISTICS	5-1-0
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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.

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.

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; forecasting.

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.

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 (ϵ - δ 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.

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.

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.

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.

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.

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*, PearsonEducation, 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
		4-0 -0	4

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 false method; secant method; fixed point iteration method; Newton- Rap son method; convergence criteria of methods.

UNIT-2 SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS :Gausselimination

Method; Gauss-Jordan method; UV factorization method; Jacobi's iteration method; Gauss- Serial 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; curvefitting.

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' method.

UNIT-5 NUMERICAL SOLUTION OF ORDINARY AND PARTIALDIFFERENTIAL EQUATION:, Taylor series method; Euler method; Euler modified method; Runge kutta method; Milne's predictor - corrector method; Adams-Bashforth method for finding solution of differentialequation.

BOOKS Recommended:

- 1) Grewal, B. S., "Numerical methods in Engineering andScience".
- 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 NumericalAnalysis".
- 4) Curtis F "Applied Numerical Analysis".**BooksRecommended**
- 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 Practical's (Using any software)

- (1) BisectionMethod.
- (2) Newton Rap sonMethod.
- (3) SecantMethod.
- (4) Regular FalseMethod.
- (5) LU decompositionMethod.
- (6) Gauss-JacobiMethod.
- (7) Gauss-SiebelMethod.
- (8) Lagrange Interpolation or NewtonInterpolation.
- (9) Simpson'srule.
- (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 twodefinitions;

Unit 2:Riemann integrability of monotone and continuous functions, Properties of theRiemann 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:
<ol style="list-style-type: none">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., Prentice Hall 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 Reprint2003.
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 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.

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 optimization 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-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 optimization 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

5. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005.
6. M.J. Strauss, G.L. Bradley and K. J. Smith, *Calculus*, 3rd Ed., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
7. E. Marsden, A.J. Tromba and A. Weinstein, *Basic Multivariable Calculus*, Springer (SIE), Indian reprint, 2005.
8. James Stewart, *Multivariable Calculus, Concepts and Contexts*, 2nd Ed., Brooks /Cole, Thomson Learning, USA, 2001.

Course outcomes:

2. 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-327	Analytical Geometry	5-1-0

<p>Course Objectives:</p> <p>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</p>	Unit
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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 nd 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.

<p>Course outcomes:</p> <ol style="list-style-type: none"> 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	5-1-0

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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, irreducibles, primes, uniquefactorization 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.

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)
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BMA-332	Mechanics	5-1-0
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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*, (4th Ed.), 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. Hons. (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	EM-101	Communication Skill-I	3	0	0	3
5	BPH-170	MathematicalPhysics-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 and 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

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 System 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-123	Thermal Physics Lab	0	0	4	2
7	BPH-271	Digital System and Applications Lab	0	0	4	2
8	BPH-272	Mathematical Physics- II Lab	0	0	4	2
9	BCS-251	Computer Science	0	1	0	1
Total			19	1	12	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 System 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	0	0	4	2
8	BPH-274	Elements of Modern Physics	0	0	4	2
9	BPH-275	Analog System and Applications	0	0	4	2
10	BPH-270	GE-04 Lab/Inorganic Lab	0	0	4	2
Total			21	2	16	31

B.Sc. Hons.(Physics)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BPH-320	Quantum Mechanics and Applications	4	0	0	4
2	BPH-321	Solid State Physics	4	0	0	4
3	BPH-322	Physics of Devices and Communications	4	0	0	4
4	BPH-323	Nuclear and Particle Physics	5	1	0	6
5	BPH-370	Quantum Mechanics and Applications-Lab	0	0	4	2
6	BPH-371	Solid State Physics-Lab	0	0	4	2
7	BPH-372	Physics of Devices and Communications-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	0	2
Total			16	2	8	22

Syllabus for Ph.D. (Physics)

Semester - I

SUBJECT NAME: MATHEMATICAL PHYSICS-I

SUBJECT CODE: BPH-120

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. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral. (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 Paldian operators. Vector identities, Gradient, divergence, curl and Laplacian in spherical and cylindrical coordinates. (10 Lectures)

Unit-III: Vector Integration:

Ordinary Integrals of Vectors. Multiple integrals, Jacobean. 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. Representation as limit of Gaussian function and rectangular function. Properties of Dirac delta function. (2 Lectures)

Reference Books:

- Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7thEdn., 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 equations by Bisection, Newton Raphson and Secant methods	Solution of linear and quadratic equation, solving $\alpha \quad \alpha \quad I I_o [(S \sin \alpha) / \alpha]^2$ in optics
Exp-4 Interpolation Method	Evaluation of trigonometric function e.g. $\sin \square, \cos \square, \tan \square$
Exp-5 Solution of ordinary differential Equation	First order differential equation
Exp-6 First order differential equation	<input type="checkbox"/> Radioactive decay <input type="checkbox"/> Current in RC, LC Circuits and DC circuits <input checked="" type="checkbox"/> Differential equation describing the motion of a Pendulum
Exp-7 Programs:	Sum and average of a list of numbers, largest of a given list of number, sorting of numbers in ascending and Descending order.
Exp-8 Plotting	Basic curve and their fitting

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 Edition. , 2007 , Wiley India
- 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.

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 Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. **(1 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. Kepler's Laws. Satellite in circular orbit and applications.

Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). **(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:

1. **Relative motion. Inertial and non inertial reference frames.**
2. **Parameters defining the motion of mechanical systems and their degrees of freedom.**
3. **Study of the interaction of forces between solids in mechanical systems.**
4. **Centre of mass and inertia tensor of mechanical systems.**
5. **Newton's laws of motion and conservation principles.**
6. **Application of the vector theorems of mechanics and interpretation of their results.**
7. **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; ϵ - δ 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 variables; Maxima and minima for function of two variables.

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 Dekker Inc. New York 1975.
4. Shanti Narayan, Elements of Real Analysis, S. Chand & Company, New Delhi. 5. Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Company, New Delhi.
5. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
6. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
7. 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 flux. 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. 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. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. **(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 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.

- 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. Water 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. **(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. Diffraction grating. Resolving power of grating. (8 Lectures)

Fresnel Diffraction: 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 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 $\lambda^2 - T$ 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, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.

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, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions. Adiabatic flame temperature, explosion temperature.

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 . Le Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase.

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 Δ 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. Magnetic Work, Cooling due to adiabatic demagnetization, First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations.

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) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) 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. Doppler Broadening of Spectral Lines and Stern's Experiment. 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 CO₂ 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. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule-Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule-Thomson Cooling.

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 calibrate a Resistance Temperature Device (RTD) to measure temperature in a specified range using Null Method/ Off-Balance Bridge with Galvanometer based Measurement.
7. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
8. 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

□□ 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. Ogb

orn, 4th Edition,

reprinted 1985, Heinemann Educational Publishers

□□ A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

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.
 Other programs (e.g. Parity Check, using interrupts, etc.).

Note: Each students 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.

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.

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.

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.

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
Introduction to Numerical	Introduction to Scilab, Advantages and

<p>Computation software Scilab, Matlab</p>	<p>disadvantages, Scilab environment, Command window, Figure, window, Edit window, Variables 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, 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) 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 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)</p>
<p>Curve fitting, Least square fit, Goodness of fit, standard deviation</p>	<p>Ohms law to calculate R, Hooke's law to calculate spring constant</p>
<p>Solution of Linear system of equations by Gauss elimination method and Gauss Seidal method. Diagonalization of matrices, Inverse of a matrix, Eigen vectors, eigen values problems</p>	<p>Solution of mesh equations of electric circuits (3 meshes) Solution of coupled spring mass systems (3 masses)</p>
<p>Generation of Special functions using User defined functions in Scilab</p>	<p>Generating and plotting Legendre Polynomials Generating and plotting Bessel function</p>
<p>Solution of ODE First order Differential equation Euler, modified Euler and Runge-Kutta second</p>	<p>First order differential equation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Radioactive decay <input type="checkbox"/> Current in RC, LC circuits with DC source <input type="checkbox"/> Newton's law of cooling <input type="checkbox"/> Classical equations of motion
<p>order methods</p>	<p>Second order Differential Equation</p>
	<ul style="list-style-type: none"> <input type="checkbox"/> Harmonic oscillator (no friction)
	<ul style="list-style-type: none"> <input type="checkbox"/> Damped Harmonic oscillator
	<ul style="list-style-type: none"> <input type="checkbox"/> Over damped

Second order differential equation Fixed	<input type="checkbox"/>	Critical damped
difference method	<input type="checkbox"/>	Oscillatory
	<input type="checkbox"/>	Forced Harmonic oscillator
	<input type="checkbox"/>	Transient and
	<input type="checkbox"/>	Steady state solution
	<input type="checkbox"/>	Solve

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, 1stEdn., 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 wavefront. 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.

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: CO₂ laser, Solid State Laser: Host material and its characteristics, doped ions, Nd:YAG 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.

Unit IV: Nonlinear Optics & Fourier Optics

Origin of nonlinearity, susceptibility tensor, phase matching, second harmonic generation, methods of enhancement, frequency mixing processes.

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:

1. Principles of lasers- O Svelto
2. Solid State Laser Engineering- W Koechner
3. Laser- B A Labgyel
4. Gas laser- A J Boom
5. Methods of Experimental Physics Vol. 15B ed. By C L Tang
6. Industrial Application of Lasers – J F Ready
7. 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:

$$\begin{aligned} dy/dx &= e^{-x} \text{ with } y = 0 \text{ for } x = 0 \\ dy/dx + e^{-x}y &= x^2 \\ d^2y/dt^2 + 2 dy/dt &= -y \\ d^2y/dt^2 + e^{-t}dy/dt &= -y \end{aligned}$$

2. Dirac Delta Function, Evaluate

$$\frac{1}{\sqrt{2\pi\sigma^2}} \int e^{-\frac{(x-2)^2}{2\sigma^2}} (x+3) dx, \text{ for } \sigma = 1, 0.1, 0.01$$

and show it tends to 5.

3. Fourier Series:

$$\sum_{n=1}^{\infty} (0.2)^n$$

Program to sum

Evaluate the Fourier coefficients of a given periodic function (square wave)

4. Frobenius method and Special functions:

$$\int_{-1}^{+1} P_n(\mu)P_m(\mu)d\mu = \delta_{n,m}$$

Plot $P_n(x), j_v(x)$

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 n^{th} roots of unity for $n = 2, 3, \text{ and } 4$.
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
- ocw.nthu.edu.tw/ocw/upload/12/244/12handout.pdf
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
- 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 Lecturer

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. 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; 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 Eigen functions, normalization; Quantum dot as example. (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, 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, 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. (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. Griffith, 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, 3rdEdn., 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. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. 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 α and β Relations between α and β . Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.

Unit III Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. 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. Hartley & Colpitts oscillators. **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 design an inverting amplifier using Op-amp (741,351) for dc voltage of given gain
14. To design inverting amplifier using Op-amp (741,351) and study its frequency response
15. To design non-inverting amplifier using Op-amp (741,351) & study its frequency response
16. To study the zero-crossing detector and comparator.
17. To add two dc voltages using Op-amp in inverting and non-inverting mode
18. To design a precision Differential amplifier of given I/O specification using Op-amp.
19. To investigate the use of an op-amp as an Integrator.

20. To investigate the use of an op-amp as a Differentiator.

21. To design a circuit to simulate the solution of a $1^{st}/2^{nd}$ order differential equation. **Note:** Each student 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

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; Expectation values of position and

(8 Lectures)

momentum. Wave Function of a Free Particle.

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 wavefunction, 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:

- 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 Schrodinger 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:

$$\frac{d^2 y}{dr^2} + A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E] \text{ where } V = \frac{e^2}{r}$$

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)^{1/2}, $\hbar c = 1973$ (eVÅ) and $m = 0.511 \times 10^6$ eV/c².

2. Solve the s-wave radial Schrodinger equation for an atom:

$$\frac{d^2 y}{dr^2} + A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E]$$

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

$$V(r) = \frac{e^2}{r} e^{-r/a}$$

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 $e = 3.795 \text{ (eV}\text{\AA})^{1/2}$, $m = 0.511 \times 106 \text{ eV}/c^2$, and $a = 3 \text{ \AA}, 5 \text{ \AA}, 7 \text{ \AA}$. In these units $\hbar c = 1973 \text{ (eV}\text{\AA})$. 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

$$m \frac{d^2 y}{dr^2} + A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E]$$

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 $m = 940 \text{ MeV}/c^2$, $k = 100 \text{ 33 MeV fm}^{-2}$, $b = 0, 10, 30 \text{ MeV fm}^{-3}$. 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.

4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen

$$\frac{d^2 y}{dx^2} + A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E]$$

Where μ is the reduced mass of the two-atom system for the Morse potential

$$V(r) = D(e^{-2\alpha(r-r_0)} - e^{-\alpha(r-r_0)})^2, r_0 = r_0$$

Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take: $m = 940 \times 106 \text{ eV}/C^2$, $D = 0.755501 \text{ eV}$, $\alpha = 1.44$, $r_0 = 0.131349 \text{ \AA}$

Laboratory based experiments:

- Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
- Study of Zeeman effect: with external magnetic field; Hyperfine splitting
- To show the tunneling effect in tunnel diode using I-V characteristics.
- 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. Pressetal., 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 irrelevance 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 34 Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T₃ 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, Pirani gauge-flow measurement-orifice meter, venturimeter, electromagnetic 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, 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.

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 (μ), (6) Stability and (7) Binding Energy.

Radioactivity: Law of Radioactive Decay. Half-life, Theory of Successive Radioactive

Transformations. Radioactive Series, Binding Energy, Mass Formula. α -decay :- Range of α -particles, Geiger-Nuttall law and α -particle Spectra. Gamow Theory of Alpha Decay, β -decay. Energy Spectra and Neutrino Hypothesis, γ -decay :- Origin of γ -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. 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. **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)**

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, William 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. **(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. Saha's Ionization Formula. **(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. **(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

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 Boltzmann 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:
- Study of local number density in the equilibrium state (i) average; (ii) fluctuations
 - Study of transient behavior of the system (approach to equilibrium)
 - Relationship of large N and the arrow of time
 - Computation of the velocity distribution of particles for the system and comparison with the Maxwell velocity distribution.
 - Computation and study of mean molecular speed and its dependence on particle mass.
 - Computation of fraction of molecules in an ideal gas having speed near the most probable speed

Computation of the partition function $Z(\beta)$ for examples of systems with a finite

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:
- Study of how $Z(\beta)$, average energy $\langle E \rangle$, energy fluctuation ΔE , specific heat at constant volume C_V , depend upon the temperature, total number of particles N and the spectrum of single particle states.
 - Ratios of occupation numbers of various states for the systems considered above.
 - 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
- Maxwell-Boltzmann distribution
 - Fermi-Dirac distribution
 - 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:

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.
2. Hari Singh Nalwa, “Nanostructured Materials and Nanotechnology”, Academic Press, 2002. 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**

Dissertation/Project

SUBJECT NAME: DISSERTATION

SUBJECT CODE: BPH-377

1. Identification of a research Topic, reading of relevant literature, Summary of National and International Scenario of course taught.
2. Understanding of the unsolved and unresolved problems in the literature, framing of objectives for dissertation.
3. Assessment about the feasibility of identified objectives within available resources, and fine tuning of objectives for future work.
4. Experimental / computational analysis, data analysis and writing of report.
5. 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 wavefunction, 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: 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:

$$\frac{d^2 y}{dr^2} + A(r)u(r), \quad A(r) = \frac{2m}{\hbar^2} [V(r) - E] \quad \text{where } V(r) = -\frac{e^2}{r}$$

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)^{1/2}, $\hbar c = 1973$ (eVÅ) and $m = 0.511 \times 10^6$ eV/c².

6. Solve the s-wave radial Schrodinger equation for an atom:

$$\frac{d^2 y}{dr^2} + A(r)u(r), \quad A(r) = \frac{2m}{\hbar^2} [V(r) - E]$$

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

$$V(r) = \frac{e^2}{r} e^{-r/a}$$

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 $e = 3.795 \text{ (eV}\cdot\text{\AA)}^{1/2}$, $m = 0.511 \times 10^6 \text{ eV}/c^2$, and $a = 3 \text{ \AA}, 5 \text{ \AA}, 7 \text{ \AA}$. In these units $\hbar c = 1973$

(eV·Å). 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

$$m \frac{d^2 y}{dr^2} + A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E]$$

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 $m = 940 \text{ MeV}/c^2$, $k = 100 \text{ 33 MeV fm}^{-2}$, $b = 0, 10, 30 \text{ MeV fm}^{-3}$. 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

$$\text{molecule: } \frac{d^2 y}{dx^2} + A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E]$$

Where μ is the reduced mass of the two-atom system for the Morse potential

$$V(r) = D \left(e^{-2r/r_0} - e^{-r/r_0} \right)^2, r_0 = \text{constant}$$

Find the lowest vibrational energy (in

MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take: $m = 940 \times 106 \text{ eV}/c^2$, $D = 0.755501 \text{ eV}$, $\alpha = 1.44$, $r_0 = 0.131349 \text{ \AA}$

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 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. T₃ 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.ClausiusMosotti 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 magneticfield.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 ° 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

Unit III: Industrial Instruments

Temperature measurement - thermocouples, cold-junction compensation for thermocouple, bourdon gauge, bellows, diaphragme, differential pressure transmitter, vacuum gauges, melead gauge, pirani gauge-flow measurement-office meter, venturimeter, electro-magnetic flow meter, ultrasonic flow meter, rotameter positive displacement meters

Unit IV: Fundamentals of Networks:

Dc And Ac Series And Parallel Circuits - Kirchhoffs Law - Network Graph – 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 voltmeters - solid state multimeter - DMM - audio and Radio frequency signal generators

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 (μ), (6) Stability and (7) Binding Energy.

Radioactivity: Law of Radioactive Decay. Half-life, Theory of Successive Radioactive Transformations. Radioactive Series, Binding Energy, Mass Formula. α -decay :- Range of α -particles, Geiger-Nuttal law and α -particle Spectra. Gamow Theory of Alpha Decay, β -decay. Energy Spectra and Neutrino Hypothesis, γ -decay :- Origin of γ -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. 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).
- 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)**

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

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

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

1. 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
2. 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 $Z(\beta)$, average energy $\langle E \rangle$, energy fluctuation ΔE , 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 .
3. Plot Planck's law for Black Body radiation and compare it with Raleigh-Jeans Law at high temperature and low temperature.
4. 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.
5. 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 leastexperiments.

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. S. Yang and P. Shen: "Physics and Chemistry of Nanostructured Materials", Taylor & Francis, 2000.

Dissertation/Project

SUBJECT NAME: DISSERTATION

SUBJECT CODE: BPH-377

1. Identification of a research Topic, reading of relevant literature, Summary of National and International Scenario of course taught.
2. Understanding of the unsolved and unresolved problems in the literature, framing of objectives for dissertation.
3. Assessment about the feasibility of identified objectives within available resources, and fine tuning of objectives for future work.
4. Experimental / computational analysis, data analysis and writing of report.
5. Writing of manuscript and Poster making for presentation in scientific conferences or publication in Journal based on above work

Scheme for M.Sc. Hons. (Chemistry)

M.Sc. Hons. (Chemistry)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCH-111	Organic Chemistry-I	4	1	0	5
2	MCH-112	Physical Chemistry-I	4	1	0	5
3	MCH-120	Inorganic Chemistry-I	4	1	0	5
4	MCH-161	Organic Chemistry –I Lab	0	0	4	2
5	MCH-162	Physical Chemistry-I Lab	0	0	4	2
6	MCH-170	Inorganic Chemistry Lab-I	4	1	0	5
Total			16	4	8	24

M.Sc. Hons. (Chemistry)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCH-114	Inorganic Chemistry-II	4	1	0	5
2	MCH-115	Organic Chemistry-II	4	1	0	5
3	MCH-116	Physical Chemistry-II	4	1	0	5
4	MCH-117	Analytical Chemistry	4	1	0	5
5	MCH-164	Inorganic Chemistry Lab-II	0	0	4	2
6	MCH-165	Organic Chemistry Lab-II	0	0	4	2
7	MCH-166	Physical Chemistry Lab-II	0	0	4	2
8	MCH-167	Analytical Chemistry Lab-I	0	0	4	2
9	MCH-168	Summer Training	0	0	4	2
Total			16	4	20	30

(Inorganic Chemistry Specialization)

M.Sc. Hons. (Chemistry)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCH-212	Heterocyclic Compounds	3	1	0	4
2	MCH-213	Physical Chemistry III	3	1	0	4
3	MCH-219	Nuclear & Radioactive Chemistry	4	1	0	5
4	MCH-220	Bio Inorganic & Environmental Chemistry	4	1	0	5
5	MCH-260	Inorganic Chemistry-III Lab	0	0	4	2
6	MCH-261	Organic Chemistry-III Lab	0	0	4	2
7	MCH-263	Physical Chemistry-III Lab	0	0	4	2
Total			14	4	12	24

M.Sc. Hons. (Chemistry)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCH-221	Oregano Transition metal Chemistry	4	1	0	5
2	MCH-222	Electro Analytical Chemistry	4	1	0	5
3	MCH-223	Medical aspects of Inorganic Chemistry	4	1	0	5
4	MCH-224	Industrial Chemistry	4	1	0	5
5	MCH-271	Inorganic Chemistry-IV Lab	0	0	4	2
6	MCH-272	Inorganic Chemistry-V Lab	0	0	4	2
7	MCH-267	Dissertation/ Major Project	0	0	8	4
Total			16	4	16	28

Scheme for M.Sc. Hons. (Mathematics)

M.Sc. Hons. (Mathematics)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MMA-110	Complex Analysis	4	1	0	5
2	MMA-111	Functional Analysis	4	1	0	5
3	MMA-112	Field Theory	4	1	0	5
4	MMA-113	Differential Equations	4	1	0	5
5	MMA-114	Numerical Analysis	4	1	0	5
Total			20	5	0	25

M.Sc. Hons. (Mathematics)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MMA-115	Topology	4	1	0	5
2	MMA-116	Measure And Integration	4	1	0	5
3	MMA-117	Module Theory	4	1	0	5
4	MMA-118	Fluid Dynamics	4	1	0	5
5	MMA-119	Probability & Statistics	4	1	0	5
Total			20	5	0	25

M.Sc. Hons. (Mathematics)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MMA-210	EL1(Any One)	4	1	0	5
2	MMA-211	EL2(Any One)	4	1	0	5
3	MMA-212	EL3(Any One)	4	1	0	5
4	MMA-213	EL4(Any One)	4	1	0	5
5	MMA-214	EL5(Any One)	4	1	0	5
Total			20	5	0	25

M.Sc. Hons. (Mathematics)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MMA-215	EL6(Any One)	4	1	0	5
2	MMA-216	EL7(Any One)	4	1	0	5
3	MMA-217	EL8(Any One)	4	1	0	5
4	MMA-218	EL9(Any One)	4	1	0	5
5	MMA-219	EL10(Any One)	4	1	0	5
Total			20	5	0	25

Scheme for M.Sc. Hons. (Physics)

M.Sc. Hons. (Physics)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MPH-110	MathematicalPhysics	3	1	0	4
2	MPH-111	ClassicalMechanics	3	1	0	4
3	MPH-112	QuantumMechanics-I	3	1	0	4
4	MPH-113	Electro-OpticEffectsInMaterials(EOEM)	3	0	2	4
5	MPH-114	Electronics	3	0	0	3
6	MPH-161	GeneralPhysicsLaboratory	0	0	4	2
7	MCS-163	Electro-OpticEffectsInMaterials(EOEM)Lab	0	0	2	1
8	MPH-164	ElectronicsLab	0	0	4	2
Total			15	3	12	24

M.Sc. Hons. (Physics)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MPH-115	QuantumMechanics-II	3	1	0	4
2	MPH-116	TheoryofRadiation&StatisticalMechanics	3	1	0	4
3	MPH-117	NumericalMethodsandComputationalPhysics	3	1	0	4
4	MPH-118	ElectromagnetictheoryandElectromagnetism	3	1	0	4
5	MPH-119	AtomicandMolecularPhysics	3	1	0	4
6	MPH-165	AdvancedPhysics Laboratory	0	0	4	2
7	MPH-167	NumericalMethodsandComputationalPhysicsLab	0	0	2	1
8		SummerTraining	0	0	2	1
Total			15	5	8	24

M.Sc. Hons. (Physics)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MPH-210	SolidStatePhysics	3	1	0	4
2	MPH-211	NuclearandParticlePhysics	3	1	0	4
3	MPH-212	FiberOptics & Laser	3	1	0	4
4	MPH-213	Electronics-I	3	1	0	4
5	MPH-214	Electronics-II	3	1	0	4
6	MPH-263	Electronics–I Lab	0	0	2	1
7	MPH-264	GeneralPhysicsLaboratory-II	0	0	2	1
Total			15	5	4	22

M.Sc. Hons. (Physics)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MPH-221	MeasurementTechniques	3	1	0	4
2	MPH-222	Nano Science And TechnologyDepartmentalElectivepaper- II	3	1	0	4
3	MPH-223	ElectronicCommunicationSystem (SpecializationElectivepaper-III)	3	1	0	4
4	MPH-224	ElectronicDevices (SpecializationElectivepaper-IV)	3	1	0	4
5	MPH-271	MeasurementTechniquesLab	0	0	2	1
6	MPH-273	ElectronicCommunicationSystemLab	0	0	2	1
7	MPH-274	Project/Dissertation	0	0	12	6
Total			12	4	16	24

Scheme for Ph.D. (Physics)

Ph.D. (Physics)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	GE-501	Research Methodology	4	0	0	4
2	LS-501	Literature Survey	0	2	0	2
3	RPE-101	Research and Publication Ethics	2	0	0	2
Optional Courses (Any two courses taking one from each option)						
Option-1						
4	PHY-601	Advanced Mathematical Methods in Physics	3	0	0	3
5	PHY-602	Advanced Nano Physics	3	0	0	3
6	PHY-603	Advanced Condensed Matter Physics	3	0	0	3
7	PHY-604	Advanced Quantum Mechanics	3	0	0	3
Option-II						
8	PHY-605	Advanced Material Science	3	0	0	3
9	PHY-606	Advanced Computational Physics	3	0	0	3
10	PHY-607	Advanced Materials and Energy Devices	3	0	0	3
11	PHY-608	Photonics and Fibre Optics	3	0	0	3
Total			30	2	0	32

Ph.D. (Physics)	
SN	Course Name
1	Synopsis writing
2	Approval of synopsis by Research Committee (Synopsis Seminar)
3	Research work by taking 10 credit hours

Scheme for Ph.D. (Mathematics)

Ph.D. Hons. (Mathematics)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	GE-501	Research Methodology	4	0	0	4
2	LS-501	Literature Survey	0	2	0	2
3	RPE-101	Research and Publication Ethics	2	0	0	2
Two of the following Courses of subject specific						
4	DMA-501	Mathematical Programming	3	0	0	3
5	DMA-502	Advanced Numerical Analysis	3	0	0	3
6	DMA-503	Inventory Modelling and Optimization	3	0	0	3
7	DMA-504	Nonlinear Analysis and Optimization	3	0	0	3
8	DMA-505	History of Mathematics & Mathematical Modelling	3	0	0	3
9	DMA-506	Fixed Point Theory and Application	3	0	0	3
Total			24	2	0	26

Ph.D. Hons. (Math)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	GE-501	Research Methodology	4	0	0	4
2	LS-501	Literature Survey	0	2	0	2
3	RPE-101	Research and Publication Ethics	2	0	0	2
Optional Courses (Any two courses taking one from each option)						
Option-1						
4	CHEM-601	Nanomaterial and Applications	3	0	0	3
5	CHEM-602	Advanced Physical Chemistry	3	0	0	3
6	CHEM-603	Advanced Organic Chemistry	3	0	0	3
7	CHEM-604	Application of spectroscopic studies in chemical research	3	0	0	3
Option-II						
8	CHEM-605	Advanced Tools & Techniques in Chemistry	3	0	0	3
9	CHEM-606	Advanced Inorganic Chemistry	3	0	0	3
10	CHEM-607	Disconnection Approach and Heterocyclic Chemistry	3	0	0	3
11	CHEM-608	Materials Science And Molecular Modelling	3	0	0	3
Total			30	2	0	32

Scheme for B.Tech. (Regular)

B.Tech.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101A	Applied Mathematics –I	3	0	0	3
2	PHB-101A	Applied Physics	3	0	0	3
3	CE-102 A	Basics of Civil Engineering	3	0	0	3
4	CSB-101 A	Computer Programming	3	0	0	3
5	CHB-101 A	Applied Chemistry	3	0	0	3
6	ENA-101A	Communication Skills-I	3	0	0	3
7	CHB-151A	Applied Chemistry Lab	0	0	2	1
8	PHB-151A	Applied Physics Lab	0	0	2	1
9	ENA-151A	Communication Skills Lab –I	0	0	2	1
10	CSB-151A	Computer programming Lab	0	0	2	1
11	CE-152A	Basics of Civil Engineering Lab	0	0	2	1
12	ME-153A	Computer Based Engineering Graphics	0	0	4	2
Total			18	0	14	25

B.Tech.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102 A	Applied Mathematics –II	3	0	0	3
2	ME-102 A	Basics of Mechanical Engineering	3	0	0	3
3	EL-101A	Basics of Electrical Engineering	3	0	0	3
4	EC-101A	Basics of Electronics Engineering	3	0	0	3
5	CEA-101A	Environmental Science and Ecology	2	0	0	2
6	EN-102A	Communication Skills-II	2	0	0	2
7	ME-152 A	Workshop Practice	0	0	2	1
8	ME-154A	Basics of Mechanical Engineering Lab	0	0	2	1
9	EL-151A	Basics of Electrical Engineering Lab	0	0	2	1
10	EN-152A	Communication Skills Lab –II	0	0	2	1
11	EC-151A	Basics of Electronics Engineering Lab	0	0	2	1
12	PD-193A	Entrepreneurship and Professional Skills	0	1	0	1
13	PD-191A	Co-curricular Activities	0	1	0	1
Total			16	2	10	23

B.Tech. (I. B.Tech 3rd Year- SEMESTER-V)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CE-201A	Surveying – I	3	1	0	4
2	MA-202A	Applied Numerical Methods	3	1	0	4
3	CE-202A	Building Materials & Construction	3	0	0	3
4	CE-203A	Structural Mechanics	3	1	0	4
5	CE-207A	Fluid Mechanics – I	3	1	0	4
PRACTICAL						
6	CE-251A	Surveying – I Lab	0	0	2	1
7	CE-252A	Building Construction Drawing	0	0	2	1
8	CE-253A	Structural Mechanics Lab	0	0	2	1
9	EN-201A	English language	0	0	2	1
10	CE-257	Fluid Mechanics Lab I	0	0	2	1
11	PD-291A	Co-curricular Activities	0	1	0	1
Total			15	5	10	25

B.Tech. (I. B.Tech 3rd Year- SEMESTER-VI)				Semester			IV
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	BA-225A	Economics	3	0	0	3	
2	CE-205A	Surveying – II	3	1	0	4	
3	CE-206A	Structural Analysis	3	1	0	4	
4	CE-208A	Fluid Mechanics – II	3	0	0	3	
5	CE-204A	Engineering Geology	3	0	0	3	
6	CE-210A	Environmental Engineering.-I (Water Resources & Systems)	3	0	0	3	
PRACTICAL							
7	CE-254A	Engineering. Geology Lab	0	0	2	1	
8	CE-255A	Surveying – II Lab	0	0	2	1	
9	CE-256A	Structural Analysis Lab	0	0	2	1	
10	CE-258A	Fluid Mechanics – II Lab	0	0	2	1	
11	CE-281A	Minor Project	0	0	2	1	
12	PD-293	Intra & Inter-personal Skills/	0	1	0	1	
13	PD-291	Co-curricular Activities	0	1	0	1	
Total			18	4	10	27	

B.Tech. (I. B.Tech 4th Year- SEMESTER-VII)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-249A	Principles of Management	3	0	0	3
2	CE-209A	Geotechnical Engineering-I	3	1	0	4
3	CE-301A	Transportation Engineering – I	3	0	0	3
4	CE-302A	Design of Concrete Structures – I	3	1	0	4
5	CE-308A	Environmental Engineering – II (Sanitary Engineering)	3	0	0	3
6	CE-306A	Hydraulics Structures & Irrigation Engg	3	0	0	3
PRACTICAL						
7	CE-259A	Geotechnical Engg- I Lab	0	0	2	1
8	CE-351A	Transportation Engineering – I Lab	0	0	2	1
9	CE-352A	Design of concrete Structure-I Lab	0	0	2	1
10	CE-358A	Environmental Engg – II (Sanitation) Lab	0	0	2	1
11	CE-391A	Survey Camp(One Week)	0	0	2	1
12	PD-392/ PD-393/ PD-352	Problem solving Skills/ Advanced Professional Development**/ Civil Engineering Drawing	0	1	0	1
13	PD-391	Co-curricular Activities	0	1	0	1
Total			18	3	12	27

B.Tech. (I. B.Tech 4th Year- SEMESTER-VIII)				Semester			VI
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	CE-303A	Geotechnical Engineering-II	3	1	0	4	
2	CE-304A	Transportation Engineering – II	3	0	0	3	
3	CE-305A	Design of Steel Structure – I	3	1	0	4	
4	CE-307A	Concrete Technology	3	0	0	3	
5	CE-309A	Estimating, Costing, Billing & Accounts	3	0	0	3	
6	CE-461A	Construction Management & Equipment	3	0	0	3	
PRACTICAL							
7	CE-357A	Concrete Technology Lab	0	0	2	1	
8	CE-353A	Geotechnical Engineering Lab	0	0	2	1	
9	CE-354A	Transportation Engineering – II Lab	0	0	2	1	
10	CE-355A	Design of steel structure-I Lab	0	0	2	1	
11	PD-392/ PD-393/ PD-352	Problem solving Skills/ Advanced Professional Development**/ Civil Engineering Drawing	0	1	0	1	
12	PD-391	Co-curricular Activities	0	1	0	1	
Total			18	4	8	26	

B.Tech. (I. B.Tech 5^h Year- SEMESTER-IX)				Semester			VII
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	CE-402A	Design of Concrete Structures-II	3	1	0	4	
2	CE-406A	Design of Earthquake Resistant Structures	3	1	0	4	
3	CE-422A	Hydrology	3	0	0	3	
4	CE-407A	Transportation Engineering - III	3	0	0	3	
5		Open Elective	3	0	0	3	
6		Departmental Elective-I	3	0	0	3	
PRACTICAL							
7	CE-486	Project work	0	0	4	2	
8	CE-452A	Design of Concrete Structure II Lab	0	0	2	1	
9	CE-455A	Case study	0	0	2	1	
10	PD 491	Co-curricular Activities	0	1	0	1	
Total			18	3	8	25	

B.Tech. (I. B.Tech 5^h Year- SEMESTER-IX)			VIII
SN	Course Code	Course Name	Credits
1	CE-425A	Departmental Elective-II	3
2	CE-483A	Internship -I	1
3	CE-484A	Internship -II	11
Total			15

Departmental Elective– I

B.Tech.			Semester			Credits
SN	Course Code	Course Name	Periods			
			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 ^h Year- SEMESTER-IX)			Semester			Credits
SN	Course Code	Course Name	Periods			
			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

Syllabus for B.Tech. (Regular)

DETAILED CONTENTS - SEMESTER – III

CE-201A	SURVEYING-I	L T P	Cr
		3 1 0	4

OBJECTIVE

One of the important functions of a civil engineer is to conduct investigations by using research based knowledge and methods including design of experiments, analysis and interpretation of data for solving engineering problems. Surveying forms an important function of civil engineers to determine relative positions of existing features of the ground; layout of proposed structure on the ground; determine areas, volumes and other related quantities; prepare maps to detail out locations of cities, towns, villages, roads etc; prepare engineering detailed plans and sections pertaining to roads, railways, dams and other structures; prepare topographical maps showing detail of hills, valleys and rivers etc. Therefore, the subject of Surveying has great importance for civil engineers. This subject has been divided into two parts I covers Linear measurement, leveling, theodolite and plane table surveying, tachometry and curves. Students are expected to understand and do extensive practice for gaining competencies for effective functioning.

- 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.
- 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.
- 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.
- 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.
- 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 BOOK:

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

CE-202A	BUILDING MATERIALS & CONSTRUCTION	L T P	Cr
		3 0 0	3

OBJECTIVE

A engineer should have proper understanding of about various construction materials, their specification and method of constructing various types of buildings. This subject is also essential to understand architectural drawings with a view to design and construct various components of the building from foundation to super structure including finishing operations. This subject therefore include materials, components of a building including doors and windows, floors and roofs and paints and varnishes

1. **MATERIALS AND TILES: Stones:** Classification of stones, quarrying, blasting and storing, dressing, sawing, polishing and seasoning of stones. **Bricks:** classification, constituents of good brick earth, harmful ingredients, manufacturing and testing of bricks. **Cement:** chemical composition, Hydration, Setting of cement, Structure of hydrate cement, testing physical properties, Different grades of cement. **Aggregate:** Classification of aggregate, Particle shape & texture, Bond strength & other mechanical properties of aggregate, Grading of fine & coarse Aggregates, Gap graded aggregate, maximum aggregate size. **Tiles:** Terra – cotta, manufacturing of tiles and terra – cotta, types and uses of terra – cotta.
2. **DAMP PROOFING:** Defects, causes and prevention of dampness, damp proofing treatment in buildings, materials used water proofing treatment of roofs. Cavity and partition walls, advantages, position of cavity, construction details, precautions, construction of masonry cavity walls.
3. **ROOFS AND FLOORS:** Types of roofs, various terms used roof trusses: King Post Truss, Queen Post Truss. Floor structure: ground, basement and upper floors, various types of floorings.
4. **DOOR AND WINDOWS:** Location, sizes, types of doors and windows, details, fixtures and fasteners for doors and windows
5. **TIMBERS, PAINTS AND VARNISHES: Timber:** Classification of timber, seasoning of timber, defects in timber, fire proofing of timber. Plywood, fire board, masonite and its manufacturing, important Indian timbers. **Paints & Varnishes:** Basic constituents of paints, types of paints, painting of wood, constituents of varnishes, classification and types of varnishes.

TEXT BOOK

Punmia, B. C., Jain, Ashok Kumar., Jain, Arun Kumar., “Building Construction”, Laxmi Publication Pvt Ltd., New Delhi, 2005

REFERENCE BOOKS

- Kumar, Sushil., ”Building Construction” Standard Pub., N. Delhi, 2008
- Rangwala, S. C., ‘Building Construction I’, Rangwala Charotar Publishing House Pvt. Ltd.
- Sane Y.S. Construction Engineering, CBS Publishers & Distributors, New Delhi., year 2006
- Gurcharan Singh., Building Construction, , Standard Pub., N. Delhi., 1999

CE-203A	STRUCTURAL MECHANICS	L T P	Cr
		3 1 0	4

OBJECTIVE

Structural Mechanics is an applied engineering subject, knowledge of which is essential in computing various types of stresses encountered by various structural members for designing the same. This subject will deal with simple stress and strains, bending moment and shear forces, torsion, deflection in beams and analysis of statically determinate trusses. Students are expected to gain conceptual understanding of above aspects for designing safe structures.

1. **SIMPLE STRESSES AND STRAIN:** Types of stresses and strain, Hooks Law, modulus of elasticity, analysis for simple stresses and strains, deformation of bars under axial loads, various elastic constants and their relationship, Poison’s ratio, temperature stresses. Principal stresses due to combined bending and torsion, Analysis of strain, Mohr’s circle for two dimensional stresses and strain
2. **BENDING MOMENT AND SHEAR FORCE:** Definitions, sign convention, bending moment and shear force diagrams for beams and cantilevers under concentrated, distributed and varying loads, beams with overhangs.
3. **BENDING, SHEAR AND TORSION:** Theory of simple bending, Assumptions, Flexure formula, Moment of resistance, Distribution of shear stress for various cross – sections. Theory of pure torsion, assumptions, torsion in solid and hollow circular sections. Columns and struts: End conditions, short and long columns, Euler’s critical buckling loads. Various empirical formulae. Axially and eccentrically loaded columns.
4. **DEFLECTION IN BEAMS:** Determination of slope and deflection by differential equations, moment area method, conjugate beam method, unit load method, principle of virtual work. Maxwell’s law of reciprocal deflections.
5. **ANALYSIS OF STATICALLY DETERMINATE TRUSSES:** Basic of plane trusses by: method of joints, method of sections, graphical method. Analysis of space trusses by tension coefficient method.

TEXT BOOK

S. Ramamurthan., “Strength of Materials”, Dhanpat Rai & sons, 2nd Edition, New Delhi, 2007

REFERENCE BOOKS

1. Bhavikatti, S. S., “Strength of Materials”, Vikas Publishing House Pvt. Ltd, New Delhi, 2008
2. Timoshenko, S., “Strength of Materials Part-I”, New Delhi, 2008
3. Popov, Nagarjan., & Lu., “Mechanics of Materials”, Prentice Hall of India.
4. Jain, A.K., “Elementary Structural Analysis”, Nem Chand & Bros, Roorkee, 2003
5. Wibur & Nooris., “Elementary Structural Analysis”, McGraw Hill Book Co., New York.
6. Subramanian.R., “ Strength of Materials”, Oxford University Press India,2016

CE-207A	FLUID MECHANICS-I	L T P	Cr
		3 0 0	3

OBJECTIVE

A civil engineer is expected to deal with water supply systems, irrigation works and systems, dams and reservoirs, hydraulic structures etc. Knowledge of fluid mechanics is required to design and solve problems related to these systems. Therefore, kinematics of fluid flow, fluid statics, dynamics of fluid flow and boundary layer theory has been included in this subject.

1. **INTRODUCTION:** Fluid properties; mass density, specific weight, specific volume and specific gravity, surface tension, capillarity, pressure inside a droplet and bubble due to surface tension, compressibility, viscosity. Newtonian and Non-Newtonian fluids, Real and ideal fluids.
2. **KINEMATICS OF FLUID FLOW:** Kinematics; Steady & unsteady, uniform and non-uniform, laminar & turbulent flows, one, two & three dimensional flows. Stream lines; streak lines and path lines. Continuity equation in differential form, rotation and circulation, elementary explanation of stream function and velocity potential function rotational and rotational flows, graphical and experimental methods of drawing flow nets.
3. **FLUID STATICS:** Pressure; density, height relationship, gauge and absolute pressure, simple differential and sensitive manometers, two liquid manometers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, determination of met centric height, fluid masses subjected to uniform acceleration, free and forced vortex.
4. **DYNAMIC OF FLUID FLOW:** Euler’s equation of motion along a streamline and its integration, limitation of Bernoulli’s equation. Pitot tubes, venturimeter, Orificemeter, flow through orifices & mouth pieces, sharp crested weirs and notches, aeration of nappe.
5. **BOUNDARY LAYER THOERY:** Boundary layer thicknesses, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, laminar sub-layer, smooth and rough boundaries, local and average friction coefficient, separation and its control.
Principles of Dimensional homogeneity, Rayleigh’s method, Buckingham’s theorem, dimensional analysis problems, use and limitation of dimensional analysis.

TEXT BOOK

P.N. Modi & S.M. Seth., “Hydraulic and Fluid Mechanic” Standard Book House, 2009

REFERENCE BOOKS

1. Streeter & Wylie., “Fluid mechanics”, McGraw-Hill Companies, 9th Sub edition (December 1, 1997)
2. V.T. Chow., “Open channel Hydraulics”, McGraw-Hill Companies (June 1, 1959)
3. R. J. Garde, & A. G. Mirajgaoker., “Engineering Fluid Mechanics”, Eurasia **Publishing** House (P) Ltd., New Delhi, 1995
4. Arora, “Fluid mechanics hydraulics and hydraulics machines”, Standard Publications.
5. Jagdish, Lal., “Hydraulics Machines”, Metropolitan Book Co, N Delhi, 2003

CE-251A	SURVEYING-I 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. Tachometry; Tachometric constants, calculating horizontal distance and elevation with the help of tachometer
10. Study and use of Theodolite in making horizontal and vertical angles

CE-252A	BUILDING CONSTRUCTION DRAWING	L T P	Cr
		0 0 2	1

DRAWINGS:

Note: Students should be taught Sign and conventions used in civil Engineering drawings

1. Masonry: Preparation of drawing in plan and elevation of at least three courses of one brick thick wall showing L-Junction, T-Junction, Cross junction in English bond
2. Preparation of drawing pertaining to different type of stone masonry .
3. Preparation of drawing pertaining to DPC at basement ,plinth level and roof level
4. Arch ; Preparation of drawing pertaining to different type of arch illustrating the key points
5. Preparation of drawing and pertaining to fully paneled ,glazed door and window, solid flush door
6. Preparation of drawing pertaining to collapsible and rolling shutters
7. Preparation of drawing of a King Post Truss
8. Detailed Drawing of single storey houses 3BHK
9. Preparation of drawing pertaining to different type of stair cases with landing and hand rail provision

10. Preparation of drawing pertaining to shear wall provision and sketches of modern lintel and chajja

CE-253A	STRUCTURAL MECHANICS LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Verification of reciprocal theorem of deflection by 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 behavior of struts with various end conditions.
7. Determination of elastic properties of materials
8. Uniaxial tension test for steel (plain & deformed bars)
9. Uniaxial compression test on concrete & bricks specimens.
10. Study of space frame and its analytical verification

CE-257A	FLUID MECHANICS – I LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. To determine the coefficient of impact for the vanes
2. To determine the coefficient of discharge of an orifice meter
3. To determine coefficient of discharge of Notch (V-Notch and Rectangular Notch)
4. To determine the friction factor for the pipes
5. To determine the coefficient of discharge of Venturimeter
6. To determine the coefficient of discharge of an orifice.
7. To Verify the Bernoulli's Theorem
8. To find critical Reynolds's number for a pipe flow
9. To determine the met centric height of a floating body.
10. To determine the minor losses due to sudden enlargement, sudden contraction and bends for pipe flow.

DETAILED CONTENTS - SEMESTER – IV

CE-205A	SURVEYING-II	L T P	Cr
		3 1 0	4

OBJECTIVE

In the past four decades, huge amount of geologic data has been accumulated. Now it is time to integrate these geologic data with other sources of data, such as the digital elevation model (DEM) and remote sensing data, to do various analyses, 3D modelling, and real-time interactive visualization to extract more meaningful results. In continuation to surveying I where elementary methods of surveying were dealt with, surveying II deals with advanced techniques like: Trigonometrically levelling, Triangulation, Field Astronomy, Elements of Photogrammetric and Remote sensing to equip the students with advances in the field of Surveying.

1. **TRIGONOMETRICAL LEVELLING:** Introduction-Height and Distance (Base of an object accessible and inaccessible)- Difference in elevations between two points-Geodetically observations and correction for temperature, refraction, curvature and signal.
2. **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.
3. **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.
4. **ELEMENTS OF PHOTOGRAMMETRY:** Introduction, types of photographs, Arial photography and its interpretation, Flight planning for Arial survey, Stereoscope and stereoscopic vision.
5. **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 equipments, 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,

REFERENCE BOOKS

1. Clark, D., "Plane and Geodetic Surveying", Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1971.
2. Bannister, A. and Raymond, S., "Surveying", ELBS, 6th Edition, 1992.
3. James, M. Anderson and Edward, M. Mikhail., "Introduction to Surveying", McGraw-Hill Book Company, 1985
4. Wolf, P.R., "Elements of Photogrammetry", McGraw-Hill Book Company, Second Edition, 1986.
5. Robinson, A.H., Sale, R.D. Morrison, J.L. and Muehrche, P.C., "Elements of Cartography", John Wiley and Sons, New York, Fifth Edition, 1984.
6. Heribert, Kahmen and Wolfgang, Faig., "Surveying", Walter de Gruyter, 1995.
7. Kanetkar, T. P., "Surveying and Leveling", Vols. I and II, United Book Corporation, Pune, 1994.
8. Arora, K. R., "Surveying" Vol. 2 & 3 , Standard Book House Pub., New Delhi.

9. Satheesh, Gopi, R. Sathikumar, and N. Madhu., “Advanced surveying”, Pearson.

CE-206A	STRUCTURAL ANALYSIS	L T P	Cr
		3 1 0	4

OBJECTIVE

Structural Engineers are required to analyze different types of structures to determine the effect of loads on physical structures and their components. In continuation of structural Mechanics, Structural Analysis analyses of statically indeterminate structures, slope deflection of structures, analysis of continuous beams and three hinged arches, cables and suspension bridges. Students are required to grasp basic concepts and principles involved and do extensive practice to analyze different structures for arriving at safe designs.

1. **STATICALLY INDETERMINATE STRUCTURES:** Introduction, Static and Kinematic Indeterminacies; Castiglione’s theorems, Strain energy method. Analysis of frames with one or two redundant members using Castiglione’s 2nd theorem.
2. **SLOPE DEFLECTION:** Slope deflection Methods; Analysis of continuous beams & portal frames. Portal frames with inclined members. Moment distribution method: Analysis of continuous beams & portal frames. Portal frames with inclined members.
3. **ANALYSIS OF THREE HINGED ARCHES:** Three hinged arches subjects to concentrated and distributed loads. Horizontal thrust, shear force and bending moment diagrams. Analysis of Three hinged Arches; Parabolic and circular Arches, Bending Moment Diagram for various loadings, Temperature effects, Rib shortening, Axial thrust and Radial Shear force diagrams.
4. **UNSYMMETRICAL BENDING:** Unsymmetrical Bending ;Introduction, Centroidal principal axes of sections, Bending stresses in beams subjected to unsymmetrical bending, shear centre for channel, Angles and Z sections.
5. **CABLE AND SUSPENSION BRIDGES:** Introduction, uniformly loaded cables, Temperature stresses, Three hinged stiffening Girder and two hinged stiffening Girder.

TEXT BOOK

Punmia, B.C., Jain, Ashok Kumar., Jain, Arun Kumar., ”Theory of structure”, Laxmi publication Pvt. Ltd, New Delhi, 2009

REFERENCE BOOKS

1. Wang, C.K., “Statically Indeterminate Structures”, McGraw Hill Book Co., New York.
2. Jain A. K., “Advanced Structural Analysis”, Nem Chand & Bros., Roorkee.
3. A. Kassimali., “Structural Analysis”, PWS-Kent, Cincinnati, OH, 1999. (K in course syllabus)
4. Kenneth, M. Leet and Chia-Ming Uang., “Fundamentals of Structural Analysis”, McGraw-Hill, New York, NY, 2002. (L & U in course syllabus)
5. James, K. Nelson and Jack, C. McCormac., “Structural Analysis: Using Classical and Matrix Methods”, John Wiley & Sons, Hoboken, NJ, 2003 (N & M in course syllabus)
6. William, Weaver, Jr. and James, M. Gere., “Matrix Analysis of Framed Structures”, Second Edition, D. Van Nostrand, New York, NY, 1980.
7. M. Hoit., “Computer-Assisted Structural Analysis and Modeling”, Prentice-Hall, Englewood, Cliffs, NJ, 1995.
8. T. R. Tauchert., “Energy Principles in Structural Mechanics”, McGraw-Hill, New York, 1974.
9. Ramamurthan, S., “Theory of structure”, Dhanapat Rai and sons, New Delhi, 2009

CE-208A	FLUID MECHANICS-II	L T P	Cr
		3 0 0	3

OBJECTIVE

In continuation to Fluid Mechanics-I, Fluid Mechanics-II is aimed at equipping the students with knowledge and skills pertaining to Turbulent flows, flow through pipes and open channels, turbines and various types of pumps used in civil engineering.

- 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.
- 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.
- 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.
- TURBINES:** Classification, definitions, similarity 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 life
- 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

- K. Jain., "Fluid Mechanics", Khanna Publishers, New Delhi, (2008)
- Subramanyam., "Fluid mechanics", Tata McGraw-Hill, New Delhi
- Rajput, R.K., "Fluid Mechanics and Hydraulic Machines", Standard Publishing House, New Delhi, 2002
- F.M. White., "Fluid Mechanics", Tata McGraw-Hill, New Delhi, 2008
- Jagdish, Lal., "Hydraulics Machines", Metropolitan Book Co, New Delhi, 2003
- Kumar, K.L., "Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, 1995

CE-204A	ENGINEERING GEOLOGY	L T P	Cr
		3 0 0	3

OBJECTIVE

Engineering Geology is the application of the geologic sciences as applied to engineering practice for the purpose of assuring that the geologic factors affecting the location, design, construction, operation and maintenance of engineering works are recognized and adequately provided for. Engineering geologists investigate and provide geologic and geotechnical recommendations, analysis, and designs associated with civil engineering structures.

1. **INTRODUCTION:** Definition, object, scope and sub division of geology, geology around us. The interior of the earth. Importance of geology in Civil Engineering projects.
2. **PHYSICAL GEOLOGY AND HYDROGEOLOGY:** The external and internal geological forces causing changes, weathering and erosion of the surface of the earth. Geological work of ice, water and winds. Hydrogeology, Aquifers, Springs and Artesian wells.
3. **MINERALOGY AND PETROLOGY:** Definition: mineral and rocks. Classification of important rock forming minerals, simple description based on physical properties of minerals. Rocks of earth surface; classification of rocks. Mineral composition, Textures, structure and origin of Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks.
4. **STRUCTURAL AND APPLIED GEOLOGY:** Forms and structures of rocks. Bedding plane, Outcrops, Dip and Strike. Elementary ideas about fold, fault, joint and unconformity. Importance of geological structures in Civil Engineering projects. Geological investigation, Rock Quality Designation (RQD). Geological conditions & their influence on selection and design of Dams and reservoirs, Tunnels, Roads and Bridges.
5. **GEOLOGICAL HAZARDS:** Earthquakes, Seismic waves, Causes and effects of earthquakes. Volcanoes, Types of volcanoes and effects of volcanic eruption. Landslide, Types of landslide, Mitigation measures used to control landslides.

TEXT BOOK

Singh, Parbin., "A Textbook of Engineering and General Geology", S. K. Kataria & Sons, Delhi, 2008

REFERENCE BOOKS

1. Garg, S.K., "Physical and General Geology", Khanna Publishers, New Delhi, 2007
2. Mukherjee, P. K., "A Text Book of Geology", World Press Pvt. Ltd. Kolkatta, 2001
3. Arthur, Holemess., "Principles of physical geology", Thomas Nelson and Sons, USA, 1964.
4. Ford, W.E., "Dana's textbook of mineralogy", (4th edition), Wiley Eastern Ltd., N. Delhi, 1989.
5. Winter J.D., "An introduction to igneous and metamorphic petrology", Prentice Hall of India, 2001.
6. Billings, M.P., "Structural Geology", Prentice Hall Inc., New Jersey, USA, 1972.
7. Krishnan, M.S., "Geology of India and Burma", 3rd Edition, IBH Publishers, Delhi, 1984.
8. Blyth, F.G.H., and de Freitas, M.H., "A geology for Engineers", 7th edition, Elsevier Publications, 2006.
9. Ramamrutham, S. and Narayanan, R., "Engineering Geology", First edition, Dhanpat Rai Publications, New Delhi, 2014

CE-210A	ENVIRONMENTAL ENGINEERING – I (WATER RESOURCES AND SYSTEMS)	L T P	Cr
		3 0 0	3

OBJECTIVE

A civil Engineer is called upon to plan, design and implement Water Supply Systems. For the performance of this function efficiently, these engineers should be well versed with importance of environmental engineering with specific reference to the need for protected water supply, water borne diseases and techniques of disposal of waste. Also, these engineers should know water requirement for domestic, public & industrial needs, fire demands, losses and wastages, Rate of demand, Factors affecting rate of demand, minimum requirements as per standards, variation in rate of demand etc..These engineers must understand water treatment process and water supply systems, their design and associated problems. Hence this subject is of great importance.

1. **SOURCES OF SUPPLY:** Surface sources and types of intake, storage reservoirs, ground water, types of aquifers and wells, well hydraulics, yield of wells, radial collector wells.
2. **WATER QUANTITY:** Sources of water (Surface & ground water sources), Estimation of quality and quantity of water from various surface & ground water sources. Storage reservoirs, streams, infiltration galleries, shallow wells deep wells, artesian wells, radial collector wells. Selection of a source of water supply, importance and necessity of water supply scheme. Water demands and its variations. Factors effecting water demand, Estimation of total quantity of water requirement. Population forecasting. Impurities in water, their sources and their sanitary significance. Physical, chemical and bacteriological analysis of water, water borne diseases, water quality standards.
3. **WATER TREATMENT (a):** Objectives, treatment processes and their sequence in conventional treatment plant, sedimentation; plain and aided with coagulation. Types, features and design aspects. Mixing basins and Flocculation units.
4. **WATER TREATMENT (b)** Filtration; mechanism involved, types of filters, slow and rapid sand filtration units (features and design aspects), Disinfection principles and aeration.
5. **WATER DISTRIBUTION SYSTEM:** Layout of distribution system ; Dead end system, Grid iron system, Ring system, Radial system, their merits and demerits, Distribution Reservoir: functions and determination of storage capacity, Water Distribution Network, analysis of distribution network, leakage detection, Maintenance, Water supply in buildings and plumbing.

TEXT BOOK

B.C. Punmia., Ashok, Jain & Arun, Jain., “Water Supply Engineering”, Laxmi Publication , New Delhi ,1995

REFERENCE BOOKS

1. E.W. Steel., “Water Supply and Sewerage”, McGraw Hill, New Delhi.
2. S.R. Krishirsagar., “Water Supply Engineering”
3. S.K. Garg., Water Supply Engineering, Khanna Publisher, Delhi
4. Manual on Water Supply and Treatment: Ministry of Urban Dev., New Delhi.
5. K.N. Duggal, M., “Elements of Public Health Engineering”, S Chand & Co Ltd.
6. G.S. Birdie and J.S. Birdie., “Water Supply and Sanitary Engineering”, Dhanpath Rai & sons , New Delhi.
7. Howard S. Peavy., Donald, R. Rowe and George., “Tchobanoglous Environmental Engineering” McGraw-Hill, Delhi

CE-254A	ENGINEERING GEOLOGY LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Study of Physical properties of minerals
2. Identification of rocks forming silicate and ore minerals
3. Determination of Apparent Specific gravity , porosity and water absorption of different Rocks
4. Recognition of rocks
5. Use of clinometers compass and Burton compass for measurement of dip and strike of formations
6. Geological cross sections and study of geological maps.
7. Study of Structural Models (folds and faults)
8. Study of Topographic maps
9. Study of maps and sections pertaining to the Foundation Geology of Major Dam sites of India
10. Study of tectonic Map of India, Seismic tectonic Atlas of India and Seismic Zoning Map of India

Note: It is important that a museum of rocks and materials is developed for physical observation by students of various rocks and materials.

CE-255A	SURVEYING-II LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Theodolite; Measurement of horizontal angle
2. Theodolite; Measurement of vertical angles, permanent adjustment
3. Setting of simple circular curves by offset method, Offset from chord produced,
4. Setting of simple circular curves by offset method, Offset from long chord
5. Setting of simple circular curves by deflection angle method
6. An exercise of triangulation including base line measurement
7. Use of total station ,measurement; linear measurement, angle ; vertical and horizontal
8. Setup of alignments by total stations with different poles.
9. Setup of vertical angles by total stations.
10. Setup of horizontal angles by total stations.

CE-256A	STRUCTURAL ANALYSIS LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Experiment on a two- hinged arch for horizontal thrust & influence line for Horizontal thrust
2. Experimental and analytical study of a 3 bar pin jointed Truss.
3. Experimental and analytical study of deflections for unsymmetrical bending of a Cantilever beam.
4. Bag's deforester verification of Muller Breslau principle.
5. Experimental and analytical study of an elastically coupled beam.
6. Sway in portal frames - demonstration.
7. To study the cable geometry and static's for different loading conditions.
8. To plot stress-strain curve for concrete.
9. To study suspension Bridge; Two hinge and three hinge
10. To Study redundant truss and Frame

CE-258A	FLUID MECHANICS- II LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS:

1. To study the constructional details of a Peloton turbine.
2. To draw the constant head, constant speed and constant efficiency performance characteristics curves of Peloton turbines.
3. To study the constructional details of Francis Turbine.
4. To draw the constant head, constant speed and constant efficiency performance characteristic curves of Francis Turbine.
5. To Study the constructional details of Kaplan Turbine.
6. To Study the constructional details of a centrifugal pump and draw its characteristics curve.
7. To Study the constructional details of a reciprocating pump and draw its characteristics curve.

DETAILED CONTENTS - SEMESTER – V

CE-209A	GEOTECHNICAL ENGINEERING-I	L T P	Cr
		3 1 0	4

OBJECTIVE

The application of principles of Geo-technical Engineering in foundation of various types of structures and in earthwork engineering plays an important role in the field of civil engineering because composition of various soil components have specific characteristics which has to match with the requirements of civil engineering for designing safe structures. Soil investigation and testing have been found to greatly reduce the cost of construction and improving the performance of structures. The subject of Geo-technical Engineering has been divided in two parts. Part I deals with Soil formation and basic soil properties, classification of soils, soil compaction, compressibility and consolidation characteristics and shear strength of soils. Hence, very important subject for Civil Engineering students.

1. **SOIL FORMATION AND BASIC SOIL PROPERTIES:** Introduction, soil and rock, Soil Mechanics and Foundation Engineering, origin of soils, weathering, soil formation, major soil deposits of India, particle size, particle shape, inter-particle forces, soil structure, principal clay minerals, introduction, three phase system, weight-volume relationships, soil grain properties, soil aggregate properties, field and laboratory test of soil properties.
2. **CLASSIFICATION OF SOIL:** Grain size analysis, sedimentation analysis, grain size distribution curves, consistency of soils, consistency limits and their determination, activity of clays, relative density of sands. Purpose of classification, classification on the basis of grain size, classification on the basis of plasticity, plasticity chart, Indian Standard Classification System and Soil Exploration. Permeability of Soils: Introduction, Darcy's law and its validity, discharge velocity and seepage velocity, factors affecting permeability, laboratory determination of coefficient of permeability, determination of field permeability, permeability of stratified deposits.
3. **COMPACTION:** Introduction, role of moisture and compactive effect in compaction, laboratory determination of optimum moisture content, moisture density relationship, compaction in field, compaction of cohesionless soils, moderately cohesive soils and clays, field control of compaction. stress distribution in soil: Stress at a point, Mohr's circle, stress due to force of gravity, point, line and uniformly distributed loads, influence charts, contact pressure distribution, Boussineque's and westerguard's equation for vertical loads due to point and uniformly distributed loads.
4. **COMPRESSIBILITY AND CONSOLIDATION:** Introduction, components of total settlement, consolidation, process, one-dimensional consolidation test, typical void ratio-pressure relationships for sands and clays, normally consolidated and over consolidated clays, Casagrande's graphical method of estimating pre-consolidation pressure, Terzaghi's theory of one-dimensional primary consolidation, determination of coefficients of consolidation, consolidation settlement, Construction period settlement, secondary consolidation.
5. **SHEAR STRENGTH:** Introduction, Mohr stress circle, Mohr-Coulomb failure-criterion, relationship between principal stresses at failure, shear tests, direct shear test, unconfined compression test, tri -axial compression tests, drainage conditions and strength parameters, Vane shear test, shear strength characteristics of sands, normally consolidated clays, over-consolidated clays and partially saturated soils, sensitivity and thixotropy.

TEXT BOOK

Punmia, B. C., Jain, Ashok Kumar., and Jain, Arun Kumar., "Soil Mechanics and Foundations", Laxmi Publication Pvt. Ltd., New Delhi, 2009

REFERENCE BOOKS

1. Gopal, Ranjan, A.S.R. Rao., "Basic and Applied Soil Mechanics", New Age International (P) Ltd. Pub. N. Delhi.
2. Alam, Singh., "Soil Engg. in Theory and Practice", Vol. I, Fundamentals and General Principles", CBS Pub., N. Delhi.
3. Gulati, S. K., "Engg. Properties of Soils", Tata-McGraw Hill, N. Delhi.
4. P. Purshotam, Raj., "Geotechnical Engg.", Tata McGraw Hill.

CE-301A	TRANSPORTATION ENGINEERING -I	L T P	Cr
		3 0 0	3

OBJECTIVE

One of the important activities of Civil Engineer include planning, design, construction and maintenance of transportation systems which may include different types of roads, bridges, tunnels and air ports and also to prepare budgets in respect of above civil works. This subject has been divided into two parts. Part I include: importance and classification of roads, materials of construction and related equipment, design of rigid and flexible payments, construction of bituminous and cement concrete pavements. Students should involve themselves in understanding basic concepts and principles as well as above aspects of knowledge and related practical exercises in the laboratory for effective functioning.

- 1. INTRODUCTION:** Transportation and its importance Different modes of transportation Brief review of the history of road development in India. Classification of roads, Planning surveys. Saturation system of planning. Main features of 20 years road development plans in India Requirements of an ideal highway alignment Factors affecting alignment.
- 2. BITUMINOUS MATERIALS AND CONSTRUCTION/EQUIPMENTS:** Types of bituminous materials; bitumen, tar, cutback and emulsions. Various tests, testing procedures. Bituminous mix, desirable properties. Basic concept of use of polymers and rubber modified bitumen in bituminous mixes. Introduction to earthwork machinery; shovel, hoe, clamshell, dragline, bulldozers. Principles of field compaction of subgrade. Compacting equipments. Granular roads. Construction steps of WBM & WMM.
- 3. DESIGN OF RIGID & FLEXIBLE PAVEMENTS:** Types of pavements; Components of a pavement and their functions. Factors affecting design of pavements. Design of thickness of a flexible pavement by Group Index method, CBR method, Rigid: Westergaard's theory, IRC guidelines for determination of thickness of a rigid pavement. Joints; requirements, types, patterns. Spacing of expansion and contraction joints. Functions of dowel and tie bars.
- 4. CONSTRUCTION OF BITUMINOUS PAVEMENTS:** Various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of BUSG, Premix carpet, BM, DBM and AC. Brief coverage of machinery for construction of bituminous roads; bitumen boiler, sprayer, pressure distributor, hot mix plant, cold-mix plant, tipper trucks, mechanical paver or finisher, rollers.
- 5. CONSTRUCTION OF CEMENT CONCRETE PAVEMENT:** Slip-form pavers, Basic concepts; soil stabilized roads, use of geo synthetics, reinforced cement concrete pavements, prestressed concrete pavements, roller compacted concrete pavements and fiber reinforced concrete pavements. Pavement failures. Maintenance operations.

TEXT BOOK

S.K. Khanna & C.E.G. Justo., "Highway Engg.", Nem Chand & Brothers, 2009.

REFERENCE BOOKS

- 1 Rao, G. V., "Principles of Transportation and Highway Engg.", Tata McGraw Hill Pub., N. Delhi.
- 2 Kadiyali, L. R., "Traffic Engg. And Transport Planning", Khanna Pub. Delhi, 2008.
- 3 Smith, T. M. W.S. and Hurd,, "Traffic Engg." McGraw Hill Book Co., New York.

CE-302A	DESIGN OF CONCRETE STRUCTURES-I	L T P	Cr
		3 1 0	4

OBJECTIVE

Planning, design, construction and maintenance of Reinforced Cement Concrete structures is one of the biggest employment opportunity for civil engineers. These engineers must have through understanding of knowledge and associated skills in respect of designing various components of a building like columns, beams, slabs, cantilevers etc. Hence this subject. Students are expected to do extensive practice in designing various components of such structural members.

- 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.
SP-34(S&T)-1987 Handbook on Concrete Reinforcement and Detailing, BIS, N. Delhi

CE-308A	ENVIRONMENTAL ENGINEERING – II (SANITARY ENGINEERING)	L T P	Cr
		3 0 0	3

OBJECTIVE

Civil Engineers are required to plan, design, construct and maintain sanitary installations and systems. For this purpose, they should have in-depth knowledge of: collection of sewage, sewage characteristics, sewage treatment procedures, sludge thickening and sludge digestion, disposal of sewage etc. Hence this subject.

- COLLECTION OF SEWAGE:** Sewer appurtenances, Systems of sewerage: separate, combined and partially separate. Shapes of sewers: circular and egg shaped. Construction, testing and maintenance of sewer lines.
- SEWAGE CHARACTERIZATION:** Quality parameters: BOD, COD, Solids, D.O., and Oil & Grease. Indian Standards for disposal of effluents into inland surface sources and on land.
- SEWAGE TREATMENT:** Objectives, sequence and efficiencies of conventional treatment units. Preliminary treatment, screening and grit removal units. Theory and design aspects of primary treatment, secondary treatment: Activated sludge process & its modifications, Tricking filter. Nutrient removal, Nitrification and denitrification, Air stripping for ammonia removal, Phosphorous removal, dissolved solids removal, waste water reuse.
- SLUDGE THICKENING AND SLUDGE DIGESTION:** Sludge characteristics, sludge volume and solids relationships, Aerobic and anaerobic digestion, factors affecting sludge digestion and their control, disposal of digested sludge and drying beds. Stabilization pond, aerated lagoon, UASB process.
- DISPOSAL OF SEWAGE:** Disposal of sewage by dilution, self-purification of streams. Sewage disposal by irrigation (sewage treatment). Design of Septic tanks, Imhoff tanks and onsite sanitation. Sewerage project and building drainage works.

TEXT BOOK:

Garg, S.K., "Sewage and Sewage Treatment", Khanna Publishers, New Delhi, 1994.

REFERENCE BOOKS

- Metcalf and Eddy., "Waste Water Engineering", McGraw-Hill Companies
 - S.R. Krishna, Sagar., "Sewage and Sewage Treatment",
 - Punmia, B. C., "Waste Water Engineering", Laxmi Publications, 1998.
- Manual on Sewerage and Sewage Treatment: Ministry of Urban Dev., New Delh

CE-306A	HYDRAULIC STRUCTURES & IRRIGATION ENGINEERING	L T P	Cr
		3 0 0	3

OBJECTIVE

The object of Hydraulic Structures and Irrigation engineering is to analyze and design the hydraulic structure (i.e. Dam, Aqueduct, Siphon Aqueduct, Canals, Cross Drainage works etc) and analysis of precipitation and methodology of irrigation systems. Hence this subject.

- 1. INTRODUCTION:** definition, necessity, benefits of irrigation, ill effects of irrigation, types of irrigation, and history of irrigation development in India. **Methods Of Irrigation:** free flooding, contour laterals, model strip method, check flooding, basin flooding, zig zag and furrow method, sub surface irrigation, sprinkler irrigation, drip irrigation
- 2. REGULATION WORKS:** Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, design of Sarda type fall, design of straight Glacis fall. Off-take alignment, cross regulator and distributor head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes.
- 3. CROSS DRAINAGE WORKS:** Classification and their selection, hydraulic design aspects of aqueducts, siphon aqueducts, super passage, canal siphon and level crossing, design of transitions. **Diversion Canal Head works:** Various components and their functions, layout plan, selection of site for diversion head works, Bligh's creep theory, Khosla's method of independent variables and use of Khosla's curves, various corrections, and silt excluders.
- 4. STORAGE HEADWORKS:** Types of dams, selection of a site, gravity dam; two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams-constant angle and constant radius arch dam, simple design and sketches, most economical angle, earthen dams, design principles, seepage through earthen dams, seepage line, control of seepage, design of filters.
- 5. SPILLWAYS AND ENERGY DISSIPATORS:** Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and siphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.

TEXT BOOK

Modi, P.N., "Irrigation Water Resources and Water Power Engineering", Standard Book. House, 2008.

REFERENCE BOOKS

- Singh Bharat, "Fundamentals on Irrigation Engineering., Nemchand Bros., Roorkee
- Garg, S. K., "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi, 2009
- Varshney, R.S. Gupta, Gupta, R. L., "Theory and Design of Irrigation Structures" Vol. I & II. Nem Chand Publication, 2007

CE-259A	GEOTECHNICAL ENGINEERING-I LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Field identification & visual soil classification and water content determination.
2. Determination of specific gravity of soil solids.
3. Grain size analysis-sieve analysis.
4. Liquid limit and plastic limit determination.
5. Field density by Sand replacement method
6. Field density by Core cutter method
7. Proctor's compaction test.
8. Coefficient of permeability of soils.
9. Unconfined compressive strength test.
10. Direct shear test on granular soil sample.

REFERENCE BOOKS

1. S. Prakash, S., Jain, P. K., "Soil Testing for Engineers", Nem Chand & Bros., Roorkee.
2. Lambi, Wiley., "Engineering Soil Testing" Eastern.
3. Bowles J. P., "Engineering Properties of Soils and their Measurement", McGraw Hill.
4. Alam, Singh., "Soil Engineering in Theory and Practice", Vol. II, Geotechnical Testing and Instrumentation,

CE-351A	TRANSPORTATION ENGINEERING -I LAB	L T P	CR
		0 0 2	1

LIST OF EXPERIMENTS

1. Aggregates impact test
2. loss –angles abrasion test on aggregates
3. Dorry's abrasion test on aggregates
4. Deval attrition test on aggregates
5. Crushing strength test on aggregates
6. Penetration test on bitumen.
7. Ductility test on bitumen
8. Viscosity test on bituminous materials
9. softening point test on bitumen
10. Flash and fire point test on bitumen

CE-352A	DESIGN OF CONCRETE STRUCTURE LAB – I	L T P	CR
		0 0 2	1

LIST OF EXPERIMENTS

1. Design and Drawing of Retaining walls
2. Design and Drawing of Counter forts walls
3. Design and Drawing of underground water tank.
4. Design and Drawing of elevated water tank.
5. Design and Drawing of R.C.C flat slab for two way. (Span Ratio < 2.)
6. Design and Drawing of R.C.C flat slab for two way. (Span Ratio > 2.)
7. Design and Drawing of portal with hinged section.
8. Design and drawing of portal with fixed section.

CE-358A	ENVIRONMENTAL ENGINEERING-II (SANITARY ENGINEERING) LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. To determine pH value of a given sample of water /waste water.
2. To determine turbidity of a given water waste /water sample.
3. To determine acidity of a given sample of water /waste water.
4. To determine alkalinity of a given sample of water /waste water.
5. To determine level of chlorides in a given sample of water/ waste water
6. To determine temporary and permanent hardness in a given water/waste sample.
7. To determine the dissolved oxygen of a given water/waste sample.
8. To determine total solids, total dissolved solids, total suspended solids in a sewage sample.
9. To determine the BOD of a given sample of water/waste water.
10. To determine the COD of a given sample of water/waste water.

TEXT BOOKS

1. Sawyer, McCarty and Parkin: Chemistry for Environmental Engineering
2. Mathur: Water and Wastewater Testing.

REFERENCES

Standard Methods for the Examination of Water and Wastewater, A. P. H. A., New York

CE- 391A	SURVEY CAMP	L T P	Cr
		0 0 2	1

Every student will carry out Survey Camp under the supervision of faculty. The Survey Camp 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.

Survey Camp will be organized for one week. Complete details of the exercises to be done by students will be worked out by concerned faculty members and will be got approved by the HOD. Concerned faculty coordinators will ensure that each student is involved in the conduct of practical work during survey camp.

DETAILED CONTENTS - SEMESTER – VI

CE-303A	GEO-TECHNICAL ENGINEERING-II	L T P	Cr
		3 1 0	4

OBJECTIVE

In continuation to Geo-technical Engineering I, Geo-technical Engineering II deals with application of soils in civil engineering works. It is, therefore, important to understand earth pressures on retaining structures, stability of slopes, bearing capacity determination for shallow and deep foundations, various types of piles and basics of foundation design for machines. Hence, this subject is very important for civil engineering students.

1. **LATERAL EARTH PRESSURE& EARTH RETAINING STRUCTURES:** Earth pressure at rest, Rankine's state of plastic equilibrium, earth pressure theories, graphical methods to determine magnitude and resultant earth pressure, concept of arching of soils and braced cuts. Gravity type retaining walls, proportioning retaining walls, stability requirement, backfill materials and drainage, joints in retaining walls cantilever and anchored sheet pile wall, braced excavation.

2. **STABILITY OF SLOPES:** Causes of failure, factors of safety, stability analysis of slopes:total stress analysis, effective stress analysis; stability of infinite slopes, types of failures of finite slopes, analysis of finite slopes-mass procedure, method of slices, effect of pore pressure, Fellenius method to locate centre of most critical slip circle, friction circle method, Taylor's stability number, slope stability of earth dam during steady seepage, during sudden draw down and during and at the end of construction.

3. **SHALLOW FOUNDATIONS & DEEP FOUNDATION:** Bearing capacity criteria and factors affecting, modes of shear failure, theories of bearing capacity, foundation pressure, permissible settlement, allowable bearing pressure, field tests to estimate bearing capacity. Types of shallow foundations, selection of type of foundation, location and depth of foundation, causes of settlement, settlement analysis. Classification of piles, pile driving equipment, calculations of bearing capacity of single pile according to IS 2911:2011 (Part-I, Part-II), under reamed piles, pile groups, uplift and lateral resistance of piles ,inclined loading on piles, pile cap.

4. **SHEET PILES:** Purpose of sheet piles, cantilever sheet piles, depth of embedment in granular soils-rigorous method, simplified procedure, cantilever sheet pile, penetrating clay, and limiting height of wall.

Soil Stabilization: Soil improvement, shallow compaction, mechanical treatment, use of admixtures, lime stabilization, cement stabilization, lime fly ash stabilization, dynamic compaction and consolidation, bituminous stabilization, chemical stabilization, pre-compression, lime pile and column, stone column, grouting, reinforced earth

5. **BASICS OF MACHINE FOUNDATIONS:** Terminology, characteristics elements of a vibratory systems, analysis of vibratory motions of a single degree freedom system; un-damped free vibrations, un-damped forced vibrations, criteria for satisfactory action of a machine foundation, degrees of freedom of a block foundation, rken's soil spring constant, Barken's method of a determining natural frequency of a block foundation subjected to vertical oscillations.

TEXT BOOKS

Gopal, Ranjan and A.S.R. Rao., "Basic and Applied Soil Mechanics", Newage International Publication.

REFERENCE BOOKS

1. S. Prakash., Gopal Ranjan, & S. Saran., "Analysis and Design of Foundation and Retaining Structures", Sarita Prakashan.
2. Swami Saran ,Analysis and Design of Sub Structures", Taylor & Francis, 2006.
3. Shamsheer Prakash ,Soil Dynamic , McGraw Hill
4. Teng., "Foundation Design", Prentice Hall of India
Bharat Singh, Shamsheer Prakash., "Soil Mechanics & Foundation Engineering", Nem Chand & Bros, Roorkee

CE-304A	TRANSPORTATION ENGINEERING-II	L T P	Cr
		3 1 0	4

OBJECTIVE

In continuation of knowledge and associated skills taught in Transportation Engineering- I, this subject deals with cross section elements, traffic engineering aspects, alignment design, traffic control devices; airport planning and design; railway engineering and docks and harbours .Hence, Transportation Engineering II is a must for all civil engineers.

1. **CROSS SECTION ELEMENTS & VARIOUS ALIGNMENT DESIGN:** Cross section elements: friction, carriageway, formation width, land width, camber, IRC recommended values.. Sight distance, stopping sight distance, sight distance at intersections, head light sight distance, Effects of centrifugal force. Design of super elevation. Providing super elevation in the field. Radius of circular curves. Extra-widening. Type and length of transition curves. Gradient, types, values. Summit curves and valley curves, their design criterion. Grade compensation on curves.
2. **TRAFFIC CHARACTERISTICS, SURVEYS & CONTROL DEVICES:** Road user and vehicular characteristics. Traffic studies such as volume, speed, O & D study. Level of service. PCU. Capacity for non- urban roads. Causes and preventive measures for road accidents. Traffic control devices: signs, signals, markings and islands. Types of signs. Types of signals. . Intersections at grade and grade separated intersections. Design of a rotary. Types of grade separated intersections

3. **AIRPORT PLANNING AND DESIGN:** Traffic characteristics and operations, fleet requirement, component parts of airport and site selection, Runway design, orientation, basic runway length, geometric design of taxiway and aprons, terminal area and their planning, Environmental requirement of airport projects.
4. **RAILWAYS ENGINEERING:** Introduction, general history of development of railways, requirement of an ideal permanent way, sleepers, ballast & rail fixture & fastenings, cross section of railway tracks, turnouts, points & crossings. Railway maintenance, rail gauges, wear and tear of rails.
5. **DOCKS AND HARBOURS:** Historical development of ports, harbours and docks, tides, winds and waves, causes and impact of tsunami waves, types of harbours, types of docks, break waters classification and types.

TEXT BOOK

S.K.Khanna & C.E.G. Justo, Highway Engg, Nem Chand Bros., Roorkee

REFERENCE BOOKS

1. Kadiyali, L. R., "Principles and Practice of Highway Engg.", Khanna Publishers, Delhi.
2. Yoder, E.J. & Witzczak, M.W., "Principles of Pavement Design", John Wiley and Sons, USA.
3. Saxena, S. C., "Tunnel Engineering", Dhanpat Rai Publications, N. Delhi.
4. A. S. P. Bindra., "Text book of Tunnel, Bridges and Railway Engg.", Dhanpat Rai Delhi.

CE-305A	DESIGN OF STEEL STRUCTURE – I	L T P	Cr
		3 1 0	4

OBJECTIVE

In continuation to Design of Concrete Structures-I, Design of Steel Structures- I is planned to develop competencies related to designing steel structural members like tension and compression members and beams. Elementary aspects of plastic analysis and design are also taught in this subject. Faculty is advised to provide extensive practice to students to develop competencies for designing various components of steel structures.

1. **CONNECTIONS:** Importance, various types of connections, simple and moment of resistant, riveted, bolted and welded connection design problems.
2. **DESIGN OF TENSION MEMBERS:** Introduction, types of tension members, net sectional areas, design of tension members, lug angles and splices design problems.
3. **DESIGN OF COMPRESSION MEMBERS:** Introduction, effective length and slenderness ratio, various types of sections used for columns, built up columns, necessity, design of built up columns, laced and battened columns including the design of lacing and battens, design of eccentrically loaded compression members.
4. **DESIGN OF BEAMS:** Introduction, types of sections, general design criteria for beams, and design of laterally supported and unsupported beams, design of built up beams, web buckling, web crippling and diagonal buckling.

5. **ELEMENTARY PLASTIC ANALYSIS AND DESIGN:** Introduction, Scope of plastic analysis, shape factor, Load factor, mechanisms, plastic collapse, and plastic analysis applied to steel beams and simple portal frames and design.

TEXT BOOK

S.K Duggal, N. Subramanian, A.S. & Ajmani, J. L., "Design of steel structures" Nem chand & Bros., Roorkee.

REFERENCE BOOKS

1. Raghupati M, Design of steel structures, Tata McGraw Hill, Pub., New Delhi.
2. A.Kazmi SM & Jindal SK., "Design of steel structures", Prentice Hall, New Delhi.
3. Duggal SK , "Design of steel structures", Tata McGraw Hill, Pub., New Delhi.

CE-307A	CONCRETE TECHNOLOGY	L T P	Cr
		3 0 0	3

OBJECTIVE

Concrete Technology is the lifeline of civil Engineers. There is hardly any structure where concrete is not used. Therefore, civil engineering students must know ingredients of concrete, Design of concrete mixes for different strengths, special purpose concretes, admixtures etc for effective functioning in the field of civil Engineering. Hence this subject.

1. **FRESH CONCRETE:** Workability - Factors affecting workability -Measurement of workability by different tests. Compression tests,, Non-destructive testing methods on hardened concrete. Segregation & bleeding, Creep & Shrinkage of concrete. Steps in manufacture of concrete.
2. **ADMIXTURES:** Types of admixtures , mineral and chemical admixtures ,properties , dosages ,effects and usage
3. **MIX DESIGN:** Factors affecting the choice of mix proportions, Durability of concrete , Quality Control of concrete Statistical methods , Acceptance criteria ,Proportioning of concrete mixes by various methods - BIS method of mix design.
4. **SPECIAL CONCRETES:** Light weight concrete , Cellular concrete, High density concrete, Fibre reinforced concrete.
5. **POLYMER CONCRETE:** Types of Polymer concrete, High performance concrete, Self compacting concrete.

TEXT BOOK

Properties of Concrete by A. M. Neville - Low priced Edition - 4th edition Concrete Technology by M.S.Shetty. - S. Chand & Co.; 2004.

REFERENCE BOOKS

1. Sharma, S.C., "Construction Equipment and Management", Khanna Publishers, 2008.
2. Purify., "Advance Construction Equipment",
3. Chandola & Vazrani., "Heavy construction", khanna Publishers.
4. Satyanaryana & Saxena., "Construction planning & Equipment", Standard Publishers Distributors, 2009

5. P. S. Gehlot., & B.M. Dhir., “Construction Planning & Management”, New Age International Publishers Ltd., 1992.
6. Srinath L. S., “ERT & CPM -Principles & Applications:”, Affiliated East-west Press(P)Ltd.
7. Punmia & Khandelwal., “Project Planning & Control with PERT & CPM”, Laxmi Publication, 2004.
8. Verma, Mahesh., “Advanced Construction & Equipment”, CBS Publishers New Delhi

CE-309A	ESTIMATING, COSTING, BILLING & ACCOUNTS	L T P	Cr
		3 0 0	3

OBJECTIVE

All civil engineers are required to estimate quantities of materials required as per drawings and specification for executive different types of civil works. They must also work out cost estimates of material and works and prepare bills of completed works for making payments to contractors and other clients. They must also understand the system of Accounts. Therefore, this subject is very important for all civil engineers for effective functioning at work sites.

1. **ESTIMATE:** Principle of estimating, units of work & different kinds of estimates, different methods of estimation, estimation of materials in single room and two room building with different sections of walls, foundation, floors and roofs, R.B and R.C.C works, Plastering, white washing, Distempering and painting doors and windows, lump sum items, Estimates of canals and roads
2. **SPECIFICATION OF WORKS:** Necessity of specification, types of specification, general specification, specification of bricks, cement, sand, water, lime, reinforcement; detailed specification for earthwork, cement, concrete, brickwork, flooring, D.P.C, R.C.C, cement plastering, white and colour washing, distempering, painting
3. **RATE ANALYSIS:** Purpose, importance and requirements of rate analysis, units of measurement, preparation of rate analysis, procedure of rate analysis for items: Earth work, brick masonry work, concrete works, R.C.C works, reinforce brick work, plastering, painting, finishing (white washing, distempering), Estimation of earth work, road hills road and canal
4. **PUBLIC WORKS ACCOUNT:** Tender and acceptance of tender, Earnest money, security money, retention money, measurement book, cash book, preparation, examination and payment of bills, first and final bills, administrative sanction, technical sanction.
5. **BILLING:** Maintenance of muster ROLL, precaution, preparation of pay bill, measurement book for payment of contractors, different types of payment ;first & final, running advance and final payment

TEXT BOOK

Chakraborty, M., “Estimate costing & specification in civil Engg.”, Chakraborty Publication, 2006.

REFERENCE BOOKS

1. Dutta, B. N., “Estimating & cost”,
2. Kohli & kohli., “A text book on estimating & costing (Civil) with drawings”, S. Chand & Company Ltd. 2004.
3. Rangwala, S.C., “Estimating & Costing”, Charotar Publishing House, 2007
4. Pasrija & Arora., “Estimating Costing Valuation”, New Asian Publishers

CE-461A	CONSTRUCTION MANAGEMENT AND EQUIPMENT	L T P	Cr
		3 0 0	3

OBJECTIVE

Construction is a fragmented industry. A project is executed with independent parties working together under a Construction Manager. The work of an Architect, designers, engineers & contractors, suppliers and manufacturers is required to be coordinated by the Project Engineer for starting and finishing of project within given time span. A Project Engineer is required to possess managerial skills to plan, organize and execute the project by using planning tools. He must have through knowledge of materials, construction methods and equipment used in execution of a project. Hence this subject is very important for civil engineers..

- LOCATION, FACILITIES & LAYOUT:** Strategic importance - Factors affecting location & layout; Installation of facilities; Single location, multiple-location decisions. Principles and types of facilities Layout. Importance and functions of Construction Planning & Control. Introduction to PERT / CPM; Network Crashing (Numerical expected for PERT/CPM)
- MAINTENANCE MANAGEMENT:** Importance and types of maintenance; Maintenance Planning; Spare Parts Management; Concept of TPM.
- PRODUCTIVITY:** Work Study; Objectives, Scope and Uses; Methods Study; Flow process chart, Flow diagram & Process mapping ; Work Measurement; Elements; Performance Rating; Allowances; Standard Time; Synthetic Time Standards; Work Sampling (Numerical expected for Standard Time).
- EQUIPMENTS FOR EARTH WORK:** Fundamentals of earth work operations -Earth moving operations -Types of earth work equipment: Tractors, Motor Graders, Scrapers, Front end Waders– Dozer, Excavators, Rippers, Loaders, trucks and hauling equipment, Compacting Equipment, Finishing equipment.
- MATERIAL HANDLING EQUIPMENT:** Equipment for dredging, trenching, drag line and clamshells. Tunneling equipment for drilling and blasting. Pile driving equipment. Erection equipment: Crane, mobile crane. Types of pumps used in construction equipment for dewatering and grouting. Equipment for demolition: Forklifts and related equipment. Portable material bins .Material handling conveyors. Material handling cranes. Industrial trucks

TEXT BOOK

Chary., “Production & Operations Management”, Tata McGraw Hill Publishing Company Limited, 2009

REFERENCE BOOKS

- 1 Krajewski, Operations Management
- 2 Mahadevan, Operations Management
- 3 Chase, Production & Operations Management
- 4 Adam & Ebert ,Production & Operations Management
- 5 Jhamb LC, .Manufacturing & Operations Management
- 6 James Womack, The Machine that Changed the World

CE-353A	GEOTECH ENGINEERING-II LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Grain Size analysis –Hydrometer method
2. Shrinkage limit determination
3. Relative density of granular soils
4. consolidated drained (CD) Traixial Test
5. Consolidated untrained (CU) Triaxial Test with pore pressure
6. Consolidation test
7. Undisturbed sampling
8. Standard penetration test
9. Dynamic cone penetration test
10. Plate load test

CE-354A	TRANSPORTATION ENGG–II LAB	L T P	Cr
		0 0 2	1

Highway Materials Testing:

1. Tests on bitumen
2. Tests on emulsion

Design of Asphalt Concrete Mixes:

3. Marshall stability test

Pavement Evaluation Tests:

4. Benkelman Beam test
5. Roughness test
6. Abrasions and index test
7. Ductility test
8. Study of soil stabilized roads
9. Study of geo-synthetics roads
10. Study for different geo-textiles used in highway embankments.

CE-355A	DESIGN OF STEEL STRUCTURE LAB – I	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Structural drawing of various type of welded connection.
2. Structural drawing of various type of welded connection for eccentric connections.
3. Structural drawing of various type of riveted connection for simple connections.
4. Structural drawing of various type of riveted connection for eccentric connections.
5. Structural drawing of beam to column connections for framed and seat connections
6. Structural drawing of column bases: slabs, gusseted base.
7. Structural drawing of Column bases: Grillage Foundation.
8. Structural drawing of Plate Girder.
9. Structural drawing of Roof truss
10. Study the model of grillage foundations steel structures.

CE-357A	CONCRETE TECHNOLOGY LAB	L T P	Cr
		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).

DETAILED CONTENTS - SEMESTER – VII

CE-402A	DESIGN OF CONCRETE STRUCTURE II	L T P	Cr
		3 1 0	4

OBJECTIVE

In continuation of Design of Concrete Structures-I, Design of Concrete Structures-II deals with design of Foundations, Slabs, Stair cases including introduction to Pre-stressed Concrete basic principles of designing such structural components. Therefore, teachers are required to give extensive practice to the students for designing simple components.

1. **FOUNDATIONS:** Structural behavior of footings, design of footing for a wall and a single column, combined rectangular and trapezoidal footings, Design of strap footing.
2. **FLAT SLABS:** Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab.
3. **STAIRCASES:** various types of staircases, design of doglegged & bifurcated stair cases, design examples
4. **PRESTRESSED CONCRETE: Introduction,** basic principles, advantages of Pre-stressing, methods of pre-stressing, classification of pre-stressed members, various pre-stressing systems and losses in pre- stress.
5. **PRESTRESSED CONCRETE, ANALYSIS & DESIGN:** Initial and final stress conditions, analysis of sections for flexure and shear, load balancing concept, IS Specifications

TEXT BOOK

I.C. Syal & A.K. Goel., "Reinforced Concrete", A.H. Wheeler & Co. Delhi.

REFERENCE BOOKS

1. Jain, A.K., "Reinforced Concrete-Limit State Design", Nem Chand & Bros., Roorkee.
2. N.Krishna Raju- Prestressed concrete
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.

CE-406A	DESIGN OF EARTQUAKE RESISTANT STRUCTURES	L T P	Cr
		3 0 0	3

OBJECTIVES:

Earthquakes are natural calamities, the effect of which should be understood by civil engineers and precautions made to counteract seismic waves. It is with this intention; Design of Earthquake Resistant Structures has been included in this curriculum. This subject deals with elements of seismology, theory of vibration, earthquake analysis and seismic design of buildings, seismic evaluation and repair.

1. **ELEMENTS OF SEISMOLOGY:** Internal structure of earth, causes of earthquakes, elastic rebound theory, plate tectonics, characteristics of Seismic waves. Quantification of earthquake, Magnitude and Intensity. Impact of earthquakes on buildings and infrastructure. Seismographs, Isoseismic map, Development of seismic zoning map.
2. **THEORY OF VIBRATIONS:** Degrees of freedom, free and forced vibrations, Undamped single degree freedom system, damped single degree freedom system, natural frequency, modes of vibration, introduction to multiple degree freedom system.
3. **EARTHQUAKE ANALYSIS:** Idealization of structures, equivalent force concepts, equivalent seismic lateral loads using seismic coefficient method, response spectrum analysis, equivalent lateral force method, time history method. Determination of seismic lateral loads on buildings using IS 1893-2002.
4. **SEISMIC DESIGN OF BUILDINGS:** Earthquake resistant measures using IS 4326-1993 for flat roof and inclined roof masonry buildings. Guidelines for improving earthquake resistance of earthen and low strength masonry buildings (IS 13828-1993 and IS 13827-1993). Fundamental concepts of ductile detailing, ductile detailing of RCC structures as per IS 13920-1993.
5. **SEISMIC EVALUATION & REPAIR:** Need for Seismic evaluation of buildings and their retrofitting, condition assessment of existing buildings. Seismic evaluation, repair and strengthening of existing masonry building and reinforced concrete buildings using guidelines of Bureau of Indian Standard & GSDMA guidelines on seismic evaluation and strengthening of buildings.

REFERENCES:

1. Introduction to Structural Dynamics - J.M. Biggs
2. Elements of Earthquake Engineering - Jai Krishna an A.R. Chandrasekaran
3. IS: 1983 – 2002, “Criterion for Earthquake Resistant Design”, Bureau of Indian Standards, Manak Bhavan, New Delhi-02.
4. IS: 4326-1993, “Earthquake Resistant Design and Construction of Buildings - Code of Practice”, Bureau of Indian Standards, Manak Bhavan, New Delhi-02.
5. IS: 13827 – 1993, “Improving Earthquake Resistance of Earthen Buildings - Guidelines”, Bureau of Indian Standards, Manak Bhavan, New Delhi-02.
6. IS: 13828 – 1993, “Improving Earthquake Resistance of Low Strength Masonry Buildings - Guidelines”, Bureau of Indian Standards, Manak Bhavan, New Delhi-02.
7. IS: 13920 – 1993, “Ductile Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces - Code Of Practice”, Bureau of Indian Standards, Manak Bhavan, New Delhi-02.
8. Structural Dynamics - Theory & Computation - Mario Paz.
9. Dynamics of Structures Theory and Applications to Earthquake Engineering - Anil K. Chopra.
10. Earthquake Resistant Design of structures - Agarwal and Srikhande.
Earthquake Resistant Design of structures - S.K.Duggal.

CE-422A	HYDROLOGY	L T P	Cr
		3 0 0	3

SCOPE

Hydrology is the study of water, tracking its very movement between the atmosphere, water bodies and earth, how it is distributed between these realms and various aspects pertaining to its quality. It is important to familiarize with the water cycle and a quantitative & qualitative study of water at different stages of the cycle is what hydrology deals with. Engineers are required to study trends in rainfall, once rain falls, how much runoff is generated on earth's surface and how much of it percolates into the ground, and how much of it replenishes the streams in the area. Hydrology is more significant these days because we plan ahead of time to deal with extremes (scarcity of water leading to droughts, and overflowing of water bodies leading to floods). Another significant area of research is looking into impacts of climate change in the hydrologic components in an area or watershed. It is important to study hydrology at any given point of time, and constantly engineers are working round the globe to provide accurate models, predictions and impact assessments. Hence this subject.

1. **INTRODUCTION:** Importance of hydrology in relation to water resources development, hydrological cycle, scope and application of hydrology to engineering problems, water budget equation, drainage basins and its characteristics, stream geometry, hypsometric curves.
2. **PRECIPITATION, EVAPORATION & TRANSPIRATION:** Forms and types of precipitation, measurement of precipitation, recording and non recording rain gages, rain gage station, rain gage network, estimation of missing data, presentation of rainfall data, mass curves, mean precipitation, depth -area -duration relationship, frequency of point rainfall, intensity -duration- frequency curves, probable maximum precipitation, rainfall distribution in India.: Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, transpiration, evapo-transpiration and its measurement, Penman's equation and potential evapo-transpiration, depression storage.
3. **RUNOFF:** Factor affecting run-off, estimation of runoff, rainfall; run off relationships, measurement of stage and velocity, area velocity method, staff gauge, wire gauge, automatic stage recorder and stage hydrograph, measurement of velocity-current meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultrasonic and dilution methods of stream flow measurement, stage discharge relationship.
4. **HYDROGRAPH:** Discharge hydrograph, components and factors affecting shape of hydrograph, basic flow separation techniques, effective rainfall, unit hydrograph and its derivation, unit hydrograph of different durations, use and limitations of unit hydrograph, methods of superimposition and S-curve, dimensionless unit hydrograph, instantaneous Unit Hydrograph. Snyder's synthetic unit hydrograph, flood : computation of peak floods by empirical formulas, rational methods, empirical formulae, unit hydrograph method, flood frequency methods, Gumbel's method, graphical method, design flood.
5. **GROUND WATER:** Sources of ground water, Occurrence, types of aquifers, mass balance equation, compressibility of aquifers, water table and its effects on fluctuations, wells and springs, movement of ground water, Darcy's law, permeability and its determination, porosity, specific yield and specific retention, storage coefficient, transmissibility, Well Hydraulics: Steady state flow to wells in unconfined and confined aquifers. Characteristics of wells and their yield, mutual interference of wells, ground water budgeting, recharging of ground water.

TEXT BOOK

K. Subramanya., "Engineering Hydrology", 2nd Edition, Tata McGraw Hill Publishing Company Limited, 1984.

REFERENCE BOOKS

1. H. M. Raghunath., "Hydrology", New Age International (p) Limited, 2006

2. Linsely, Kohler, Paulhus., Hydrology”, McGraw Hill, 1988.
Singh, V. P., “Engineers Elementary Hydrology”, Prentice Hall.

CE-407A	TRANSPORTATION- III (RAILWAY AND AIRPORT ENGINEERING)	L T P	Cr
		3 0 0	3

Objectives:

Civil Engineers are connected with planning, design and construction of works related to Railways and Airports. This subject is extension of Transportation Engineering-II

- INTRODUCTION** :Different types of railway gauges in India & abroad, loading and construction gauges. Requirements of ideal permanent way, detailed study of different components of permanent way, rails, rail joints, track fillings. Indian Railway Track: different gauges, cross sections, coning of wheels; Tractive resistances and stresses; Track components: rails, rail failures, sleepers and ballast; Geometric design of the railway track; Design of points and crossings,
- STATIONS, YARDS, PERMANENT WAY CONSTRUCTION & MAINTENANCE:** Site selection of stations & yards, different types of stations and their layout, junctions and terminals with relative positions of passenger and goods platforms. Marshalling Yards. Level crossing, laying of track, rail creep, rail and sleeper renewals. Common defects found in rail track. Signaling and interlocking :Objects of signaling, different types of signals and their location in station yards, Interlocking , requirements of good interlocking system, mechanical devices used in interlocking,
- AIRPORTS:** History of air transportation, preliminary requirements to airport planning, Airport classification, Effect of aircraft, aircraft characteristics and airport size. Airport Regional Planning. Aircraft characteristics; Site selection, obstructions and zoning laws, runway orientation; Geometric design of the airfield, air travel demand forecasting
- AIRPORT TERMINOLOGY SITE SELECTION & INVESTIGATION:** Approach surface, Approach area, Bean fort scale conical surface fuselage load classification number. Airport Site Selection, requirements. Desirable properties of sub grade soil classification of soils, Guidelines for improving earthquake resistance of earthen and low strength masonry buildings. Design of airport and Runway.
- AIRPORT PAVEMENT DESIGN, GRADING DRAINAGE PLANNING:** Types of runway patterns, Runway layout conditions, Wind rose, taxiways, airport capacity terminal area, hangers, long range planning estimation of future air traffic, Airport and making. Airport grading general considerations. Drainage Purpose & data required, drainage structure & materials, ,

BOOKS:

- Horonjeff, R. Mckelvey, F. X., Planning & Design of airports, Mc Graw Hill, New York.
Aggarwal, M.
- M., Indian Railway Track, Sachdeva Press, Mayapuri, New Delhi.

REFERENCES:

- Khanna, S. K. Arora, M. G. and Jain, S. S., Airport Planning and Design-Horon Jett, Nemchand Bros., Roorkee.
- Airport Engineering-Khanna & Arora

CE-433A	ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT (Departmental Elective-I)	L T P	Cr
		3 0 0	3

OBJECTIVE

Environment assessment is taken up as a rapid assessment technique for determining the current status of the environment and identifying impact of critical activities on environment parameters. Keeping in view pollution problems in our country, this subject has been added in the curriculum with a view to understand environmental problems and issues, remedial actions to be taken, environment management, planning and economics, impact assessment and remedial actions.

- ENVIRONMENTAL PROBLEMS AND ISSUES:** Explosion of Environmental issues and scientific, technological and regulatory responses. Effects on ecology, environment, society, health and economy. Review of national and international developments related to environmental issues
- REVIEW OF REMEDIAL ACTIONS:** Rural and urban approaches, energy approach, transportation approach, industrial approach, agricultural approach, Technological solutions and Role of technology. Religion- philosophical approaches and concept of Deep ecology. Market based instrument its including taxation for pollution control; Role of environmental ethics
- ENVIRONMENTAL MANAGEMENT, PLANNING AND ECONOMICS:** Multidisciplinary environmental strategies, planning and decision making, human dimensions. Setting of industries and concept of Zoning Atlas, Economic valuation of environmental assets and preliminary concept of Natural Resource Accounting.
- IMPACT ASSESSMENT:** Collection of baseline data, concept and methodologies for initial environmental examination (IEE), Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS), Environmental Audit (EA), Risk Assessment (RA) etc. Case studies for the above.
- ENVIRONMENTAL IMPACT AND ASSESSMENT:** Typical case study related to environmental impact assessment and auditing

TEXT BOOK

R.K. Sapru., "Environment Management in India", APH Publishing Corporations, 1990.

REFERENCE BOOKS

- Sharma, P. D., "Ecology and Environment", Rastogi Publication, 2009.
- Bindu, N. Lohani., "Environmental Quality Management", Publisher South Asian, 1984.
- R.B. Singh., "Studies in Environment and Development" Commonwealth Publishers, 1988.
- Larry W. Canter., "Environmental Impact Assessment by Larry W. Canter.
- Saxena, K.D., "Environmental Planning Policies and Programmes in India," Shipra Publication, 1993.
- Shukla, S. K., & P.R. Shrivastava., "Concepts in Environmental Impact Analysis", Commonwealth Publishers 1992

CE-452A	DESIGN OF CONCRETE STRUCTURE-II LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Drawing for simply supported beam by plastic analysis.
2. Drawing for compression members.
3. Drawing for Tension members.
4. Drawing for Riveted connections.
5. Drawing for welded connection
6. Design and drawing for plate Girder Bridge.
7. RCC design of raft foundation
8. Design and drawing for RCC elevated water tank.
9. Design of grillage foundation and combined footing.
RCC design and drawing for isolated footing.

6. Guidelines for Minor & Major Project Assignments

A. Minor Projects

1. Identification of the project(s)

The concerned Department will identify areas for minor projects as given below:

- a) Areas for minor projects would be proposed by the faculty members and finalized by the HOD and Dean of the concerned Department/School before a month of beginning of the session with inputs from PVC, Dean R&D and Dean (Academics).
- b) Students will propose projects in the identified areas. A Minor project is taken up normally by a group of two students of the same class. In special cases where the project size is big, a group of 4 students may be allowed with permission from PVC/VC.
- c) Each project will have a Project Advisor. The project scope, activity plan will be worked out by the students with the help of Advisor and finalized with the recommendation of the Dean/HOD and approval of Dean (R&D).
- d) The project proposal will be made in a prescribed format.

2. Design/preparation of the project proposal

- a) Objectives of the project
- b) Background to the project: Motivation/need
- c) Literature survey and status of the area/topic
- d) Scope of the project (May include a few or all of the following):
Literature survey and status of the area/topic, New idea generation, New application development of an existing basic idea, Algorithm development, Software development, Hardware development, Firmware, Modelling and simulation, Software testing, Technical case studies, Prototype development, Lab demo, Field demo, Publications, Report preparation
- e) Activity planning: Listing of various project activities and prepare time lines for the implementation (Bar chart/pert-chart)

3. Implementation of the project

- a) To each Project Group of students, a faculty member will be assigned, mainly based on his/her expertise. The assigned faculty member will be called the Project Advisor of the Group. This will be done by Dean/HOD in consultation with the faculty
- b) The Project Advisor may make sure that all the students in a Group for the project are equally engaged in the project work and the role/work done by each of them is clearly specified.
- c) A log book will be maintained by the Group of Students indicating who has done what. The Project Advisor would sign the log book on regular basis, at least once a week on real time basis. The project work would be closely monitored by the Project Advisor.
- d) Serious team work is important for the projects and is given due consideration in evaluation of the projects
- e) The Expert panel will award the grades to the students based on pre-decided parameters and the recommendations/report of the Project Advisor.
- f) The Project Advisor will be in regular communication with the student Groups allotted to him/her and shall maintain a brief weekly status report and communicate the same to the Dean/HOD.
- g) The projects status will be reviewed monthly by Expert Panels consisting of 3 faculty members constituted by Dean/HOD. The Expert Panel may give suggestions and/or feedback to the Project Advisor and the students for further work in the project.
- h) Subsequent minor projects could be either based on the work of the earlier minor projects done by the same team of students or on a different topic/problem.
- i) Report Preparation and Presentation will be done by the students.
- j) The expert panel will award grades based on the work done on a regular basis, project report and presentation.

4. Nature of the Minor/Major projects

The following is an indicative list of type of projects that the students can take up:

- a) Design of a product
- b) Development of models
- c) Technology development
- d) Prototype development
- e) Product Development
- f) Design and operation of specific processes
- g) Technology implementation
- h) Case Studies
- i) Field study
- j) Tools Development
- k) Modeling and Simulation
- l) Application development (hardware and software)
- m) Societal application Projects
- n) Micro controller/Microprocessor based applications

Few projects examples in CSE: Development of algorithm, Web applications, Smart Phone applications, Portals Development, Animations, Digital walk through, Video Games, Image Processing Project, etc.

A. Major projects

The general guidelines (Identification, design, Implementation and Nature of the projects) are similar to the Minor Projects. The additional specific points pertaining to major projects are as follows:

1. Project Scope

The overall aim of the major project is the development of technology/product/prototype that demonstrates the same preferably in the field situation or in the lab for engineering/science disciplines. For management or related programs, this may be a major case study or field study that arrives at clear cut conclusions or development of a model and study its efficacy in the field. The scope of the Project will involve literature survey, field survey and status review, identification of problem/topic in a systematic way, proposal definition and identification of its scope, identification of specifications, plan of activities, and their execution through developmental/field work.

2. Timelines for the major project

The major project will be completed by 7th Semester for the 4 year B.Tech Program (or the prescribed semester in general for other Programs). In order to produce a good project comparable to the best, it is advised that thinking, conceptualization and the work on the major project may be initiated and carried out from at least 1-2 Semesters before the actual period of Project mentioned in the Curriculum.

5. Expected outputs from both the major and minor projects

- a) Working prototypes (either hardware, software or both)
- b) Field deployment
- c) Intensive Field study reports and development of models
- d) Publications in journals of repute

Kindly note:

1. Inter-disciplinary projects (Major projects or even in very special cases Minor projects) shall be given highest priority and appreciated where students from different disciplines may take up a project. In such cases, there may be more than one Project Advisor each from the respective disciplines. The batch size may be decided based on the type and size of the project.
2. All the projects will have innovative content either in the idea/concept, design, methodology, low cost etc. (in at least one aspect of the project). Creative thinking is a skill that can be learnt. The central idea of the minor and major projects is to bring out the innovative skills of the students to the fore and make them to learn practical problem solving skills, acquire confidence and face the real world boldly.
3. The University has zero tolerance policy for plagiarism which may be strictly adhered to.

7. Guidelines for Organizing Field Visits and Extensions Lectures

Name of subject	Industrial visits	Extension lecturers
<u>III Semester</u> 3.1 Surveying-I 3.2 Applied Numerical Methods 3.3 Building Construction & Materials 3.4 Structural Analysis-I 3.5 Fluid Mechanics-I	Visit to a Building under construction to understand about materials and construction techniques	Modern Building Materials, their specifications and Applications
<u>IV SEMESTER</u> 4.1 English Language 4.2 Surveying-II 4.3 Structural Analysis-II 4.4 Fluid Mechanics-II 4.4 Engineering Geology 4.5 Environmental Engineering-I (Water Resources & Systems) 4.6 Economics	Visit to Water Treatment Plant and understanding associated problems	Factors Governing design of safe high- rise buildings
<u>V SEMESTER</u> 5.1 Principles of Management 5.2 Geo-Technical Engineering-I 5.3 Transportation Engineering-I 5.4 Design of Concrete Structures-I 5.5 Environmental Engineering-II (Sanitary Engineering) 5.6 Hydraulic Structures & Irrigation Engg.	Visit to Sewerage Treatment Plant to study the system and associated problems	Design of flexible pavements for express ways
<u>VI SEMESTER</u> 6.1 Geo-Technical Engineering-II 6.2 Transportation Engg-II 6.3 Design of steel Structures-I 6.4 Concrete Technology 6.5 Estimating, Costing, Billing & Accounts 6.6 Construction Management & Equipment	Visit to CSMRS to see Soil Testing Operation	Lecture on Soil Investigation
<u>VII SEMESTER</u> 7.1 <u>Design of Concrete Structures-II</u> 7.2 <u>Earthquake Resistant Structures</u> 7.3 <u>Hydrology</u> 7.4 <u>Transportation Engg-II</u> 7.4 <u>Open Elective</u> 7.4 <u>Programme Elective-I</u> 7.6 <u>Project Work</u>	Visit to High Rise Buildings to study construction problems with reference to wind and seismic effects as well as Project Management Techniques	Earthquake Resistant Structures

8. Guidelines for Organizing Internship Training

Guidelines for internship training have already been circulated to all the Schools. The purpose of internship training in the final semester is to link the students with actual field organizations with a view:

- To get acquainted with the organization, work culture and responsibilities of engineers
- To see the size and scale of operations
- To involve in to actual field operations for equipping himself/herself with operational knowledge and also contribute for the organization where placed for such internship training
- To explore employment opportunities including pre-placement offer
- To create a brand value for the Alma mater

Internship training is very important component of providing direct experience to students. Therefore, they are required to:

- Be punctual and abide by the rules and regulations of the concerned organization
- Schedule their activities in line with the requirement of the organization
- Study the operations and prepare their own write-ups
- Propose improvements in the processes based on their study of field operations
- Take initiatives to enhance their competencies by having regular Interaction with their mentors
- Work for the growth of the company

Note: Students may also carry with them their appropriate books for relating their class room knowledge with field practices. This will also help the students in preparing their notes

Guidelines for Instructional Strategies

- **Teachers should understand the difference between teaching and learning. Efforts should be made to convert teaching into learning by selecting appropriate learning experiences like tutorials, practical work in laboratory and workshops, drawing classes, practical training, seminars, assignments, project work etc.**
- Entire teaching should be based on existing knowledge base of students before each unit of instruction. Any new term or concepts involved during instruction should be defined for better comprehension by the students and registering the knowledge/information imparted in the Long Term Memory (LTM) of students. It is also essential to teach from simple to complex and from known to unknown. Logical and chronological teaching will be helpful to students for LTM. To eliminate boredom, involvement of students in teaching-learning process, making use of demonstrations, showing a video clipping, exposing students to actual worksite, discovery learning by experimentation in the laboratories will help a great deal for LTM.
- Linking instruction with the professional life of students can create better motivation for learning by the students. Similarly, exposing students to actual professional life can also be very motivating.
- Greater stress should be laid on developing learning-to-learn skills by providing independent assignments, seminars etc to the students.
- Blackboard writing should be planned in advance.
- Teachers should understand the importance of soft skills like: leadership, communication skills, interpersonal skills, team work, punctuality, integrity, human values, personal grooming, attitude and values, basic skills of self management, time and stress management. Teachers are expected to play a role model to develop above aspects.
- Teachers are expected to understand various aspects of formative and summative evaluation for attainment of objectives and improving teaching-learning processes.

Other important considerations which teachers should keep in mind that theory is going to be forgotten. Skills ones learnt become permanent part of students' profile. Therefore, as far as possible, maximum time should be spent on student centered learning.

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
Total			18	0	14	25

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
Total			16	3	16	27

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
Total			18	1	12	25

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
Total			21	1	8	26

Diploma			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CEA-101 D	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
Total			22	1	8	27

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
Total			12	2	14	21

Scheme for M. Tech. in Construction Technology & Management

M. Tech. (Construction Technology & Management)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			12	4	8	20

M. Tech. (Construction Technology & Management)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			12	4	8	20

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

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 weight ages.
- There shall be *two* assessments (*Phase-I 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"> • Title • Abstract • Introduction • Literature Survey • References 	<ul style="list-style-type: none"> • Title • Abstract • Introduction • Literature Survey • Methodology • Modules Split-up and Gantt Chart • Proposed System (Phase 1) • Equations /Design and software to be used • Algorithms / Techniques used • Expected outcomes

Semester - III

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			
Total			
Comments			

Member 1

Member 2

Member 3

HOD

Semester - III

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	
Total	
Comments	

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"> • Title • Abstract • Work completed for Phase I • Expected outcomes • Draft copy of conceptual paper • References 	<ul style="list-style-type: none"> • Title • Abstract • Work completed for Phase II • Detailed Design (if any deviation) • Contribution of the candidate • Experimental Results • Performance Evaluation • Comparison with Existing system • Result Analysis and Conclusion • References • Draft copy of a dissertation for publishing

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.

Semester - IV

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 1and 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	
Total	
C o m m e n t s	

Member 1

Member 2

Member 3

HOD

Semester - IV

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	
Total	
Comments	

Member 1

Member 2

Member 3

HOD

Detailed Contents

Semester First

Course Code	Course Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
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

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
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 in free field and enclosure. External and Internal air borne noise control. Protection against structure borne noise. Lighting principles and day lighting. Day light factor, and design for desired illumination and glare free lighting.

Suggested Readings:

Subject Code	Subject Name	L-T-P	Cr	Theory	Internal Assessment	Total	Duration
CEC-505	Construction Project Management	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, TataMcGraw 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	Seminar on Construction Technology & Management	0-0-4	2	30	20	50	3 hours

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 & 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, Benefit cost 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 & Equipment</i>	3-1-0	4	60	40	100	3 hours

Form work design and scaffolding, slip form and other moving forms, Shoring, Restoring, and Back shoring in multi-storeyed Building construction. Pressurising, 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 micro structural 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

CEC-601	<i>Construction Contract Management</i>	3-1-0	4	60	40	100	3 hours
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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:

1.

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
CEC-656	<i>Teaching Practice</i>	0-0-8	4	30	20	50	3 hours

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) Materials</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 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 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 – Geo-membranes 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 & Maintenance Management)</i>	3-1-0	4	60	40	100	3 hours

Books Recommended:

1. Building Repair and Maintenance Management by P. S. Gahlot
2. Maintenance of Buildings by A C Panchdhari

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
Total			9	3	16	20

M. Tech. (Environmental Engineering)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			0	0	40	20

Departmental Electives-I		
SN	Course Code	Course Name
1	CEE-507	Hazardous Waste Management
2	CEE-509	Water Quality Management
3	CEE-511	Environmental Planning & Management

Departmental Electives-II		
SN	Course Code	Course Name
1	CEE-512	Environmental Safety and Management
2	CEE-514	Watershed Management
3	CEE-516	Industrial Environment Management Systems

Departmental Electives-III		
SN	Course Code	Course Name
1	CEE -611	Climate Change and Sustainable Development
2	CEE-613	Environmental Legislation and Impact Assessment
3	CEE-615	Cleaner Technologies

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 TECHNOLOGIE

- 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. Metcalfe 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)

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 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 4thed. (2002)*
- 2. Eckenfelder WW Jr., Industrial Water Pollution Control, McGrawHill 3rded. (2003)*
- 3. Biological Wastewater Treatment, Edited Volume Series, IWA (2008).*

CEE-504 AIR POLLUTION NAD 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;

Inventorizing 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; 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,

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

M. Tech. in Structural Engineering

M. Tech. (Structural Engineering)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			12	4	4	18

M. Tech. (Structural Engineering)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			12	4	4	18

M. Tech. (Structural Engineering)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			6	2	24	20

M. Tech. (Structural Engineering)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			0	0	40	20

Departmental Electives-I		
SN	Course Code	Course Name
1	CES-511	Composite Materials
2	CES-513	Design of Pre-Stressed Concrete Structures
3	CES-515	High Rise Buildings

Departmental Electives-II		
SN	Course Code	Course Name
1	CES-512	Advanced Engineering Geology
2	CES-514	Stability Theory in Structural Engineering
3	CES-516	Rehabilitation of Structures

Departmental Electives-III		
SN	Course Code	Course Name
1	CES-611	Construction and Maintenance Management
2	CES-613	Advanced Numerical Analysis

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-I 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"> • Title • Abstract • Introduction • Literature Survey • References 	<ul style="list-style-type: none"> • Title • Abstract • Introduction • Literature Survey • Methodology • Modules Split-up and Gantt Chart • Proposed System (Phase 1) • Equations /Design and software to be

	used <ul style="list-style-type: none"> • Algorithms / Techniques used • Expected outcomes
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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			
Total			
Comments			

Member 1

Member 2

Member 3

HOD

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			
Total			
Comments			

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"> • Title • Abstract • Work completed for Phase I • Expected outcomes • Draft copy of conceptual paper • References 	<ul style="list-style-type: none"> • Title • Abstract • Work completed for Phase II • Detailed Design (if any deviation) • Contribution of the candidate • Experimental Results • Performance Evaluation • Comparison with Existing system • Result Analysis and Conclusion • References • Draft copy of a dissertation for publishing

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.

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 1and 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	
Total	
Comments	

Member 1

Member 2

Member 3

HOD

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	
Total	
Comments	

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. Meghre & 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.

Books recommended:

1. Varghese, P.C. (2001), 'Advanced Reinforced Concrete Design', Prentice Hall of India, New Delhi.
2. Jain, A.K. (1999), 'Reinforced Concrete Limit State Design' Nem Chand & Bros, Roorkee.
3. Krishna Raju (1986), 'Advanced Reinforced Concrete Design', C.B.S. Publication, New Delhi.
4. Ferguson P.M., Breen J.E. and Jirsa J.O. (1988), 'Reinforced Concrete Fundamentals', Johan wiley & sons, New York.

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, modal response, approximate methods: Stodalla-Vanaello, Modified Reyleigh's method, Holzer's Method, Holzer Mykleston method, Matrix method, Energy method, Lagrange's equation, modal analysis, stochastic response of linear 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
CES-521	Advanced Material Testing Lab	0-0-4	2	30	20	50	3 hours

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

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-502	Design of Bridges	3-1-0	4	60	40	100	3 hours

- 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.
- 7. Foundations:** Types of foundations and general design criteria, design of well and
Pile foundations for piers and abutments.

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.



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Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-504	Advanced Design of Steel Structures	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 (INSDAG), 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.

Books recommended:

1. Bhavikati S. S., "Finite Element Analysis" New Age International Publishers, New Delhi (2005)
2. Desai C. S. and Abel J. F.; Introduction To The Finite Element Method : A Numerical Method For Engineering Analysis, CBS Publisher (2005)
3. O.C. Zienkiewicz & R.L. Taylor, "The Finite element method", Butterworth Heinemann (Vol I and Vol II), (2000).
4. J. N. Reddy, An introduction to the finite element method, McGraw Hill Inc. (1993).
5. C.S. Krishnamoorthy, "Finite Element Analysis, Theory and programming", Tata McGraw Hill, (1994).

Subject Code	Subject Name	L-T-P	Cr	Internal Assessment	Practical	Total	Duration
CES-522	Computational Lab for Structural Engineering	0-0-4	2	30	20	50	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.



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. Engineering Seismology:** Basic terms, seismic waves, earthquake magnitude and intensity, ground motion, dynamic response of structures, normalized response spectra, seismic coefficients and seismic zone coefficients.
- 2. Torsion and Rigidity:** Rigid diaphragms, torsional moment, centre of mass and centre of rigidity, torsional effects.
- 3. Lateral Analysis of Building Systems:** Lateral load distribution with rigid floor diaphragms, moment resisting frames, shear walls, lateral stiffness of shear walls, shear-wall frame combination, Examples.
- 4. Concept of Earthquake Resistant Design:** Objectives of seismic design, ductility, hysteric response & energy dissipation, response modification factor, design spectrum, capacity design, classification of structural system, IS codal provisions for seismic design of structures, multistoreyed buildings, design criteria, P- Δ effects, storey drift, design examples, ductile detailing of RCC structures.
- 5. Seismic Design of Special Structures:** Elevated liquid storage tanks, hydrodynamic pressure in tanks, stack like structures; IS-1893 codal provisions for bridges: Superstructure, sub-structure, submersible bridges.
- 6. Seismic Strengthening of Existing Buildings:** Seismic strengthening procedures.
- 7. Seismic Design of Brick Masonry Construction:** Shear walls and cross walls, opening in bearing walls, brick infills in Framed buildings, strengthening arrangements as per IS-4326, Design of bands.

CLOSURE

Books recommended:

1. Chopra A.K., 'Dynamics of Structures- Theory & Applications to Earthquake Engineering' Prentice Hall, India.
2. Clough & Penzien, 'Dynamic of Structures' McGraw Hill Co.
3. Paz, M., 'International Handbook of Earthquake Engineering', Chapman & Hall, Newyork.
4. IS 1893-1984 Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
5. IS 4326-1993 Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.

Detailed Syllabus of Departmental Electives

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-512	Advanced Engineering Geology	3-1-0	4	60	40	100	3 hours

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.

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-513	Design of Pre-Stressed Concrete Structures	3-1-0	4	60	40	100	3 hours

1. **Prestressing**
prestressing
2. **Working**
stresses; L
prestressing
design by L
3. **Continuou**
eccentricit
continuous
4. **Limit Sta**
torsion; p
cracking a
Limit Sta
rectangula
5. **Bond and**
tensioned
cables cau
stresses, et

1. N.
2. P.
3. Jai
Co
4. IS
sta

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-515	High Rise Buildings	3-1-0	4	60	40	100	3 hours

1. **Princip**
Mechan
Types o
arrange
2. **Loads**
loading
loading
3. **Analys**
analysis
constru
Stiffnes
4. **Design**
design a
connect

Books recom

1. Structural A
 2. Advances in
 3. Analysis of S
 4. Design of m
- Blume, N.M. Ne



Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-511	Composite Materials	3-1-0	4	60	40	100	3 hours

1. Fibre Reinforced Concrete
Proportions, Mechanical Properties, Stress-Strain Relationship, Mechanics approach, Applications

2. Fly Ash Concrete
Reaction Mechanism, Properties, Use of fly ash in concrete in fresh and hardened state

3. Polymer Concrete
constituent materials, Properties, Applications, Polymer impregnated concrete, Pre-stressed polymer concrete

4. Ferro Cement Concrete
properties of Ferro cement concrete.

5. High Performance Concrete
Supplemental cementitious materials, performance based applications

6. Sulphur Concrete
technology, Properties of Sulphur concrete, Sulphur properties, Applications

7. Light Weight Concrete
concrete, Aeration process, Properties of light weight concrete

Books recommended

- Concrete Technology
- Concrete Technology

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-514	Stability Theory in Structural Engineering	3-1-0	4	60	40	100	3 hours

- 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.

Books recommended:

1. Timoshenko, S.P., "Theory of Elasticity"
2. Timoshenko, S.P., "Theory of Elastic Stability"
3. Lyenger N.G.R.; "Structural Stability of Columns & Plates"

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-516	Rehabilitation of Structures	3-1-0	4	60	40	100	3 hours

1. **Maintena**
Facets of
Inspection
causes of
buildings
buildings
2. **Serviceab**
constructio
properties
corrosion
cracking.
3. **Materials**
concrete cl
cement, po
reinforced
repair, foa
Shotcrete,
underpinni
corrosion r
4. **Repairs,**
overcome l
weathering
techniques
etc).
5. **Demolition**
structures
buildings,
buildings; C
building co

Books recommended:

1. Denison Campbell, Allen and Harold Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, (1991).
2. R.T. Allen and S.C. Edwards, Repair of Concrete structures, Blakie and Sons, UK, (1987)
3. M. S. Shetty, Concrete Technology - Theory and Practice, S. Chand and Company, New Delhi, (1992).
4. Santhakumar, A.R., Training Course notes on Damage Assessment and repairs in Low Cost Housing, "RHDC - NBO" Anna University, July (1992).
5. Raikar, R., Learning from failures - Deficiencies in Design, Construction and Service - R & D centre (SDCPL), Raikar Bhavan, Bombay, (1987).
6. N. Palaniappan, Estate Management, Anna Institute of Management, Chennai, (1992).
7. Lakshmipathy, M. et al. Lecture notes of Workshop on Repairs and Rehabilitation of Structures, 29 -30th October 1999, (1999).

Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-611	Construction and Maintenance Management	3-1-0	4	60	40	100	3 hours

1. Services in Resident

- (A) Sanitation, water illumination, calculation
- (B) Air Conditioning modern systems of air conditioning.
- (C) CCD-CS: General reverberation, absorption principles of good acoustics
- (D) Thermal Insulation conductivity. Thermal air conditioning loads
- (E) Fire Safety Dye.

2. Architectural contr

local byelaws and archi

3. Regional planning:

for regional planning.

4. Landscaping: Force

landscape, site analy

Books Recommended:

- 3. Building Repair and Maintenance Management by P. S. Gahlot
- 4. Maintenance of Buildings by A C Panchdhari.



Subject Code	Subject Name	L-T-P	Cr	Theory	Sessional	Total	Duration
CES-613	Advanced Numerical Analysis	3-1-0	4	60	40	100	3 hours

1. Introduction of Pro
2. Error analysis, sig and relative error,
3. Solution of linear based on Gauss eli
4. Numerical solution position method, method.
5. Interpolation form interpolation poly
backward differen
6. Numerical differen quotient, Richards rule, Simpson's 1/3
7. Numerical solution Euler's method, Polygon method.



Books recommend

1. Terrence J.Akai, Inc,Singapore,1
2. S.S Shastry, 'Int Ltd.,1997.
3. H.C Saxena, 'Fin
4. Baron M.L & Sal Ltd.,1963.
5. Curtis F.Gerald Ed.,Addison We
6. Balagurusamy E

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
Total			15	5	12	26

M. Tech. (Transportation Engineering)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			9	3	14	19

M. Tech. (Transportation Engineering)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
Total			0	0	40	20

Departmental Electives-I		
SN	Course Code	Course Name
1	CE-511-T	Advanced Engineering Geology

Departmental Electives-II		
SN	Course Code	Course Name
1	CE-512-T	Construction Material

Departmental Electives-III		
SN	Course Code	Course Name
1	CE-611-T	Bridge Engineering

Scheme for Ph.D.

Ph.D.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
		Total				

Ph.D.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
		Total				

Ph.D.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
		Total				

Ph.D.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

				Total				
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Scheme for B.Tech. Computer Science and Engineering

B.Tech. (Regular) Computer Science and Engineering (CSE)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101 A	Applied Mathematics –I	4	0	0	4
2	PHB-101 A	Applied Physics	4	0	0	4
3	CSB-101 A	Computer Programming	3	0	0	3
4	CHB-101 A	Applied Chemistry	4	0	0	4
5	ENA-101 A	Communication Skills-I	3	0	0	3
6	CHB-151 A	Applied Chemistry Lab	0	0	2	1
7	PHB-151 A	Applied Physics Lab	0	0	2	1
8	ENA-151 A	Communication Skills Lab-I	0	0	2	1
9	CSB-151 A	Computer Programming Lab	0	0	2	1
10	ME-153 A	Computer Based Engineering Graphics	0	0	4	2
11	PD-191A	Co-curricular Activities / hobby club	0	1	0	1
Total			18	1	12	25

B.Tech. (Regular) Computer Science and Engineering (CSE)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102 A	Applied Mathematics –II	4	0	0	4
2	PHB-101 A	Applied Physics	4	0	0	4
3	CSB-101 A	Computer Programming	3	0	0	3
4	CHB-101 A	Applied Chemistry	4	0	0	4
5	ENA-102 A	Communication Skills-II	3	0	0	3
6	CHB-151 A	Applied Chemistry Lab	0	0	2	1
7	PHB-151 A	Applied Physics Lab	0	0	2	1
8	ENA-152 A	Communication Skills Lab-II	0	0	2	1
9	CSB-151 A	Computer Programming Lab	0	0	2	1
10	ME-153 A	Computer Based Engineering Graphics	0	0	4	2
11	PD-192 A	Co-curricular Activities / Hobby Club	0	1	0	1
Total			18	1	12	25

B.Tech. (Regular) Computer Science and Engineering (CSE)			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	2	1
10	HOT-201A	Minor Project / Hands on training **	0	0	4	2
11		Co-curricular Activities	0	1	0	1
Total			20	1	10	26

B.Tech. (Regular) Computer Science and Engineering (CSE)			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 Industrials 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	29

B.Tech. (Regular) Computer Science and Engineering (CSE)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-303 A	Computer Graphics	4	0	0	3
2	CS-304 A	Formal Languages and Automata Theory	4	0	0	4
3	IT-304A	Software Engineering	4	0	0	3
4	IT-308 A	Core Java	4	0	0	4
5	CS-310 A	Free and Open Source Software	3	0	0	4
6	EC-313A	Digital and Analog Communications	3	0	0	3
7	IT-356A	Web Technology Lab	0	0	4	2
8	CS-353A	Computer Graphics Lab	0	0	2	1
9	IT-358A	Core Java Lab	0	0	2	1
10	CS-360 A	Free and Open Source Software Lab	0	0	2	2
11	CS-381 A	Minor Project	0	0	4	2
12		PDP Course	0	1	0	1
13	PD-391	Co-curricular Activities	0	1	0	1
Total			22	2	14	31

B.Tech. (Regular) Computer Science and Engineering (CSE)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	IT-305 A	Data Mining & Data Warehousing	4	0	0	4
2	IT-309A	Programming Using C#	3	0	0	3
3	IT-310 A	Advance Java	4	0	0	4
4	IT-322A	Computer Software Testing	3	0	0	3
5		Deptt Elective -1	3	0	0	3
6	EC-302A	Microprocessor and Interfacing	4	0	0	4
7	IT-355A	Data Mining & Data Warehousing Lab	0	0	2	1
8	IT-359A	Programming using C# Lab	0	0	2	1
9	IT-360 A	Advance Java Lab	0	0	2	1
10	EC-352A	Microprocessor and Interfacing Lab	0	0	2	1
11	CS-382	Minor Project	0	0	4	2
12	PD 392 A	PROBLEM SOLVING SKILLS	2	0	0	2
Total			23	0	12	29

B.Tech. (Regular) Computer Science and Engineering (CSE)			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-402 A	Artificial Intelligence	3	0	0	3
2	CS-403 A	Soft Computing Techniques	4	0	0	4
3		Deptt Elective -1	3	0	0	3
4		Deptt Elective 2	3	0	0	3
5		Open Elective	3	0	0	3
6	CS-452 A	Artificial Intelligence Lab	0	0	2	1
7	CS-453 A	Soft Computing Techniques Lab	0	0	2	1
8	CS-486 A	Project	0	0	4	2
9	CS-487 A	Seminar based on Project *	0	0	2	1
10	PD-492A	PDP	0	1	0	1
11	PD-491	Co-curricular Activities	0	1	0	1

			Total	16	2	10	23
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B.Tech. (Regular) Computer Science and Engineering (CSE)			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1		Department Elective	3	0	0	3
2	CS-483/484	Internship / Dissertation Phase	0	0	24	12
3		Seminar based on Internship	0	0	0	1
		Total	3	0	12	16

Syllabus for B.Tech.

Unit-1 Mechanics: Classification of forces, parallelogram law, triangle law, Lami's theorem, resolution of forces, moment, couple, equilibrium in two dimensions, numerical.

Unit-2 Thermodynamics:- Thermodynamic work, p-dV work in various processes, p-V representation of various thermodynamic processes and cycles Ideal gas equations, Properties of pure substance, Statements of I and II laws of thermodynamics and their applications in Mechanical Engineering. Carnot cycle for Heat engine, Refrigerator and Heat pump numerical.

Unit-3 Energy Conversion Devices :- Formation of steam, types of boilers, Babcock and Wilcox boiler, Cochran boiler, mountings and accessories , Turbine(Impulse & Reaction turbine, Gas turbine, Hydraulic turbines), Working principle and applications of Reciprocating I.C. engines, 4-stroke and 2-stroke engine-construction and working.

Unit-4 Stress and Strain : Definition of stress and strain, types of stress and strain, Hooke's law, stress-strain diagram, poisson's ratio, modulus of rigidity, bulk modulus, Elastic constants & their relationships, numerical.

Unit-5 Power transmission: Types of Belts and belt drives, Chain drive, Types of gears and gear train, Types of Couplings, friction clutch (cone and single plate), brakes (types and applications only) Applications of these devices.

Text Books:

Engineering Mechanics -Meriam, J. L. , 6th Edition, John Wiley & Sons, 2005.
Thermodynamics - P. K Nag , Tata McGraw-Hill Publishing Co. Ltd
Elements of Mechanical Engineering – R.K.RajputLakmi Pub., Delhi
Elements of Mechanical Engineering – D.S.Kumar, S.K. Kataria and Sons Engineering
Refrigeration &Airconditioning – Arora&Domkundwar, Dhanpatrai&co.pvt ltd

Reference Books:

Beer, F.P. and Johnston, E.R. "Mechanics of Materials", 3rd Edition, Tata McGraw Hill, 2005.
Strength of Materials – Popov, Pub. - PHI, New Delhi.
Hydraulic Machines – JagdishLal, Pub.- Metropolitan, Allahbad.
Strength of Materials - G.H. Ryder, Pub.- ELBS.
Hydraulic and Fluid Mechanics – Modi and Seth, Pub. – Standard Book House, New Delhi

ME-153A	COMPUTER BASED ENGINEERING GRAPHICS	L-T-P	Credits
		1-0-3	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.**

PHB-101A	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 , Clausius-Mossotti 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' 3rd edition, Prentice Hall

PHB-151A	APPLIED PHYSICS LAB	L-T-P	Credits
		0-0-2	1

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", PragatiPrakashan
2. Chauhan & Singh, "Advanced Practical Physics Vol. I & II", PragatiPrakashan.
3. Advanced Practical Physics; Worsnop and Flint, Methuen & Co., London,

MA-101A	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; 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", 41st Edition,2010,Khanna Publishers.

REFERENCE BOOKS

1. Kreyszig, E., "Advance Engineering Mathematics", 10th Edition, 2011,Wiley India Publishers, New Delhi
2. Weir, M. D., Hass, J. and Giordano, F. R., "Thomas Calculus", 11th Edition, 2012, Pearson Education.
3. Jain, R.K. and Iyengar, S.R.K., " Advance Engineering Mathematics" ,3rd Edition,2002, Narosa Publishing House New Delhi.
4. Dass, H.K., " Higher Engineering Mathematics",10th Edition, 2008, S. Chand & Company Ltd.
- 5 " Higher Engineering Mathematics" by H.C Taneja

MA-102A	APPLIED MATHEMATICS-II	L-T-P	Credits
		4-0-0	3

Unit-1: ORDINARY DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS:Exact differential equations; application of differential equations of first order and first degree to simple electrical circuits; Newton's law of cooling. Linear differential equations of second and higher order; complete solution; method to find C.F.; method to find P.I. ; method of variation of parameters to find P.I.; Cauchy's linear equations and its solutions;

Unit-2: PARTIAL DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS: Formation; solution of partial differential equations in ordinary cases; different solutions of partial differential equations; types of first order non-linear partial differential equations; Charpit's method; Application to wave equation; one dimensional heat equation.

Unit-3: 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; periodic function and its LT; Laplace transform of unit step function; unit impulse (direct-delta) function.

Unit-4: 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, saw-toothed wave, half and full rectified wave functions; half range sine and cosine series

Unit-5: VECTOR CALCULUS :Scalar and vector point functions; gradient of a scalar field and its physical interpretations; divergence of vector field and its physical interpretations; curl of a vector field and their physical interpretations. Application of Green's theorem, Stoke's theorem and Gauss theorem (without proof)

TEXT BOOK:

1. Higher Engineering Mathematics: B. S. Grewal

REFERENCES:

1. Higher Engineering Mathematics: H.C. Taneja
2. Higher Engineering Mathematics: B. V. Ramana
3. Differential and Integral Calculus: Piskunov
4. Advanced Engineering Mathematics: Jain and Iyenger
5. Advanced Engg Mathematics: Michael D. Greenberg
6. Advanced Engineering Mathematics: E. Kreyszig

CSB-101A	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

CSB -151A	COMPUTER PROGRAMMING LAB	L-T-P 0-0-2	CR 1
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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

FILE HANDLING

- 43 Write a program to Create a file and store text and display the content.

ENA-101A	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.

ENA-151A	COMMUNICATION SKILLS LAB-1	L T P	Cr
		0-0-2	1

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

ENA-102A	COMMUNICATION SKILLS-2	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 (2nd 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, 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.

ENA-152A	COMMUNICATION SKILLS LAB-2	L T P	Cr
		0-0-2	1

LIST OF PRACTICAL

1. **Listening Skills:** Listening to the Audio clips of important speeches; conducting a discussion on the listened content; writing & presenting the content of the speech / conversation. (Speeches are saved in the system)
2. **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.
3. **Reference Work:** Students are given topics of current importance and are asked to collect information from the Internet and to share it in front of the class. A creative teacher can develop a good discussion on the topic. Suggested topics:- CBCS System by the UGC; Need of foreign language proficiency; Career opportunities for a B.Tech. degree holder; Information on CAT, GMAT, GRE etc.
4. **News Paper Reading:** Reading online news paper; encouraging students on how to catch the headlines and to develop conversation on topics of greater significance.
5. **Extempore Speech:** Discuss the rules for effective Extempore speech; differentiate it from Elocution; conduct extempore speech on topics from daily life.
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. **Presentation** – Discuss the presentation skills and assign the students with topics for effective presentation.
10. **Conversation ability:-** Develop lively and meaningful conversation in pairs or in group. Let them practice writing down the conversation exchanges

CEA-101A	ENVIRONMENTAL 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-101A	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

EL-151A	BASICS OF ELECTRICAL & ELECTRONICS ENGG. LAB	L T P	Cr
		0-0-2	1

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
- 5.

CHB-101A	APPLIED CHEMISTRY	L T P	Cr
		4-0-0	4

Unit-1: Phase Rule: Terminology, Definition of phase rule, Derivation of phase rule equation, One component system (H₂O system and CO₂ 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 & electro dialysis.

Softening of water: Zeolite method. Ion exchange method: Demineralized and mixed bed demineralized method.

CHB-151A	APPLIED CHEMISTRY LAB	L T P	Cr
		0-0-2	1

LIST OF PRACTICALS

- (i) Determination of Ca⁺⁺ and 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 KMnO₄ solution using spectrophotometer.
- (ix) To determine the strength of HCl solution by titrating against NaOH solution conductometrically .
- (x) To determine the Na⁺ and K⁺ ions with the help of flame photometry

ME-152A	WORKSHOP PRACTICE	L T P	Cr
		0-0-4	2

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. FOUNDARY 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.

ME-154 A	BASIC OF MECHANICAL ENGINEERING LAB	L T P	Cr
		0-0-4	2

LIST OF EXPERIMENTS

- (1) To study the single start worm and worm wheel and find M.A, V.R and minimum effort to overcome the friction.
- (2) To study the double start worm and worm wheel and find M.A, V.R and minimum effort to overcome the friction.
- (3) To study the triple start worm and worm wheel and find M.A, V.R and minimum effort to overcome the friction.
- (4) To study the single purchase winch crab and find M.A, V.R and minimum effort to overcome the friction.
- (5) To study the double purchase winch crab and find M.A, V.R and minimum effort to overcome the friction.
- (6) To study the compound screw jack and find M.A, V.R and minimum effort to overcome the friction.
- (7) To perform the tensile test on UTM.
- (8) To measure the brake horse power of an engine with the rope brake dynamometer .
- (9) To study the construction and working 2-stroke petrol/diesel engine.
- (10) To study the construction and working 2-stroke petrol/diesel engine.

CS-201 A	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. Lipschitz 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

CS-202 A	PROGRAMMING LANGUAGES	L T P	Cr
		3 0 0	3

OBJECTIVE: This subject focuses on the fundamental concepts that underlie programming language syntax and semantics through a comparative study of several languages and their features; to learn several new programming language features and paradigms.

PRE-REQUISITES: Knowledge of data structures, microprocessors and interfacing

- 1. INTRODUCTION:** Syntactic and semantic rules of a Programming language; Characteristics of a good programming language; Programming language translators compiler and interpreters; Elementary data types – data objects, variable & constants, data types; Specification & implementation of elementary data types; Declarations; type checking & type conversions; Assignment & initialization; Numeric data types; enumerations, Booleans & characters.
- 2. STRUCTURED DATA OBJECTS & PROGRAMMER DEFINED DATA TYPES:** Structured data objects & data types; specification & implementation of structured data types; Declaration & type checking of data structure; vector & arrays; records; Character strings; variable size data structures; Union, pointer & programmer defined data objects; sets; files. Evolution of data type concept; abstraction, encapsulation & information hiding; Subprograms; type definitions; abstract data types.
- 3. SEQUENCE CONTROL:** Implicit & explicit sequence control; sequence control within expressions; sequence control within statement, Subprogram sequence control: simple call return, recursive subprograms; Exception & exception handlers; co routines.
- 4. DATA CONTROL & STORAGE MANAGEMENT:** Names & referencing environment; static & dynamic scope; block structure; Local data & local referencing environment; dynamic & static scope; Parameter transmission schemes; Major run time elements requiring storage; programmer and system controlled storage management & phases; Static storage management; Stack based storage management; Heap storage management; variable & fixed size elements.
- 5. PROGRAMMING LANGUAGES:** Introduction to procedural, non-procedural, structured, functional and object oriented programming language; Comparison of C & C++ programming languages.

TEXTBOOK :-

1. Pratt and Zelkowitz, —Programming Languages: Design and Implementation, 4th edition, Prentice Hall, 2001

REFERENCES:-

1. Tucker Allen & Noonan Robert, —Programming Languages – Principles and Paradigms, Tata McGraw Hill, 2006
2. Ellis Horowitz, —Fundamentals of Programming languages, Galgotia Publications/ Springer Verlag, 1984
3. Ghezzi C., —Programming Languages Concepts, 3rd ed., Wiley Publications, 1997.

CS-203 A	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., —Schaum's Outline series: Theory and problems of Probability, McGraw Hill Singapore, 1982
6. Kolman B. and Busby R. C., —Discrete Mathematical Structures, Prentice Hall of India, 1996
7. Trembley and Manohar, —Discrete Mathematical Structures with Applications to Computers, McGraw Hill, 1995

CS-206 A	DATABASE 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 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.

EC-207-A	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.

I. 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 QuineMcluskey 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.

MA-202A	APPLIED NUMERICAL METHODS	L-T-P	Credits
		3-0-2	3

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; fixed point iteration method; Newton- Raphson method; convergence criteria of methods.

Unit-II: SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS : Gauss elimination method; Gauss-Jordan method; UV factorization method; Jacobi's iteration method; Gauss-Seidal iteration method; .

Unit-III: 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 by least square method

Unit-IV: 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; Romberg' method.

Unit-V: SOLUTION OF ORDINARY DIFFERENTIAL EQUATION: Taylor series method; Euler method; Euler modified method; Rungekutta method; Milne's predictor -corrector method; Adams-Bashforth method for finding solution of differential equation.

TEXT BOOK

Grewal, B. S., "Numerical methods in Engineering and Science", 9th Edition, 2010, Khanna publishers.

REFERENCE BOOKS

1. Jain, R.K. and Iyengar, S.R.K., "Numerical Methods for Scientific and Engg. Computations" ,5th Edition, 2007, New Age International publishers.
2. Sastry, S.S., " Introductory Methods of Numerical Analysis", 3rd Edition, 1999, Prentice Hall of India.
3. Applied Numerical Analysis" by Curtis F, Gerald and Patrik.
4. Numerical Methods by E. Balagurusamy T.M.H.

CS-251 A	DATA STRUCTURE AND ALGORITHMS LAB	L T P	Cr
		0 0 2	1

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.
6. Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method

RECURSION

7. Write a program to compute factorial of given number using recursion
8. Write as program to solve Tower of Hanoi problem using recursion
9. Write a program to find power of given number using recursion

STACK & QUEUE

10. Write a program for static implementation of stack
11. Write a program for dynamic implementation of queue
12. Write a program for static implementation of circular queue
13. Write a program for dynamic implementation of queue
14. Write a program to evaluate a postfix operation

LINKED LIST

15. Create a linear linked list & perform operations such as insert, delete at end , at beg & reverse the link list
16. Create a circular linked list & perform search, insertion & delete operation
17. Create a doubly linked list & perform search, insertion & delete operation

TREE & GRAPH

18. Write program to implement binary search tree. (Insertion and Deletion in Binary Search Tree)
19. Write program to simulates the various tree traversal algorithms
20. Write program to simulate various graph traversing algorithms.

SORTING ALGORITHMS

21. Write program to implement Bubble, Insertion & selection sort.
22. Write program to implement quick sort
23. Write program to implement merge sort
24. Write a program to implement heap sort

TEXT BOOK

1. A.K. Sharma – Data structure Using C, 2nd 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. R. S. Salaria -Data Structure Using C
2. Kruse Robert, —Data Structures and Program Design in C++, Prentice Hall of India, 1994
3. Lipschitz Jr. Seymour, —Theory & Problems of Data Structures, Schaum’s Outline, 2nd Edition, Tata McGraw Hill

HOT-201 A	HANDS ON TRAINING	L T P	Cr
		0 0 2 **	2

CS-256 A	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

CS-204 A	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 Reference Principle, memory hierarchy in practice: cache, main memory and secondary memory, memory parameters: access cycle time, cost per bit); main memory (semiconductor RAM & 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. Carl Hamacher, Zvonko G. Varanesc 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 Performance, 6th 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 Organisation, Tata 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- 205 A	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

- BRIEF REVIEW:** Growth of functions, Asymptotic Notations, Representation of Graphs, Breadth First Search, Depth First Search and Data Structures for Disjoint Sets.
- 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.
- 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.
- DYNAMIC PROGRAMMING AND BACK TRACKING:** General method; optimal binary search trees; 0/1 knapsack; the traveling salesperson problem, 8 queens ‘problem; graph coloring; Hamiltonian cycles
- 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 :-

- Horowitz Ellis and Sahni Sartaj, —Fundamental of Computer Algorithms, Galgotia Publications, 1978

REFERENCE BOOKS:

- Cormen Thomas H., Leiserson Charles E. and Rivest Ronald L., —Introduction to Algorithms, Tata McGraw Hill, 1990
- Aho A. V. and Hopcroft J. E., —The Design and Analysis of Computer Algorithms, Addison Wesley, 1974
- Berlion P., and Bizard P., Algorithms – The Construction, Proof and Analysis of Programs, John Wiley & Sons, 1986.
- Bentley J. L., —Writing Efficient Programs, Prentice Hall of India, June 1982.
- Goodman S. E. and Hedetnieni, —Introduction to Design and Analysis of Algorithms, McGraw Hill, 1997
- Trembley Jean Paul and Bunt Richard B., —Introduction to Computers Science - An Algorithms Approach, Tata McGraw Hill, 2002
- Knuth Donald E., —Fundamentals of Algorithms: The Art of Computer Programming, Vol. 1, Naresh Publications, 1985
- Goodrich Michael T. and Roberto Tamassia, —Algorithm Design: Foundations, Analysis & Internet Examples, Wiley Student Ed., 2002

CS-207A	OPERATING SYSTEMS	L T P	Cr
		3 0 0	3

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", 5th 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. Dhamdhere D. M., "Operating System", 2nd 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. Singhal Mukesh and Shivaratri N.G., "Operating Systems", Tata McGraw Hill, 2003

IT-201 A	OBJECT ORIENTED PROGRAMMING USING C++	L T P	Cr
		4 0 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.

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, proxy class, 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.

- 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

- Balagurusamy, E., —Object Oriented Programming with C++, Prentice Hall of India, 2008
- Scheldt, 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.

IT-202 A	COMPUTER NETWORKS	L T P	Cr
		4 0 0	4

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

- 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.
- 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.
- 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
- 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.
- 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. ForouzanBehrouz 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.

BA-273A	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, DhanpatRai Publishers
2. L.M. Prasad, Principles & Practices of management, Sultan Chand & Sons 2005
3. Harold Koontz & O' Doneell Cyril Management, McGraw Hill, 1968.

CS-257A	OPERATING SYSTEMS LAB	L T P	Cr
		0 0 2	1

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.

IT-251 A	OBJECT ORIENTED PROGRAMMING USING C++LAB	L T P	Cr
		0 0 2	1

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.

IT-252 A	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

CS-303 A	COMPUTER GRAPHICS	L T P	Cr
		4 0 0	4

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 planar 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, Feiner Stevan K. and Hughes J ohb F., —Computer Graphics Principles and P ractices, 2nd Edition, Addison Wesley, 2000

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
3. Watt Alan, —Fundamentals of 3-Dimensional Computer Graphics, Addison Wesley, 1999
4. John Corrigan, —Computer Graphics: Secrets and Solutions, BP B Publications, 1994
5. Krishanmurthy N., —Introduction to Computer Graphics, Tata McGraw Hill, 2002

CS- 304 A	Formal Languages and Automata Theory	L T P	Cr
		4-0-0	4

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.

- 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 ϵ -moves; limitations of FSM, Moore and Mealy Machines; Equivalence of Moore and Mealy Machines., Minimization of Finite Automata. Concept of basic machine; properties
- 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.
- 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.
- TURING MACHINES:** Basic concepts, Deterministic and non-deterministic Turing machines; design of Turing machines; halting problem of Turing machines.
- 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 Motswani R., "Introduction to Automata Theory, Language & Computations", Addison Wesley, 2001

REFERENCE BOOKS

- Mishra K. L. P. and Chandrasekaran N., "Theory of Computer Science - Automata, Languages and Computations", Prentice Hall of India, 2000
- Linz Peter, "Introduction to Formal Languages & Automata", Narosa Publications, 2001
- Greenlaw Ramond and Hoover H. James, "Fundamentals of the Theory of Computation - Principles and Practice", Harcourt India Pvt. Ltd., 1998
- Lewis H. R. and Papaditriou C. H., "Elements of Theory of Computation", Prentice Hall of India, 1998
- Martin John C., "Introduction to Languages and Theory of Computations", Tata McGraw Hill, 2003

IT-304 A	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 I , McGraw Hill, 2004

REFERENCE BOOKS

- Jalote P ankaj, —An Integrated Approach to Software EngineeringI, 3rd edition, Narosa Book Distributors Private Ltd, 2005
- Mall Ra jib, —Fundamentals ofSoftware Engineering II, Prentice Hall of India,2003
- Sommerville Ian, —Software EngineeringII, 8th edition, Addison Wesley, 2007
- Gustafson David, —Software Engineering II, Tata McGraw Hill, 2002
- Behforooz Ali and Hudson Frederick J., —Software Engineering FundamentalsII, Oxford University press, John Wiley & Sons, 2005

IT-308 A	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 associativity; 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 & APPLLET 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-310 A	Free Open Source Software	L T P	Cr
		3 0 0	3

OBJECTIVES:

- Be exposed to the context and operation of free and open source software (FOSS)
- Communities and associated software projects.
Be familiar with participating in a FOSS project
- Learn scripting language like Python or Perl
- Learn programming language like Ruby.
- Learn some important FOSS tools and techniques.

UNIT I PHILOSOPHY :- Notion of Community, Guidelines for effectively working with FOSS community, Benefits of Community based Software, Development Requirements for being open, free software, open source software, Four degrees of freedom, FOSS Licensing Models, FOSS Licenses, GPL, AGPL, LGPL, FDL, Implications, FOSS examples.

UNIT II LINUX :- Linux Installation and Hardware Configuration, Boot Process, The Linux Loader (LILO) , The Grand Unified Boot loader (GRUB), Dual-Booting Linux and other Operating System, Boot-Time Kernel Options, X Windows System Configuration-System Administration, Backup and Restore Procedures, Strategies for keeping a Secure Server.

UNIT III PROGRAMMING LANGUAGES : Programming using languages like Python or Perl or Ruby

UNIT IV PROGRAMMING TOOLS AND TECHNIQUES :- Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent, Bug Tracking Systems- Package Management Systems

UNIT V FOSS CASE STUDIES :- Open Source Software Development, Case Study : Libreoffice - Samba

TEXT BOOK:

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.

REFERENCES:

1. Philosophy of GNU URL: <http://www.gnu.org/philosophy/>.
2. Linux Administration URL: <http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/>.
3. The Python Tutorial available at <http://docs.python.org/2/tutorial/>.
4. Perl Programming book at <http://www.perl.org/books/beginning-perl/>.
5. Ruby programming book at <http://ruby-doc.com/docs/ProgrammingRuby/>.
6. Version control system URL: <http://git-scm.com/>.
7. Samba: URL : <http://www.samba.org/>.
8. Libre office: <http://www.libreoffice.org/>.

EC-313A	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 equipments and standard guiding such communication.

- 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.
- 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)
- 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
- 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
- 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

- Sanjay Sharma, Communication Systems, Kataria& Sons.
- HSU. HWei P, Analog and Digital Communications, Schaum's outline series, Tata McGraw Hill, 2003
- Singh, R.P. and Sapre, S.D., Communication Systems, Analog and Digital, Tata McGraw Hill, 2002.
- P Chakraborty, Analog communication systems, Dhanapatirai& Sons, 2008
- Sam Shanmugam.K.; Digital and Analog Communication Systems, Wiley, 1998.
- Taub and Shilling, Principles of Communication Systems, 2nd edition, Tata McGraw Hill, 2003.
- Carlson, A.B.; Rutledge.J. andCrilly. P.Communication Systems, 4th edition,TataMcGrawHill, 2002.

IT-356A	Web Technology Lab	L T P	Cr
		0 0 4	2

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.
- 22 WAP to create cookies using PHP
- 23 WAP to delete and manage the cookies using PHP
- 24 WAP to create, manage and delete the sessions in PHP
- 25 Working with Form Validation using PHP

CS-353 A	COMPUTER GRAPHICS LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

- 2D line as raster graphics display using Bresenham line drawing algorithm
- 2D line drawing as raster graphics display using DDA line drawing algorithm
- Circle drawing as raster graphics display using mid point circle drawing algorithm
- Polygon filling as raster graphics display using Boundary fill algorithm and Flood fill algorithm
- Line clipping
- Polygon clipping
- Display 3D object as 2D raster graphics display using perspective transformation
- Rotation for 3D object about arbitrary axis
- Hidden surface removal from a 3D object
- 2D transformations of a given object (triangle, rectangle, pentagon) for translating, scaling, rotating, reflecting, shearing
- Create a screen saver using inbuilt functions of graphics
- Zoom an object
- Reverse zooming
- Create a Bezier Curve

REFERENCE BOOKS

- Hearn Donald and Baker M. Pauline, —Computer GraphicsI, 2nd Edition, Prentice Hall of India, 1999
- Rogers David F., —Procedural Elements for Computer GraphicsI, 2nd Edition, Tata McGraw Hill, 2001

IT-358 A	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

- Write a Java program to print “Hello Java”

2. Operators and Expressions

- Write a java program to find the area of a rectangle.
- To write a java program to find the result of the following expressions
 - $(a \ll 2) + (b \gg 2)$
 - $(b > 0)$
 - $(a + b * 100) / 10$
 - $a \& b$
 Assume $a=10, b=5$

- To write a java program to print the individual digits of a 3 digit number using Command line arguments.

3. Decision making statements

- 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.

REFERENCE BOOKS

1. Balaguruswamy , E., ““Programming with Java”, Tata Mcgraw Hill.
2. Horetmann Cay and Cornell Gary, “Core Java Volume – I”, Pearson Education.

IT-305 A	Data Mining and Data Warehousing	L T P	Cr
		4 0 0	4

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 ARCHITECTURE AND IMPLEMENTATION:** 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. Arjun Pujri, "Data Mining Techniques" PHI Publication

References:

1. Berson, "Data Warehousing, Data-Mining & OLAP", TMH
2. Mallach, "Decision Support and Data Warehousing System", TMH
3. Bhavani Thura-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

IT-309 A	PROGRAMMING USING C#	L T P	Cr
		3- 0 0	3

Objective: To impart knowledge of C# programming is useful in making various web and windows applications on .NET framework.

- .NET OVERVIEW AND ITS MAJOR COMPONENTS:** origin of .NET technology; understanding .NET platform; benefits and limitations of .NET approach; building blocks of .NET framework; .NET programming languages, types and namespaces; understanding CLR; CTS and CLS; developing C# Applications using Visual Studio .Net.
- INTRODUCTION TO C#:** Evolution of C#; Characteristics of C#; C++ and C#; Java and C#; object-oriented programming using C#; Applications of C#.
- C# PROGRAMMING:** Creating a C# program; types in C#; operators; statements and control; classes & objects; inheritance and polymorphism; methods; arrays and strings; interfaces; abstract and base classes.
- SPECIAL FEATURES OF C#:** operator overloading; properties and indexers; delegates and their usefulness; I/O in C#; exception and error handling in C#; C# and windows application.
- INTRODUCTION TO ADO .NET AND ASP .NET:** comparison of ADO and ADO. NET; introduction to data access with ADO.NET; components of ADO.NET; comparison of ASP and ASP .NET; features of ASP .NET; web forms and their components.

Text Book:-

- Balaguruswamy, E, “Programming in C#”, Tata McGraw Hill

REFERENCE BOOKS

- Jain, V K, “The Complete Guide to C# Programming”, IDG Books India.
- Pappas & Murray, “C# Essentials”, Prentice Hall of India
- Gunnerson Eric, “A programmer’s Introduction to C#”, IDG Books
- Wakefield, “C# and .NET Web Developers Guide”, IDG Books India

IT-310 A	ADVANCE JAVA	L T P	Cr
		4 0 0	4

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

IT-322 A	COMPUTER SOFTWARE	L T P	Cr
	TESTING	3 0 0	3

OBJECTIVE

To develop deep understanding about computer software testing methodologies and tools

PRE-REQUISITES

Knowledge of programming, software engineering, software project management

1. **FUNDAMENTALS & TESTING TYPES:** First, second and later cycles of testing, Objectives and limits of testing, Overview of software development stages, Planning and Design stages and testing during these stages. Glass box code, Regression and Black box testing, Software errors, Categories of software error
2. **REPORTING BUGS&PROBLEM TRACKING SYSTEM:** Problem reports, Content and Characteristics of Problem Report, analysis and Tactics for analyzing a reproducible bug, Making a bug reproducible; Objective of Problem Tracking System, tasks of the system, Problem tracking overview, users of the tracking system, mechanics of the database

3. **TEST CASE DESIGN:** Characteristics of a good test, equivalence classes and boundary values, visible state transitions, Race conditions and other time dependencies, load testing. Error guessing, Function equivalence testing, Regression Testing, General issues in configuration testing, printer testing
4. **LOCALIZATION AND USER MANUALS TESTING:** Translated text expands, Character sets, Keyboards, Text filters, Loading, saving, importing, and exporting high and low ASCII, Operating system Language, Hot keys, Error message identifiers, Hyphenation rules, Spelling rules, Sorting Rules, Uppercase and Lowercase conversion, Printers, Sizes of paper, CPU's and video, Rodents, Data formats and setup options, Rulers and measurements, Culture-bound Graphics and output, European product compatibility, Memory availability, automated testing, Testing User Manuals, Effective documentation, documentation tester's objective, How testing documentation contributes to software reliability
5. **TESTING TOOLS & MANAGEMENT ISSUES OF TESTING:** Fundamental tools, automated acceptance and regression tests, standards, translucent box testing Overall objective of the test plan: product or tool? Detailed objective, type of test, strategy for developing components of test planning documents, components of test planning documents, documenting test materials: Software Development tradeoffs and models, Quality-related costs, The development time line, Product design, alpha, Pre-beta, Beta, User Interface freeze, Pre- final, Final integrity testing, Project post-mortems, Legal consequences of defective software, Managing and role of a testing group, independent test agencies

TEXT BOOK

Cem Kaner, Jack Falk and Hung Quoc Nguyen, —Testing Computer Software, 2nd Edition, Wiley, 1999.

REFERENCE BOOKS

1. Craig, Jaskiel, —Systematic Software Testing, Artech House, 2002
2. Aditya P. Mathur, —Foundation of Software Testing, 1st Edition, Pearson Education, 2008
3. Bauersfeld, —Software by Design: Creating People Friendly Software, M&T Books, New York, 1994
4. Beck, —Test Driven Development, Addison-Wesley Signature Series, Library of Congress Cataloging in Publication, 5th Edition, 2004.
5. Elfriede Dustin, —Effective Software Testing: 50 Specific Ways to Improve Your Testing, 1st Edition, Addison-Wesley, 2002.
6. Freedman, Weinberg, —Handbook of Walkthroughs, Inspections & Technical Reviews, 3rd Edition, Dorset House, 1990.

EC-302-A	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

IT-355A	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

IT-359 A	Programming Using C# Lab	L T P	Cr
		0-0-2	1

List of Experiments

1. Study of conversion methods in C#.
2. WAP in C# illustrating various access modifiers like private, public, protected and internal and use of ref parameters.
3. WAP to implement classes and objects in C#.
4. WAP to show polymorphism and virtual base class in C#.
5. WAP to show use of constructor and destructor in C#.
6. WAP in C# illustrating use of delegates.
7. WAP in C# illustrating use of properties and indexers.
8. WAP in C# illustrating use of exception and error handling.
9. WAP in C# illustrating use of abstract base class and interfaces
10. Connectivity with ADO.NET

IT-360 A	Advance Java Lab	L T P	Cr
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		0-0-2	1
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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.

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-403 A	SOFT COMPUTING TECHNIQUES	L T P	Cr
		4 0 0	4

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 co-efficient ;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. KonarAmit, “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

CS-452 A	ARTIFICIAL INTELLIGENCE LAB	L T P	Cr
		0-0-2	1

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.

CS-453 A	Soft Computing Techniques Lab	L T P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

- 1 Study of NN toolbox
To generate a few activation functions that is used in neural networks in MatLab.
- 2 To generate AND function using McCullock Pitts Neural Network in MatLab.
- 3 To generate OR function using McCullock Pitts Neural Network in MatLab.
- 4 To generate AND NOT function using McCullock Pitts Neural Network in MatLab.
- 5 To generate XOR function using McCullock Pitts Neural Network in MatLab.
- 6 Write a MATLAB program for perceptron net for an and function with bipolar input and targets.
- 7 Write a MATLAB program to use Hebbian Network to classify 2-Dimensional input pattern.
- 8 Write a MATLAB program to impliment DICRETE HOPFIELD network and test the input pattern
- 9 Write a MATLAB program to impliment FUZZY set operations and properties
- 10 Write a MATLAB program to impliment composition of Fuzzy and Crisp Relations
- 11 Consider the following FUZZY sets . $A = \{1/2+0.4/3+0.6/4+0.3/5\}$, $B = \{0.3/2+0.2/3+0.6/4+0.5/5\}$. Calculate UNION , INTERSECTION , COMPLIMENT using MATLAB program
- 12 Check for any given relation for its tolerance using MATLAB program.
- 13 Find the FUZZY Relation between any two Fuzzy Vectors using FUZZY MIN-MAX methhod using MATLAB program.
- 14 Find the FUZZY Relation between any two Fuzzy Vectors using FUZZY MAX PRODUCT methhod using MATLAB program.
- 15

CS-447 A	Cloud Computing	L T P	Cr
		3 0 0	3

Objective:-

Explain the concepts of Cloud Computing and the various deployment and service models of Cloud Computing

Prerequisites

Knowledge of object oriented programming language (such as Java) and basic operational knowledge of any RDBMS (such as MySQL).

Unit I: Overview of Cloud Computing: Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing. Why Cloud Computing, Cloud service models (IaaS, PaaS&SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.

Unit II: Working with Private Cloud: Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing. Business cases for the need of Cloud computing environment, Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Vendors, Private Cloud Building blocks namely Physical Layer, Virtualization Layer, Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud. Implementing private cloud (one out of CloudStack, OpenStack, Eucalyptus, IBM or Microsoft)

Unit III: Working with Public Clouds :What is Public Cloud, Why Public Cloud, When to opt for Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings, IaaS Vendors, PaaS offerings, PaaS vendors, Software as a Service. Implementing public cloud (one out of AWS, Windows Azure, IBM or Rackspace).

Unit IV: Business Clouds :Cloud Computing in Business, Various Biz Clouds focused on industry domains (Retail, Banking and Financial sector, Life Sciences, Social networking, Telecom, Education). Cloud Enablers (Business Intelligence on cloud, Big Data Analytics on Cloud)

Unit V: Overview of Cloud Security Explain the security concerns in Traditional IT, Introduce challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security. Security reference model, Abuse and Nefarious Use of Cloud Computing, Insecure Interfaces and APIs, Malicious Insiders, Shared Technology Issues, Data Loss or Leakage, Account or Service Hijacking, Unknown Risk Profile, Introduce the different vendors offering Cloud Security for public and private clouds.

Text Book

- 1 Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski , Cloud Computing: Principles and paradigms, Cloud Computing, By Michael Miller, 2008.
- 2 Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for dummies, 2009.
- 3 Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter, Cloud Computing: A Practical Approach, McGraw Hill, 2010.
- 4 BorkoFurht, Armando Escalante ,Handbook of Cloud Computing, (Editors), Springer, 2010.

Reference Book

- 1Rittinghouse, John, W. , Cloud computing: Implementation, management and security
- 2 Barrie Sosinsky , Cloud Computing Bible, , Wiley, 2011.
- 3 Rhoton, John., Cloud Computing Architected: Solution Design Handbook.
- 4 Krutz, Ronald L.; Vines, Russell Dean, Cloud Security, A comprehensive Gui

CS-446 A	Mobile Computing	L T P	Cr
		3 0 0	3

Objective:-

- 1 Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
2. Appreciation of nuances such as native hardware play, location awareness, graphics, and multimedia.
3. Perform testing, signing, packaging and distribution of mobile apps

Prerequisites: Java (J2SE) and basic RDBMS

Unit 1: Introduction to Wireless Transmission: Application, A short history of wireless communication, Mobile network Models, Study of Mobile layers, GSM, Mobile services, System architecture, DECT: system architecture.

Unit 2: Getting started with Mobility Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development

Unit 3: Building blocks of mobile apps :App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle, interaction amongst activities.

Unit 4 App functionality beyond user interface :- Threads, Asynchronous task, Services – states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs
Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)

Unit 5: Testing mobile apps and Taking Apps to Market.

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, Monkey Talk

Books:-

- 1 JochenSchiller , Mobile Communications, 2nd Edition, By Addison Wesley Publications..
- 2 Barry Burd, Android Application Development All in one for Dummies,First Edition.
- 3 Teach Yourself Android Application Development In 24 Hours ,First edition by SAMS Publication

CS-445 A	Agile Software Development	L T P	Cr
		3 0 0	3

To Understand the background and driving forces for taking an Agile approach to software development and the business value of adopting Agile approaches

- Understand the Agile development practices
- Drive development with unit tests using Test Driven Development
- Apply design principles and refactoring to achieve Agility
- Deploy automated build tools, version control and continuous integration
- Perform testing activities within an Agile project

Prerequisites:

Awareness of basics of software engineering concepts and waterfall methodology

Exposure to any object oriented programming language such as Java, C#.

Unit I: Fundamentals of Agile:

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

Unit II: Agile Framework:, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories,

Unit III Agile Scrum: Introduction to Scrum Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management

Unit IV: Agile Testing: The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester

Unit V: Agile Software Design and Development and Need : Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

Text Books

1 Ken Schawber, Mike Beedle, Agile Software Development with Scrum By Publisher: Pearson Published: 21 Mar

2 Robert C. Martin, Agile Software Development, Principles, Patterns and Practices By Publisher: Prentice Hall Published: 25 Oct 2002

CS-432 A	NATURAL LANGUAGE PROCESSING	L T P	Cr
		3 0 0	3

Prerequisite: Students should have knowledge of Regular Grammar and Automata Theory.

OBJECTIVES:

The student should be made to:

- Learn the techniques in natural language processing.
- Be familiar with the natural language POS techniques.
- Be exposed to machine translation.
- Understand the ambiguity Resolution retrieval techniques.

1 INTRODUCTION TO NATURAL LANGUAGE UNDERSTANDING: The study of natural Language and Natural Language Processing, applications of NLP, evaluating language understanding systems, Role of Knowledge in Natural Language Processing , Phases of natural Language Processing, Different levels of

language analysis, representations and understanding, organization of natural language understanding systems.

2. **BASIC ENGLISH GRAMMARS:** Basic English language has been discussed that include word formation, basic English Grammar, Sentence formation, part of speech Linguistic background: an outline of English syntax. Grammars and sentence structure, Characteristics of good grammar, Basic sentence structure in language processing, Components of a general purpose grammar in language processing.

3. **PARSING AND SYNTACTIC ANALYSIS:** Phases of syntactic Analysis, Parsing Techniques, Parsing Algorithm, Types of Parsing technique: top-down and bottom-up parsers, top-down chart parsing, Encoding uncertainty, deterministic parser, word level morphology and computational phonology; basic text to speech; introduction to HMMs and speech recognition, parsing with CFGs; probabilistic parsing. Representation of meaning.

4. **TRANSITION NETWORK AND AUGMENTED GRAMMARS:** A finite state model for analysis sentences, Transition Network, Purpose and Use of a transition network for language processing, types of transition networks, Augmented Grammar, augmented transition networks, movement phenomenon in language, handling questions in context-free grammars.

5. **SEMANTICS AMBIGUITY RESOLUTION AND :** Word senses and ambiguity, encoding ambiguity in logical form, semantic analysis; lexical semantics; word sense; disambiguation; discourse understanding; natural language generation, Statistical methods, estimating probabilities, part-of- speech tagging, obtaining lexical probabilities, probabilistic context-free grammars, best first parsing, Indian language case studies.

Text Book

1. Allen James, "Natural Language Understanding", 2nd edition, Pearson Education, 2003.
2. Ela Kumar "Natural Language Processing", I.K International Publication House.

REFERENCE BOOKS

1. Siddiqui Tanveer and Tiwary U. S., "Natural Language Processing and Information Retrieval", Oxford University Press, 2008
3. Winograd Terry, "Language as a Cognitive Process", Addison Wesley, 1983
4. Gazder G., "Natural Language Processing in Prolog", Addison Wesley, 1989
5. Jurafsky D. and Martin J. H., "Speech and Language Processing", Pearson Education, 2002.
6. Manning Christopher D. and Schütze Hinrich, "Foundations of Statistical Natural Language Processing", The MIT Press, Cambridge, Massachusetts. 1999.

IT-341 A	NETWORK SECURITY & MANAGEMENT	L T P	Cr
		3 0 0	3

OBJECTIVE

The main objective behind this course is to learn about the various network attacks and preventing attacks. This course is designed to cover Application security, Network security, Web security etc.

PRE-REQUISITES

Knowledge of data communications and computer networks, computer programming, data structures, mathematics, telecom network. Knowledge of digital signal processing is desirable

1. **INTRODUCTION:** Codes and ciphers; some classical systems; statistical theory of cipher systems; complexity theory of crypto systems; stream ciphers; block ciphers.
2. **STREAM CIPHERS:** Rotor based system; shift register based systems, design considerations for stream ciphers; crypt-analysis of stream ciphers; combined encryption and encoding;
3. **BLOCK CIPHERS:** DES and variant; modes of use of DES; public key systems, Knapsack systems; RSK; Diffie Hellman exchange; authentication and digital signatures;
4. **HASH FUNCTION – AUTHENTICATION:** Protocols: digital signature standards; electronics mail security: PGP (Pretty Good Privacy) MIME; data compression technique; broadband network management (ATM, HFC, DSL); ASN secure socket layer and transport layer security.
5. **NETWORK SECURITY:** – Authentication; computer crime; privacy; ethical issues in computer society; IP Security: architecture, authentication leader; encapsulating security payload: key management; web security: Web Security, Secure electronic transactions.. case studies of ethics. Firewalls Design principle, established systems

Text Book

1. “Atul Kahate” Cryptography and Network Security ,2nd Edition, Tata McGraw Hill
2. “Charles P. Pfleger” Security in Computing, 4th Edition, Prentice Hall of India

REFERENCE BOOKS

1. Stallings William, “Cryptography and Network Security: Principles & Practices”, 4th Edition, Prentice Hall of India, 2005
2. Kauffman C., Perlman R. and Spenser M., “Network Security”, 2nd Edition, Prentice Hall, Englewood Cliffs, 2002.
3. Mani Subramanian, “Network Management Principles & Practices”, Addison Wesley, 1999
4. Burke J. Richard, “Network Management concepts and Practice A Handon Approach”, Pearson Education/Prentice Hall of India, 2003
5. Stalling William, “SNMP”, 3rd Edition, Addison Wesley, 1999

Scheme for BCA & BCA-MCA Integrated

BCA & BCA-MCA Integrated			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-1104A	Mathematics-I	4	0	0	4
4	EN-101A	Technical Communication	3	0	0	3
5	PH-1104A	Basics of Physics	3	0	0	3
6	BA-247 A	Accounting and Financial Management	3	0	0	3
7	CA-1151 A	Computer Programming Lab	0	0	4	2
8	CA-1157 A	PC Software Lab	0	0	2	1
9	CA-1158 A	Internet and Web Development Lab	0	0	2	1
10	PDA-192A	Personality Development Skills	0	1	0	1
11	PDA-191	Co-Curricular Activities	0	1	0	1
Total			21	2	8	27

BCA & BCA-MCA Integrated			Semester			II
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
7	CA-1152 A	Data Structures Using C Lab	0	0	2	1
8	CA-1154A	Object Oriented Programming using C++ Lab	0	0	4	2
9	PD-251 A	MAT LAB	0	1	0	1
10	PDA-191	Co-Curricular Activities	0	1	0	1
Total			21	2	6	26

BCA & BCA-MCA Integrated			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1201 A	Operating Systems	4	0	0	4
2	CA-1202A	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
7	CA1256A	Multimedia Technologies Lab	0	0	2	1
8	CA-1262A	Core java Lab	0	0	2	1
9	CA-1263 A	Database Management System Lab	0	0	4	2
10	PD-292A	Effective Communications**	0	1	0	1
11	PDA-191	Co-Curricular Activities	0	1	0	1
Total			23	2	8	29

BCA & BCA-MCA Integrated			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
7	CA-1254A	Computer Graphics Lab	0	0	2	1
8	CA-1257A	Linux and Shell Programming Lab	0	0	2	1
9	CA-1261A	Rapid Application Development Lab	0	0	2	1
10	PD-293A	Interpersonal Skills	0	1	0	1

11	PD-291	Co-Curricular Activities	0	1	0	1
Total			20	3	6	26

BCA & BCA-MCA Integrated			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1302A	Software Engineering Principles	4	0	0	4
2	CA-1303A	Programming Using C#	4	0	0	4
3	CA-1304A	Artificial Intelligence	4	0	0	4
4	CA-1305A	Introduction to E-commerce	3	0	0	3
5		Elective – I	3	0	0	3
6	CA-1353A	Programming Using C# Lab	0	0	2	1
7	CA-1354A	Artificial Intelligence Lab	0	0	2	1
8	CA-1381A	Minor project -1	0	0	10	5
9	PD-392A	Problem solving skills	0	1	0	1
10	PD-391	Co-Curricular Activities	0	1	0	1
Total			18	2	14	27

BCA & BCA-MCA Integrated			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CA-1306 A	Software Project Management	3	0	0	3
2	CA-1307 A	Neural Network	4	0	0	4
3	CA-1309 A	Network security & management	3	0	0	3
4	CA-1310	Python Programming	3	0	0	3
5		Elective -2	3	0	0	3
6	CA-1382	Project	0	0	8	4
7	CA-1357 A	Neural network lab	0	0	2	1

8	CA-1360 A	Python Programming Lab	0	0	2	1
9	PD-391	Co-Curricular Activities	0	1	0	1
Total			16	1	12	23

BCA & BCA-MCA Integrated			Semester			VII
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 Advance 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
7	MCA-251 A	Computer Graphics and Multimedia Lab	0	0	4	2
8	MCA-256 A	Core and Advance Java Lab	0	0	4	2
9	MCA-258 A	C# Programming Lab	0	0	4	2
Total			20	0	12	26

BCA & BCA-MCA Integrated			Semester			VIII
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	Advance 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
7	MCA-259 A	Data Mining and Data Warehousing Lab	0	0	4	2
8	MCA-266 A	Cloud Computing Lab	0	0	4	2
9	MCA- 271 A	Big Data Analysis Lab	0	0	4	2
Total			21	0	12	27

BCA & BCA-MCA Integrated			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-301 A	Artificial Intelligence	4	0	0	4
2	MCA-303 A	Introduction to ERP	3	0	0	3
3	MCA-304 A	Android Applications development	4	0	0	4
4		Elective- 1	3	0	0	3
5		Elective- 2	3	0	0	3
6	MCA-351 A	Artificial Intelligence Lab	0	0	4	2
7	MCA-354 A	Android Applications development Lab	0	0	4	2
8	MCA-381 A	Minor project	0	0	8	4
Total			17	0	16	25

BCA & BCA-MCA Integrated			Semester			X
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-371 A	Internship	0	0	32	16
2		Elective(CST)	3	0	0	3
3	MCA-391 A	Seminar***	0	0	4	2

			Total	3	0	36	21
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Scheme for BCA & BCA-MCA Integrated (Elective)

BCA & BCA-MCA Integrated (Elective-1)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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	Advance 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
		Total	21	0	0	21

BCA & BCA-MCA Integrated (Elective-2)			Semester			II
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	Advance 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
Total			27	0	0	27

Scheme for MCA Lateral Entry

MCA Lateral Entry			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
7	MCA-151 A	Computer Programming Lab	0	0	4	2
8	MCA-154 A	Data Structures and its application Lab	0	0	4	2
9	MCA-156 A	Web Development Lab	0	0	4	2
Total			21	0	12	27

MCA Lateral Entry			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	

1	MCA-103 A	Relational DBMS	3	0	0	3
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	3	0	0	3
6	MCA-111 A	Software Engineering Principles	3	0	0	3
7	MCA-153 A	Relational DBMS Lab	0	0	4	2
8	MCA-155 A	Object Oriented Programming USING C++ Lab	0	0	4	2
9	MCA-159 A	Operating System lab	0	0	4	2
Total			18	0	12	24

MCA Lateral Entry (Semester – I for Lateral Entry)			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 Advance 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
7	MCA-251 A	Computer Graphics and Multimedia Lab	0	0	4	2
8	MCA-256 A	Core and Advance Java Lab	0	0	4	2
9	MCA-258 A	C# Programming Lab	0	0	4	2
Total			20	0	12	26

MCA Lateral Entry (semester – II for Lateral Entry)			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	Advance 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
7	MCA-259 A	Data Mining and Data Warehousing Lab	0	0	4	2
8	MCA-266 A	Cloud Computing Lab	0	0	4	2
9	MCA- 271 A	Big Data Analysis Lab	0	0	4	2
Total			21	0	12	27

MCA Lateral Entry (semester – III for Lateral Entry)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-301 A	Artificial Intelligence	4	0	0	4
2	MCA-303 A	Introduction to ERP	3	0	0	3
3	MCA-304 A	Android Applications development	4	0	0	4
4		Elective - 1	3	0	0	4
5		Elective - 2	3	0	0	3
6	MCA-351 A	Artificial Intelligence Lab	0	0	4	3
7	MCA-354 A	Android Applications development Lab	0	0	4	2
8	MCA-381 A	Minor project	0	0	4	2
Total			21	0	12	27

MCA Lateral Entry (semester – IV for Lateral Entry)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MCA-371 A	Internship	0	0	32	16
2		Elective(CST)	3	0	0	3
3	MCA-391 A	Seminar***	0	0	4	2
Total			3	0	36	21

Scheme for MCA Degree(Elective)

MCA Degree(Elective - I)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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	Advance 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

			Total	24	0	0	24
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MCA Degree(Elective - II)			Semester			II
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	Advance 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
		Total	27	0	0	27

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
		Total	12	4	6	19

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
Total			15	4	12	25

B.Tech - M.Tech Integrated SEMESTER -IX

B. Tech.-M.Tech. Integrated			Semester			III
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
Total			9	2	18	20

B.Tech - M.Tech Integrated SEMESTER –X

B. Tech. - M.Tech. Integrated			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-659	Dissertation	0	0	42	21
3	CS-658	Seminar – III	0	0	4	2
5	CS-622	Expert System	3	0	0	3
Total			3	0	46	26

Scheme for B. Tech. Integrated & Diploma (Regular)

B. Tech. Integrated & Diploma (Regular)			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	4	3
7	ME-152D	General Workshop Practice -I	0	0	4	2
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
12	CHI-161	Activity Based on Chemistry	0	0	2	1
13	PHI-161	Activity Based on Physics	0	0	2	1
14	MAI-161	Activity Based on Mathematics	0	0	2	1
Total			18	0	22	29

B. Tech. Integrated & Diploma (Regular)			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	EE-101D	Basic Electrical Engineering	3	0	0	3
6	EC-101D	Analog Electrics- I	3	1	0	4
7	CS-102D	Programming in C	3	0	0	3
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	EE-151D	Basic Electrical Engineering Lab	0	0	2	1
12	EC-151D	Analog Electrics-I lab	0	0	2	1
13	CS-152D	Programming in C lab	0	0	2	1
Total			21	3	12	30

B. Tech. Integrated & Diploma (Regular)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CS-201D	Data Structure using C	4	0	0	4
2	CS-202 D	Data Base Management system	4	1	0	5
3	EC-203D	Digital Electronics	4	1	0	5
4	CS-203 D	Computer Architecture and Organization	3	0	0	3
5	CS-204 D	Internet and Web development	1	0	4	3
6	CS -254 D	Computer Workshop	0	0	4	2
7	CS-251D	Data Structure using C Lab	0	0	2	1
8	CS-252D	Data Base Management system Lab	0	0	2	1
9	EC-253D	Digital Electronics Lab	0	0	2	1
10		Co-curricular Activities	0	1	0	1
Total			16	3	14	26

Diploma 2nd Year 4th Semester

B. Tech. Integrated & Diploma (Regular)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	

			L	T	P	
1	CS-205 D	Object Oriented Programming	4	0	0	4
2	CS-206 D	Operating System and System Programming	4	0	0	4
3	CS-207 D	Multimedia Technology	4	0	0	4
4	EC-209 D	Microprocessor	4	0	0	4
5	CS-209 D	Computer Network	3	0	0	3
6	CS-258 D	Windows and Linux Operating system Lab	3	0	0	3
7	CS-259 D	Computer Network Lab	0	0	2	1
8	CS-255 D	Object Oriented Programming Lab	0	0	2	1
9	CS-256 D	Operating System and System Programming Lab	0	0	2	1
10	CS-257 D	Multimedia Technology Lab	0	0	2	1
11	PD 293 A	INTERPERSONAL SKILLS	0	0	2	1
12		Co-curricular Activities	2	0	0	2
Total			24	0	10	29

B. Tech. Integrated & Diploma (Regular)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1		Employability Skills-1	3	0	0	3
2	CEA-101	Environmental Science and Ecology	2	0	0	2
3	CS-301 D	Computer Graphics	4	0	0	4
4	CS-302 D	Core Java	4	0	0	4
5		Elective	3	0	0	3
6	CS-303 D	Software Engineering	4	0	0	4
7	CS- 351 D	Computer Graphics Lab	0	0	2	1
8	CS-352 D	Core Java Lab	0	0	2	1
9	CS-353 D	Workshop/Minor Project/Troubleshooting	0	0	4	2
10		Co-curricular Activities	0	1	0	1
Total			20	1	8	25

B. Tech. Integrated & Diploma (Regular)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1		Employability Skills-2	3	0	0	3
2		Entrepreneurship Development and Management	3	0	0	3
3	CS-304 D	Network Security and Management	3	0	0	3
4	CS-305 D	Artificial Intelligence	3	0	0	3
5	CS-306 D	Software Project Management	3	0	0	3
6	CS-354 D	Major Project	3	0	0	3
7	CS-355 D	Seminar	0	0	10	5
8		Co-curricular Activities	0	1	0	1
Total			18	1	5	24

Scheme for B.Ed.

B.Ed.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BED-110	Childhood and Growing UP	4	0	0	4
2	BED-111	Philosophical & Sociological foundations of education	4	0	0	4
3	BED-112	Language across the Curriculum	2	0	0	2
4	BED-113	Understanding Disciplines and Subjects	2	0	0	2
5	BED-114	School Organization & Management	2	0	0	2
6	PD-191A	Co- curricular activities and Hobby club	0	1	0	1
		Pedagogy of a School subject-I (any one)				
7	BED-121	Teaching of Hindi	4	0	0	4
8	BED-122	Teaching of English				
9	BED-123	Teaching of Mathematics				
10	BED-128	Teaching of Commerce				
11	BED-129	Teaching of Life science				
12	BED-126	Teaching of Home Science				
13	BED-134	Teaching of Sanskrit				
PRACTICAL						
1	BED-110	Understanding the self	0	0	4	2
2	BED-111	PSE (Preliminary School Engagement)	0	0	4	2
		Total	18	1	8	23

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-116	knowledge and curriculum - I	2	0	0	2
3	BED-117	Assessment for learning	4	0	0	4
4	BED-118	Teacher as a Counsellor	2	0	0	2
5	PD-192A	Co- curricular activities and Hobby club	0	1	0	1
Pedagogy of a School subject-II (any one)						
6	BED-124	Teaching of Social Science	4	0	0	4
7	BED-125	Teaching of Integrated Science				
8	BED-127	Teaching of Accountancy				
9	BED-130	Teaching of Economics				
10	BED-133	Teaching of Computer Science				
PRACTICAL						
1	BED-158	Drama & Art In Education	0	0	4	2
2	BED-159	Critical Understanding of ICT	0	0	4	2
3	BED-160	PSE (Preliminary School Engagement) –II	0	0	4	2
Total			16	1	12	23

B.Ed.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BED-201	Internship- I	0	0	18	9
2	BED-202	Internship- II	0	0	18	9
Total			0	0	36	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	0	1	0	1
		Elective Course (any one)				
5	BED-216	Guidance & Counselling	4	0	0	4
6	BED-217	Value Education				
7	BED-218	Peace Education				
8	BED-219	Environmental Education				
PRACTICAL						
1	BED-230	Reflection on School Experience	0	0	4	2
2	BED-231	Reading & Reflecting on Text	0	0	4	2
		Total	14	1	8	19

Scheme for M.Ed.

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						
5	MED-192	Communication & Expository writing	0	0	4	2
6	MED-193	Self-Development	0	0	4	2
7	PD191A	Hobby Club	0	1	0	1
Total			16	1	8	21

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
PRACTICAL						
5	MED-194	Dissertation	0	0	4	2
6	MED-195	Internship In TEI	0	0	8	4
Total			16	0	12	22

M.Ed.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MED-209	Advance Research Methodology	4	0	0	4
2	MED-210	In Service Teacher Education in India	4	0	0	4
		Specialization Courses-I(Any One of the following)				
3 (a)	MED-211	Elementary Education In India: Administration & Management	4	0	0	4
(b)	MED-212	Planning & Management at Secondary Level				
		Specialization Courses-II(Any One of the following)				
4 (a)	MED-213	Issues and Curricular Concerns at Elementary Level	4	0	0	4
(b)	MED-214	Issues and Curricular Concerns at Secondary Level				
PRACTICAL						
5	MED-296	Internship In School	0	0	4	4
6	MED-297	Dissertation (Progress Report)	0	0	4	2
7	MED-298	Academic writing	0	0	8	2
		Total	16	0	16	24

M.Ed.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MED-209	Advance Curriculum Theory	4	0	0	4
		Specialization Courses-III(Any One of the following				
2 (a)	MED-217	Policy, Planning and Financing Of Education	4	0	0	4
(b)	MED-218	Educational Technology				
(c)	MED-219	Issues, Planning and Policies of Elementary Education				
		Specialization Courses-IV(Any One of the following				
3 (a)	MED-220	Peace Education	4	0	0	4
(b)	MED-221	Educational, Vocational Guidance				
(c)	MED-222	Inclusive Education				
(d)	MED-223	Environmental Education				
PRACTICAL						
1	MED-299	Dissertation	0	0	8	4
Total			12	0	8	16

Scheme for B.Tech. Electronics & Communication Engineering (ECE)

B.Tech. Electronics & Communication Engineering (ECE)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ENA-101A	Communication Skill-I	3	0	0	3
2	MA-101A	Applied Mathematics-I	3	1	0	4
3	CEA-101A	Environmental Science and Ecology	2	0	0	2
4	ME-102A	Basics of Mechanical Engineering	3	1	0	4
5	ENA-151A	Communication Skill-I Lab	0	0	2	1
6	EL-101A	Basics of Electrical and Electronics Engineering	3	0	0	3
7	EL-151A	Basics of Electrical and Electronics Engineering Lab	0	0	2	1
8	ME-152A	Workshop Practice-I	0	0	4	2
9	ME-154A	Basics of Mechanical Engineering Lab	0	0	2	1
10	PD-191A	Co-curricular Activities/Hobby Club	0	0	4	2
Total			14	2	14	23

B.Tech. Electronics & Communication Engineering (ECE)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102A	Applied Mathematics –II	3	1	0	4
2	ENA-102A	Communication Skill-II	3	0	0	3
3	ME-153A	Computer Based Engineering Graphics	2	0	0	2
4	CSB-101A	Computer Programming	3	0	0	3
5	PHB-101A	Applied Physics	3	1	0	4
6	CHB-101A	Applied Chemistry	3	1	0	4
7	ENA-152A	Communication Skill-II lab	0	0	2	1
8	CSB-151A	Computer Programming Lab	0	0	2	1
9	PHB-151A	Applied Physics Lab	0	0	2	1
10	CHB-151A	Applied Chemistry Lab	0	0	2	1
11	PD-192A	Co-curricular Activities/Hobby Club	0	0	4	2
Total			17	3	12	26

B.Tech. Electronics & Communication Engineering (ECE)				Semester			III
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	MA-202-A	Applied Numerical Methods	3	0	0	3	
2	EC-202-A	Electrical Engineering Materials and Semi-Conductor Devices	3	0	0	3	
3	EC-203-A	Electromagnetic Theory	3	1	0	4	
4	EC-205-A	Analog Electronics	3	1	0	4	
5	EC-211-A	Electrical & Electronics Measuring Instruments	3	0	0	3	
6	CS-201-A	Data Structures & Algorithm	3	0	0	3	
7	MA-252-A	Applied Numerical Methods Lab	0	0	2	1	
8	EC-252-A	Electrical Engineering Materials and Semi-Conductor Devices Lab	0	0	2	1	
9	EC-259-A	Electrical & Electronics Measuring Instruments Lab	0	0	2	1	
10	HOT-201-A	Hands on Training	0	0	2	1	
11	PD-291-A	Co-curricular Activities	0	1	0	1	
Total			18	3	8	25	

B.Tech. Electronics & Communication Engineering (ECE)				Semester			IV
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	BA-225-A	Economics	3	0	0	3	
2	EC-206-A	Network Theory	3	0	0	3	
3	EC-207-A	Digital Electronics	3	1	0	4	
4	EC-209-A	Communication System	3	1	0	4	
5	EC-210-A	Signals and Systems	3	0	0	3	
6	EC-256-A	Network Theory Lab	0	0	2	1	
7	EC-257-A	Digital Electronics Lab	0	0	2	1	
8	EC-258-A	Communication Systems Lab	0	0	2	1	
9	EC-260-A	Minor Project-I	0	0	2	1	
10	PD293-A	Intra & Inter-personal Skills	0	0	2	1	
11	PD-291-A	Co-curricular Activities	0	1	0	1	
Total			15	3	10	23	

B.Tech. Electronics & Communication Engineering (ECE)				Semester			V
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	BA-249-A	Principles of Management	3	0	0	3	
2	EL-301-A	Control Systems	3	0	0	3	
3	EC-301-A	Analog Electronic Circuits	3	1	0	4	
4	EC-302-A	Microprocessors and Interfacing	3	1	0	4	
5	EC-303-A	Antenna and Wave Propagation	3	1	0	4	
6	EC-304-A	Digital System Design	3	0	0	3	
7	EL-351-A	Control System Lab	0	0	2	1	
8	EC-352-A	Microprocessors and Interfacing Lab	0	0	2	1	
9	EC-354-A	Digital System Design Lab	0	0	2	1	
10	PD354-A /PD392A/ PD393-A	PCB Lab/AEC Lab**/ Problem Solving Skills/Advanced Professional Development	0	0	2	1	
11	PD-391-A	Co-curricular Activities	0	1	0	1	
Total			18	4	8	26	

B.Tech. Electronics & Communication Engineering (ECE)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-305-A	Embedded System Design	3	0	0	3
2	EC-306-A	Communication Engineering	3	1	0	4
3	EC-307-A	Wireless Communication	3	0	0	3
4	EC-308-A	MOS IC's and Technology	3	1	0	4
5	EC-309-A	Digital Signal Processing	3	1	0	4
6	EC- 310-A	TV Engineering	3	0	0	3
7	EC-355-A	Embedded System Design Lab	0	0	2	1
8	EC-358-A	MOS IC's and Technology Lab	0	0	2	1
9	EC-359-A	Digital Signal Processing Lab	0	0	2	1
10	EC-360-A	Minor Project-II	0	0	2	1
11	PD354-A /PD392-A / PD393-A	PCB Lab /AEC Lab**/ Problem Solving Skills/Advanced Professional Development	0	0	2	1
12	PD-391-A	Co-curricular Activities	0	1	0	1
Total			18	4	10	27

B.Tech. Electronics & Communication Engineering (ECE)			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-402-A	Microwave and Radar Engineering	3	1	0	4
2	EC-404-A	Data Communication	3	0	0	3
3		Dept. Elective-I	3	0	0	3
4		Dept. Elective-II	3	0	0	3
5		Open Elective	3	0	0	3
6	EC-452-A	Microwave & Radar Engineering Lab	0	0	2	1
7	EC-454-A	Data Communication Lab	0	0	2	1
8	EC-491-A/ EC-492-A	Major Project+ (project based seminar)	0	0	8	4
9	PD-492-A	Professional Career Skill	0	0	2	1
10	PD-491-A	Co-curricular Activities	0	1	0	1
Total			15	2	14	24

B.Tech. Electronics & Communication Engineering (ECE)				Semester			VIII
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	EC-483-A	Internship /Dissertation Phase	0	0	28	14	
2	EC-484-A	Seminar based on Internship	0	0	2	1	
3		Dept. Elective-III	3	0	0	3	
Total			3	0	30	18	

DEPARTMENT ELECTIVES AND OPEN ELECTIVES (DE and OE)

Department Elective - I						
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-434-A	Principle of Advanced Long term Evolution System	3	0	0	3
2	EC-403-A	Optical Communication	3	0	0	3
Total			6	0	0	6

Department Elective - II						
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-433-A	Satellite Communication	3	0	0	3
2	EC-514-A	Digital Image Processing	3	0	0	3
Total			6	0	0	6

Department Elective - III						
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-434-A	5G Technology	3	0	0	3
2	EC-436-A	Internet of Things	3	0	0	3
Total			6	0	0	6

Open Elective						
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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
8	EC-307-A	Wireless Communication	3	0	0	3
9	EC-401-A	Mobile Communication	3	0	0	3
Total			27	0	0	27

Syllabus for B.Tech. (ECE)

ELECTRONICS & COMMUNICATION ENGINEERING

DETAILED SYLLABUS

1st Year

SEMESTER – I

ENA-101-A	COMMUNICATION SKILL-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 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:

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	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	-	-

choose to know

MA-101A	APPLIED MATHEMATICS-I	L T P	CR
		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 1

Matrices: 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 2

Sequences 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 3

Calculus: 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 4

Calculus: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

UNIT 5

Multivariable 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:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

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	-	-

CEA-101-A	ENVIROMENT 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 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.

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	-	-

ME-102-A	BASICS OF MECHANICAL ENGINEERING	L T P	CR
		3 1 0	4

OBJECTIVE: To give students practice in applying their knowledge of mathematics, science, and engineering and to expand this knowledge into the vast area of “rigid body Mechanics”. To enhance students’ ability to design by requiring the solution of open ended problems. To prepare the students for higher level courses such as courses in Mechanics of Solids, Mechanical Design and Structural Analysis.

Course Outcomes:

- CO1. The student will be able to analyse statically determinate structures including trusses using equations of equilibrium
- CO2. The student will be able to find space-time relationship (kinematics) of particle
- CO3. The student will be able to solve dynamic problems of particle using Newton’s law, energy method and impulse-momentum approach
- CO4. The student will be able to solve elementary problems in vibration
- CO5. Apply theoretical principles of modern physics to analysis and measurements performed in the laboratory

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

1. Meriam, J. L. "Engineering Mechanics", John Wiley & Sons.
2. Beer, F.P. and Johnston, E.R. "Mechanics of Materials", Tata McGraw Hill
3. Shames, I.H. "Engineering Mechanics", 4th Edition, Pearson Education, 2003
4. Pytel, A and Kiusalaas, J. Thomsom, "Mechanics of Materials", Brooks & Cole, 2003

ENA-151A	COMMUNICATION SKILL-I LAB	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

EL-101A	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	L T P	CR
		3 0 0	3

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 circuits

CO2: Students are able to understand the working principles of electrical machines and power converters

CO3: Learn the application of Power converters.

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 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

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.

EL-151A	BASICS OF ELECTRICAL AND ELECTRONICS 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.

ME-152A	WORKSHOP PRACTICE-I	L T P	CR
		0 0 2	1

Course Objectives:

- To teach students the practices of workshop management and maintenance.
- To familiarize students with workshop machinery like drills, lathes, welding torches, files, saws, hammers, etc.
- To teach students the need to economize materials when managing a workshop.
- To teach students the safety measures needed in a workshop and how to deal with accidents at work.
- To teach student welding and manufacture of selected items.
- To teach students the practice of plumbing.

Course Outcomes:

CO1: Given a drawing of a product/part such as carpentry job, fitting job, sheet metal job, assembly of system and pipe fitting, apply the various hand tools and general purpose machine tool to make or assemble the product/part

CO2: select and use various measuring and gauging instrument which are required for different types of jobs.

CO3: Develop creativity, craftsmanship, approach to work and planning capabilities within students

CO4: Acquire knowledge about various types of wiring systems, wiring tools, lighting & wiring accessories, wiring estimation & costing, etc

CO5: Acquire knowledge about household electrical appliances, need of earthing, electric shock, etc

To teach students the basics of electrical installations.

(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) Foundry Trade: Introduction to foundry, Patterns, pattern allowances, ingredients of molding sand and melting furnaces. Foundry tools and their purposes

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) Welding: Introduction, Study of Tools and welding Equipment (Gas and Arc 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
2. Workshop Technology Vol. 1 and 2 by Raghuvanshi B.S. DhanpatRai& Sons 1998
3. Workshop Technology by Chapman W.A. J and Arnold E. Viva low priced student edition, 1998

PD-191A	CO-CURRICULAR ACTIVITIES/HOBBY CLUB	L T P	CR
		0 0 4	2*

OBJECTIVE: To make the Environment clean and green and pollution free .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.

Course Outcomes:

- CO1: Learn the importance of Nature.
- CO2: Learn the importance of Natural resources
- CO3: Learn to working culture of NGO’s
- CO4: Learn the leadership qualities.
- CO5: Learn to organize the events.

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.

Ist Year

SEMESTER – II

MA-102-A	APPLIED MATHEMATICS-II	L T P	CR
		3 1 0	3

Objective: The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced

Course Outcomes:

CO1: Student will learn the mathematical tools needed in evaluating multiple integrals and their usage.

CO: Develops the ability to solve higher order & first degree linear non homogenous differential equation arising in various branch of engineering and related mathematical model develops arising to form mathematical modeling of Real World Problem with its physical interpretation.

CO3: Students learn about random variables, various discrete, continuous probability distributions, and their properties.

CO4: Learn to expand any functions of two variables in the ascending power of variables and also develops error and approximation, extremum value of a given function related to engineering application

CO5: Develop the concepts of Laplace transformation & inverse Laplace Transform with its property to solve partial Differential equation and Ordinary Differential Equation with given boundary conditions which is helpful in all engineering & research work.

Level that will serve them well towards tackling various problems in the discipline.

Unit I: Basic Probability: (12 lectures)

Probability spaces, conditional probability, independence; Discrete random variables,

Independent random variables, the multinomial distribution, Poisson approximation to the

binomial distribution, infinite sequences of Bernoulli trials, sums of independent random

variables; Expectation of Discrete Random Variables, Moments, Variance of a sum,
Correlation coefficient, Chebyshev's Inequality.

Unit II: Continuous Probability Distributions: (6 lectures)

Continuous random variables and their properties, distribution functions and densities,
normal, exponential and gamma densities.

Unit III: Complex Variable – Differentiation: (14 lectures)

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate;
elementary analytic functions (exponential, trigonometric, logarithm) Contour integrals, Cauchy-Goursat theorem
(without proof), Cauchy Integral formula (without proof).

Unit IV: First order ordinary differential equations: (8 lectures)

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p,
equations solvable for y, equations solvable for x and Clairaut's type.

Unit V: Ordinary differential equations of higher orders: (10 lectures)

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler
equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Suggested Text/Reference Books

(i) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,
2006.

(ii) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal
Book Stall, 2003 (Reprint).

(iii) S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

(iv) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,
Wiley, 1968.

(v) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi
Publications, Reprint, 2010.

(vi) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

(vii) E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall
India, 1995.

(viii) E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.

ENA-102A	Communication Skill-II	L T P	CR
		3 0 0	3

Course Objective: To enable the students to use English language as a tool for their specific professional and individual requirements

Course Outcomes:

CO1: Students will be able to communicate effectively orally and in writing

CO2: Students will develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others

CO3: students will be able to explain major theoretical frameworks, constructs, and concepts for the study of communication and language

CO4: Students will be able to understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication, etc. from multiple perspectives.

CO5: summarize the work of central thinkers associated with particular approaches, and begin to evaluate the strengths and weaknesses of their approaches.

Unit -1 Information 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 Wiley. 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)

ME-153A	COMPUTER BASED ENGINEERING GRAPHICS	L T P	CR
		2 0 0	2

Objective: All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products. The conversion of new ideas and design concepts into the basic line language of graphics. This course is designed to address a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

Course Outcomes:

CO1: To read, understand and apply the knowledge of orthographic projections (production related features and instructions) in manufacturing industry, process industry and other allied engineering application.

CO2: To communicate with the globally recognized engineers and the engineers of different discipline of engineering for research and development activities.

CO3: To apply the concept of intersections of solids for various engineering applications.

CO4: Exposure to engineering graphics standards.

CO5: To understand and apply the concept of surface development for fabricating and manufacturing industrial devices.

Unit 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

Unit 2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes;

Unit 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.

Unit 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

Unit 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 Kanniah (2008), Text book on Engineering Drawing, Scitech
5. Publishers (Corresponding set of) CAD Software Theory and User Manuals

CSB-101A	COMPUTER PROGRAMMING	L T P	CR
		3 0 0	3

Course Objective: To explore computing and to introduce the art of computer programming. This course teaches the programming,

Course Outcomes:

CO1: Learn C programming

CO2: Able to develop specific application based programs

CO3: Able to set up relation between hardware and software applications

CO4: Knowledge of structured programming in program design

CO5: Learn Program testing skills

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

CSB-101A	APPLIED PHYSICS	L T P	CR
		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 electromagnetics field.

CO3: Student will the application of laser technology

CO4: Learn the application of wave optics.

CO5: Learn the concepts of quantum mechanics

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, CO₂), 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

CHB-101A	Applied Chemistry	L T P	CR
		3 1 0	4

Course Objective: To familiarize the students with basic and applied concept in chemistry

Course Outcomes:

CO1: Recall the fundamentals of basic chemistry

CO2: Familiarise the students with analytical techniques used in identification of molecules

CO3: Recognise and explain the trends in periodic properties

CO4: Understand the spatial arrangement of molecules

CO5: Apply the concept of organic reactions in daily life.

Unit-I PHASE RULE

Terminology, Definition of phase rule, Derivation of phase rule equation, One component system (H₂O system and CO₂ 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 H₃, H₂F 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. Volhardt and N. E. Schore, 5th Edition <http://bcs.whfreeman.com/vollhardtschore5e/default.as>

ENA-152A	Communication Skill-II Lab	L T P	CR
		0 0 2	1

Course Objective: To develop students with presentation skills

Course Outcomes:

CO1: Learn leadership skill

CO2: Learn interview/viva appearing techniques

CO3: Learn Group discussion skills

CO4: Learn to be self confident while presenting themselves

CO5: Learn Telephone etiquette

LIST OF EXPERIMENTS:

1. Introduction to phonetics
2. Word stress and intonation.
3. Influence of mother tongue (mti)
4. Listening comprehension
5. Group discussion
6. Interview skills
7. Descriptions and giving directions
8. Telephone etiquette
9. Situational dialogues role-play
10. Formal and Informal Language

CS-151A	Computer programming Lab	L T P	CR
		0 0 2	1

Course Objective: To learn and develop programs

Course Outcomes:

CO1: **Design** algorithm, flowchart and pseudopodia

CO2: **Develop** c programs using control structures

CO3: **Develop** c programs using functions and arrays

CO4: **Demonstrate** computer system and program development process

CO5: **Develop** programs for managing memory using pointers and for processing strings

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 and 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.

PHB-151A	APPLIED PHYSICS LAB	L T P	CR
		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.

CHB-151A	Applied Chemistry Lab	L T P	CR
		0 0 2	1

Course Objective: To provide an in-depth knowledge of principles of chemical engineering to address the challenges of chemical and industries

Course Outcomes:

CO1: The students will learn to Estimate rate constants of reactions from concentration of reactants/products as a function of time.

CO2: Learn the properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.

CO3: Learn to Synthesis small drug molecule and analysis a the sample salt

CO4: Learn the filtration techniques used in water purification

CO5: Learn to analysis slats

LIST OF EXPERIMENTS:

Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. 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.

2nd Year

SEMESTER – III

MA-202-A	APPLIED NUMERICAL METHODS	L T P	CR
		3 0 0	3

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.

Course Outcomes:

- CO 1. It is used for solving a system of equations
- CO 2. It has application in all branches of engineering.
- CO 3. To know how to find the roots of transcendental equations.
- CO 4. To learn how to interpolate the given set of values
- CO 5. To understand the curve fitting for various polynomials

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; fixed point iteration method; Newton- Raphson method; convergence criteria of methods.

Unit-II: SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS:

Gauss elimination method; Gauss-Jordan method; UV factorization method; Jacobi's iteration method; Gauss-Seidal iteration method.

Unit-III: 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 by least square method

Unit-IV: 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; Romberg' method.

Unit-V: SOLUTION OF ORDINARY 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.

TEXT BOOK

Grewal, B. S., "Numerical methods in Engineering and Science", 9th Edition, 2010, Khanna publishers.

REFERENCE BOOKS

1. Jain, R.K. and Iyengar, S.R.K., "Numerical Methods for Scientific and Engg. Computations" ,5th Edition,2007, New Age International publishers.
2. Sastry, S.S., "Introductory Methods of Numerical Analysis",3rd Edition,1999, Prentice Hall of India.
3. Applied Numerical Analysis" by Curtis F, Gerald and Patrik.
4. Numerical Methods by E. Balagurusamy T.M.H.

EC-202-A	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.

Course Outcomes

- CO 1. Understanding about conducting materials and their behaviour
- CO 2. Study of dielectric and magnetic material and their losses and application
- CO 3. Understand the current voltage characteristics of semiconductor devices,
- CO 4. Study the optical properties of the materials
- CO 5. Understand the characteristics of power devices

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.

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-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.

UNIT-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.

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 MaterialsI, 3rd Ed. Pentice Hall of India; 2009

REFERENCE BOOKS

1. Boylested and Nashelsky, —Electronic Devices and Circuit TheoryI, Pearson. Education, 2009
2. Dutta Alok, —Semiconductor Devices and CircuitsI, Oxford University Press, 2008
3. Streetman and Banerjee, —Solid State Electronic DevicesI, Pearson, 2010
4. Millman and Halkias, —Electronic Devices and CircuitsI, McGraw Hill, 1996
5. Gupta, J.B., —Electrical Engineering Materials and Semiconductor DevicesI, Katsons, 2006

EC-203-A	ELECTROMAGNETIC THEORY	L T P	CR
		3 1 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 MAGNETOSTATICS:

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

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
4. Publishing Company Ltd, New Delhi, 2008

EC-205-A	ANALOG ELECTRONICS	L T P	CR
		3 1 0	4

OBJECTIVE

To show the students the physical picture of the internal behaviour of semiconductor diode and its different type of circuit. Among these are rectifier; clipper; clamper; and filter. also gives knowledge of internal behaviour of transistor; FET and its application. regulated power supplies. Step knowledge from semiconductor physics to devices; model; circuit and system is.

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
- CO5. 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 : π 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-3 TRANSISTOR 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-4 FIELD 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-5 REGULATED POWER SUPPLIES: Series and shunt voltage regulators; power supply parameters; three terminal IC regulators; SMPS.

TEXT BOOK Millman and Halkias, Integrated Electronics, 2nd Edition, Tata McGraw Hill,1998.

REFERENCE BOOKS

1. Neamen, D.A., —Electronic Circuit Analysis and Design, 2nd Edition, Tata McGraw Hill, 2004.
2. Malvino, —Electronics Principles, 6th Edition McGraw Hill, 2003.
3. Schilling, Donald L. and Boylestad, Charles Belove and Nashelsky, —Electronics Circuits, 8th Edition, McGrawHill, 2005.
4. 4 Bell, David A., —Electronic Devices and Circuits, 3rd Edition, Prentice Hall of India, 2007. 5 Motorstad, IElectronics Devices and Circuits, 2nd Edition, Prentice Hall of India, 2004.

EC-211-A	ELECTRICAL & ELECTRONICS MEASURING INSTRUMENTS	L T P	CR
		3 0 0	3

Objectives: To present a problem oriented introductory knowledge of Electronic measurement techniques. To focus on the study different Instruments used for Electronic measurements.

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.

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-3 A.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 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.

CS-201-A	DATA STRUCTURES & ALGORITHM	L T P	CR
		3 0 0	3

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, 2nd 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 S ahni S artaj, —Fundamentals of Data Structures, Addison-Wesley Pub, 1984.
3. Horowitz, S ahni 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

EC-252-A	ELECTRICAL ENGINEERING MATERIALS AND SEMI-CONDUCTOR DEVICES LAB	L T P	CR
		0 0 2	1

Course Outcomes:

- CO1. to provide students with a thorough understanding of the electrical properties and characteristics of various materials, used in the electrical appliances, devices, instruments and in the applications associated with generation, transmission and distribution of electric power.
- CO2. to provide students with a moderate level understanding of the physics behind the electrical engineering materials
- CO3. An understanding of the electrical engineering material science essential for them to work in different industries and also motivate them to do innovative research while going for higher studies and also work in R & D with scientific enthusiasm

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.

EC-254-A	ELECTRONIC MEASUREMENT AND INSTRUMENTATION LAB	L T P	CR
		0 0 2	1

Course Outcomes:

- CO1. Analyze and understand the performance characteristics of various transducers like RTD, Thermocouple, strain gauge.
- CO2. Analyze and understand the performance characteristics of sensor like solid state sensor or Fiber optic sensor.
- CO3. Analyze and understand the working of various DC and AC bridges.

LIST OF EXPERIMENTS

1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
3. Measurement of temperature using R.T.D.
4. Measurement of temperature using Thermocouple.
5. Measurement of pressure using Strain Gauge.
6. Measurement of pressure using Piezo-Electric Pick up.
7. Measurement of distance using Capacitive Pick up.
8. Measurement of distance using Inductive Pick up.
9. Measurement of speed of DC Motor using Magnetic Pick up.
10. Measurement of speed of DC Motor using Photo Electric Pick up.

MA-252-A	APPLIED NUMERICAL METHODS LAB	L T P	CR
		0 0 2	1

Course Outcomes:

- CO1. Discretization,
- CO2. solving a system of algebraic equations,
- CO3. linearization,
- CO4. algorithm development,
- CO5. expressing the solver as a computer program

LIST OF EXPERIMENTS

WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C++

1. To find the roots of non-linear equation using Bisection method.
2. To find the roots of non-linear equation using Secant method.
3. To find the roots of non-linear equation using Newton's method.
4. To solve the system of linear equations using Gauss-Elimination method.
5. To solve the system of linear equation using Gauss-Seidal iteration method.
6. To find the values of function at a particular point using Newton's forward formula.
7. To find the values of function at a particular point using Newton's backward formula.

8. To find the values of function at a particular point using Lagrange's interpolation formula.
9. To integrate numerically using Trapezoidal rule.
10. To integrate numerically using Simpson's rule.
11. To find the solution of o.d.e (ordinary differential equation) by Euler's method.
12. To find the solution of o.d.e by Runge-Kutta method.
13. To find the numerical solution of Laplace equation.
14. To find the numerical solution of heat equation.
15. To find the numerical solution of wave equation.

EC-259-A	ELECTRONICS & ELECTRICAL MEASURING INSTRUMENTS LAB	L T P	Cr
		0 0 2	1

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.

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.

2nd Year

SEMESTER – IV

BA-225-A	ECONOMICS	L T P	CR
		3 0 0	3

OBJECTIVE The purpose of this course is to

- Acquaint the students in the basic economic concepts and their operational significance
- Stimulate him to think systematically and objectively about contemporary economic problems.

Course Outcomes:

- CO1. Explain the transaction approach and cash balance approach of quantity theory of money
- CO2. Describe the process of credit creation of a commercial bank, describe the balance sheet of a commercial bank, explain the functions of commercial bank
- CO3. Explain the various functions of central bank
- CO4. Describe the various phases of business cycle, explain the Hawtrey's theory of trade cycle
- CO5. Explain the main objective of monetary policy in under developed countries

Unit 1: INTRODUCTION:

Definition of economics; Central problems of economy and the Production Possibility Curve, Applications of PPC, Concept of Utility, Marginal Utility, Law of Diminishing Marginal Utility (DMU); Law of Equimarginal Utility (EMU)

Unit 2: DEMAND:

Meaning of Demand, Law of demand, Demand function & Factors affecting Demand; Changes in the Demand curve; Elasticity of demand; Types of Elasticity, Price elasticity & its degrees, Measurement of elasticity of demand; Factors affecting elasticity of demand; Importance of Price Elasticity of demand

Unit 3: PRODUCTION FUNCTION:

Meaning of production and production function; Law of Variable Proportions; Law of Returns to Scale, Internal and External Economies and Diseconomies of scale

Unit 4: Cost Function:

Cost concepts- fixed cost, variable cost, average cost, marginal cost, opportunity cost; Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

Unit 5: MARKET STRUCTURES:

Meaning of market; Main features of Perfect competition; Monopoly; Oligopoly; monopolistic competition, Equilibrium Price, Role of demand and supply in Equilibrium price; Effect of changes in demand and supply on it; Indian economy features, Privatization; Globalization (merits & demerits)

TEXT BOOK

1. Raj Kumar, Kuldeep Gupta, Economics for Engineers, UDH publications
2. Jain T.R., Economics for Engineers, VK Publication

REFERENCE BOOKS

1. Chopra P. N., Principle of Economics, Kalyani Publishers
2. Dewett K. K., Modern economic theory, S. Chand
3. H. L. Ahuja., Modern economic theory, S. Chand
4. Mishra S. K., Modern Micro Economics, Pragati Publications

EC-206-A	NETWORK THEORY	L T P	CR
		3 0 0	3

Objective To understand Magnetic Circuits, Network Topology and Three phase circuits. . To analyze transients in Electrical systems. To evaluate Network parameters of given Electrical network . To design basic filter configurations

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 TOPOLOGY:

Principles of network topology; graph matrices; network analysis using graph theory; cut and tie set.

UNIT-2 LAPLACE TRANSFORMATION and ITS APPLICATION IN CIRCUIT ANALYSIS: Introduction; Laplace transformation of derivative; integral; common forcing function; application of Laplace transform in circuit analysis; step response of RL; RC series and parallel circuit; impulse response of RL; RC Series and parallel circuit.

TRANSIENT RESPONSE: Introduction; Transient Response of RC; RL; RLC Circuits to various excitation signals such as step; ramp; impulse and sinusoidal excitations using laplace transform.

UNIT-3 NETWORK FUNCTIONS:

Terminal pairs or Ports; Network functions for one-port and two-port networks; poles and zeros of Network functions; Restrictions on pole and zero Locations for driving point functions and transfer functions; Time domain behavior from the pole-zero plot.

UNIT-4 CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS: Relationship of two-port variables; short-circuit Admittance parameters; open circuit impedance; parameters; Transmission parameters; hybrid parameters; relationships between parameter sets; Inter-connection of two port networks.

UNIT-5 TYPES OF FILTERS AND THEIR CHARACTERISTICS:

Filter fundamentals; high-pass; low-pass; band-pass; and band-reject Filters.

NETWORK SYNTHESIS: Positive real functions; synthesis of one port and two port networks; elementary ideas of Active networks.

TEXT BOOKS

Soni and Gupta ,|A Course in Electrical Circuit Analysis|,13th edition, Dhanpat Rai Publication 1998.

REFERENCE BOOKS

1. Umesh Sinha ,|Network Analysis and Synthesis,| 2nd edition, Satya Prakash Pub 2002.
2. D.Roy Choudhury ,|Networks and Systems| ,2nd edition, New Age International 2006.
3. F.F.Kuo ,|Network Analysis and Synthesis|,2nd edition ,John Wiley and Sons Inc 2003.
4. Sudhakar and Shyam Mohan ,|Circuits and Networks| 3rd edition TMH 2004.
5. Van Valkenburg ,|Introduction to modern Network Synthesis| 8th edition , John Wiley 2006.

6. Van Valkenburg, „Network Analysis”, 3rd edition, PHI 2000.
7. Dasoer Kuh, „Basic circuit theory”, 2nd edition, McGraw Hill 1998.
8. G.K. Mithal, „Circuit Analysis —”, 2nd edition, Khanna Publication 2000.

EC-207-A	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.

Course Outcomes: After studying this course the students would gain enough knowledge

- CO1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
- CO2. To understand and examine the structure of various number systems and its application in digital design.
- CO3. The ability to understand, analyze and design various combinational and sequential circuits.
- CO4. Ability to identify basic requirements for a design application and propose a cost effective solution.
- CO5. The ability to identify and prevent various hazards and timing problems in a digital design.

UNIT-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 Quine Mccluskey methods of simplification.

UNIT-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.

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: 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 & 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

EC-209-A	COMMUNICATION SYSTEMS	L T P	CR
		3 1 0	4

Objective

To study about the behavior and noise performance characteristics of the various methods; processes involved in the communication equipments. It includes the mathematical analysis of various principles and processes; their merits and demerits. It also involves the coding and decoding of information to be transmitted.

Course Outcomes:

- CO1. Use of different modulation and demodulation techniques used in analog communication
- CO2. Identify and solve basic communication problems
- CO3. Analyze transmitter and receiver circuits
- CO4. Compare and contrast design issues, advantages, disadvantages and limitations of analog communication systems

UNIT-1 INTRODUCTION TO COMMUNICATION SYSTEMS:

Block diagram of basic communication system; elements of basic communication system; modes and media of communication; noise in communication system; modulation and need for Modulation; Fourier analysis of signals.

UNIT-2 AMPLITUDE MODULATION:

Linear modulation; amplitude modulation; depth of modulation; bandwidth and power calculations; generation and demodulation of AM, DSBSC, SSB and VSB.

UNIT-3 ANGLE MODULATION:

Frequency and Phase modulation; narrow band and wide band FM; transmission bandwidth of FM; power calculations; direct and indirect methods of FM signal generation; demodulation of FM signals; slope detector; balanced slope detector; pre-emphasis and De-emphasis.

UNIT-4 PULSE ANALOG MODULATION:

Sampling theory; PAM, PWM and PPM-generation and detection; TDM & FDM.

UNIT-5 DIGITAL MODULATION:

PCM; Signal to quantization noise ratio of a PCM; electrical representation of binary data; on-off, RZ, NRZ, Differential encoding; Manchester coding. DPCM, DM, ADM; ASK, FSK, BPSK, QPSK.

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, Dhanapati rai & 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.
7. Carlson, A.B.; Rutledge.J. and Crilly. P.Communication Systems, 4th edition,Tata McGrawHill, 2002.

EC-210-A	SIGNALS AND SYSTEMS	L T P	CR
		3 0 0	3

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

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 behaviour of electronic

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, properties, magnitude and phase spectra, some important FT theorems, Parseval's theorem, Inverse FT

Unit – 3 Introductions to Systems

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. Ifeacher, Barrie. W. Jervis, 2ndEd., Pearson Education.

EC-256-A	Network Theory Lab	L T P	Cr
		0 0 2	1

Course Outcomes:

- CO1. Estimate the steady state response of circuits for sinusoidal excitation
- CO2. Analyse various circuits in the time and transform domains using transient analysis methods
- CO3. Analyse various networks by applying transformation techniques, mesh analysis, nodal analysis and network theorems
- CO4. Evaluate the bandwidth and quality factor of series and parallel resonant circuits
- CO5. Determine the characteristics of different two port networks

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

EC-257-A	Digital Electronics Lab	L T P	Cr
		0 0 2	1

Course Outcomes:

- CO1. Design and analyze combinational logic circuits.
- CO2. Design & analyze modular combinational circuits with MUX/DEMUX, decoder, encoder.
- CO3. Design & analyze synchronous sequential logic circuits.
- CO4. Design & build mini project using digital ICs.

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.

EC-258-A	Communication Systems Lab	L T P	Cr
		0 0 2	1

Course Outcomes:

- CO1. Students will be able to understand amplitude modulation techniques and the process of demodulation
- CO2. Student will be able to understand frequency modulation techniques and the process of demodulation
- CO3. Students will be able to understand communication between transmitter and receiver and validate/ study different the receiver parameters
- CO4. Students will be able to understand PAM, PWM, PPM, PCM, delta modulation and the process of modulation and demodulation
- CO5. Students will be able to understand delta modulation techniques and the process of demodulation

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.

3rd Year

SEMESTER – V

BA-249-A	Principles of Management	L T P	Cr
		3 0 0	3

Objective: To acquaint the students with various concepts of management which will be very basic to appreciate the subject.

Course Outcomes:

- CO1. Recognize the role of a manager and how it relates to the organization's mission.
- CO2. Define management, its four basic functions and skills.
- CO3. Know critical management theories and philosophies and how to apply them.
- CO4. Recognize the concept of social responsiveness and its benefits.
- CO5. Explain the relationship between strategic, tactical, and operational plans.
- CO6. Identify the stages of team development and the skills a team must acquire to become effective.

Unit 1: INTRODUCTION:

Meaning of management, Definitions of management, Nature of management, Management vs. Administration; Management: art, science and profession; importance of management; Fayol's principles of management; Functions of Management, inter-relationship of managerial functions.

Unit 2: PLANNING & ORGANISING:

Meaning of Planning, definitions of Planning, features of planning, Barriers of Planning and how to overcome those barriers, Process of Planning, Meaning of Organizing, Definitions of Organizing, Organization structure, Delegation vs. Decentralization

Unit 3: STAFFING:

Nature and significance of staffing; Human Resource Management - Functions of Human Resource Management; Human Resource Planning; Process of human resource planning; Recruitment and Selection; Promotion-seniority vs. merit.

Unit 4: DIRECTING & CONTROLLING:

Meaning and Nature of Directing, Motivation: Meaning, Maslow Need Hierarchy Theory, and Herzberg Two factor theory, Leadership: Meaning, Leadership Styles, Meaning and Nature of Control, Techniques of control

Unit 5: MARKETING MANAGEMENT:

Marketing management – Definition of marketing, marketing concept, functions of marketing; marketing mix (basics of 4Ps of marketing)

TEXT BOOK Vashisht Neeru, —Principles of Management, Taxmann Publishers, Third Edition

REFERENCE BOOKS

1. Chhabra T. N., —Principles and Practice of Management, Dhanpat Rai Publishers, 2008
2. Prasad L. M., —Principles and Practice of Management, Sultan Chand & Sons, 2005
3. Harold, Koontz and O'Doneell Cyril —Management, McGraw Hill, 1968
4. Stoner James A. F. and Freemann R. Edward, —Management, 6th Edition, Prentice Hall of India, 2000
5. Sherlekar S. A., —Marketing Management, Himalaya Publishing House, 2009

EL-301-A	Control Systems	L T P	Cr
		3 0 0	3

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.

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

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; tacho-generators; 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 1st and 2nd 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 2nd 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

EC-301-A	Analog Electronic Circuits	L T P	Cr
		3 1 0	4

Objective: Most of the signals in physical world are analog; thus requiring array of analog circuits for conditioning of such signals. This subject deals with the study of circuits designed using Transistors/FETs. It also aims to impart knowledge to the students about Operational Amplifiers and their various linear and non linear applications

Course Outcomes:

- CO1. Understand the characteristics of diode, transistors, 555 timer and op-amp.
- CO2. Analyse various rectifier and amplifier circuits.
- CO3. Design sinusoidal and non-sinusoidal oscillators.
- CO4. Apply the knowledge of KVL and KCL to obtain voltage / current waveforms at different points in analog electronic circuits such as diode clippers and clampers.
- CO5. Conduct experiment using analog electronic components to function as amplifier, comparator, rectifier, ADC and DAC.

UNIT-1 FEEDBACK AMPLIFIERS:

Revision of Amplifiers (AE); Feedback concept; transfer gain with feedback; general characteristics of negative feedback amplifiers; Feedback Topologies: voltage series feedback; current series feedback; current shunt feedback; voltage shunt feedback and their impact on input and output resistance.

UNIT-2 OSCILLATORS:

Sinusoidal oscillators; Barkhausen criteria; R-C phase shift oscillator; wien-bridge oscillator; crystal oscillator; General form of Oscillator Circuit; Hartley and Colpitt Oscillator.

UNIT-3 POWER AMPLIFIERS:

Classification of Amplifiers; Distortions in Amplifiers; Class A large signal amplifiers; higher order harmonic distortion; efficiency; transformer coupled power amplifier; class B amplifier: efficiency and distortion; class A and class B push-pull amplifiers; Introduction to Class C and Class D power amplifiers

UNIT-4 OPERATIONAL AMPLIFIERS:

Introduction; Ideal and practical operational amplifiers; inverting and non-inverting and differential configuration; Emitter coupled differential amplifier; Integrator; differentiator; Comparators; Logarithmic/anti-log amplifier; multivibrators; Monolithic Timer – NE555.

UNIT-5 FILTERS:

Active RC Filters: Idealistic and Realistic response of filters (LP; BP; and HP); Butter worth and Chebyshev filter functions all pass; Notch Filter; Operational transconductance amplifier (OTA)-C filters.

TEXT BOOK

Millman Halkias, |Integrated Electronics|, 6th Edition, Tata McGraw Hill, 2008

REFERENCE BOOKS

1. Sedra and Smith, |Microelectronic Circuits|, 2nd Edition, Oxford, 2004.
2. Gaekwad, |Operational Amplifier|, 8th Edition, Prentice Hall of India, 2009.
3. Neamen, Donald A., |Electronic Circuit Analysis and Design|, 2nd Edition, Tata McGraw Hill, 2002.
4. Franco, Sergio, |Design with Operational Amplifiers and Analog Integrated Circuit|, 3rd Edition, Tata McGraw Hill, 2001

EC-302-A	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

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.

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-4 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.

UNIT-5 PROGRAMMABLE 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

EC-303-A	Antenna and Wave Propagation	L T P	Cr
		3 1 0	4

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.

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.

UNIT-1 Basics of Antenna:

10

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.
2. Kraus, J.D., ”Antennas”, 2nd Edition, Tata McGraw Hill, 2003.
3. “ Antenna Analysis”, Edward A. Wolf, John Wiley and Sons,
4. “Antenna Theory and Practice”, Rajeshwari Chatterjee, IInd Edition, New Age International Ltd.

EC-304-A	Digital System Design	L T P	Cr
		3 0 0	3

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.

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.

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 behavioural; 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 Primmer|, 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.
7. Jain, R.P., —Modern Digital Electronics|, 3rd Edition, Tata McGraw Hill, 2003.

EL-351-A	Control System Lab	L T P	Cr
		0 0 2	1

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.

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 ω_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.

EC-352-A	Microprocessors and Interfacing Lab	L T P	Cr
		0 0 2	1

Course Outcomes:

- CO1. Familiarize with the assembly level programming using 8086 microprocessor.
- CO2. Design circuits for various applications using microprocessor.
- CO3. An in-depth knowledge of applying the concepts on real-time applications
- CO4. Design and apply interfacing circuits for different applications
- CO5. Understand the basic concepts of 8086 microprocessors with their application

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.

EC-354-A	Digital System Design Lab	L T P	Cr
		0 0 2	1

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.

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) demultiplexer
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

PD-354-A	Embedded System Design (8051 Microcontroller)	L T P	Cr
		0 0 2	1

Objective:The course intends to cover the design issues involved in embedded systems and system-on-chip technologies. The course also deals with the applications, programming languages, and processor architectures used for embedded systems. This course introduces the students to standard Embedded System Development tools and gives a hands-on experience in developing various embedded applications.

Course Outcomes:

- CO1. Identify the functionality of development boards to implement embedded applications.
- CO2. Compile bug free assembly or C language programs for microcontrollers to a required task.
- CO3. Design an electronic circuit for diverse I/O devices used in real time embedded applications.
- CO4. Develop a product with all sub systems of functional requirements in optimal hardware and software components.

LIST OF EXPERIMENT

1. To study I/O Addresses, software and memory mapping.
2. To study serial interface with microcontroller.

3. To study various commands for e.g. fill, Move, constant.
4. Write a program to move a block of memory from one location to another location.
5. Write a program for splitting a byte into two nibble.
6. To study details of various connectors.
7. Write a program for interfacing of microcontroller with stepper motor.
8. To study in detail RISC pipelines in PIC microcontroller.
9. Write a program for any microcontroller application.
10. Write a program on any real time application using microcontroller.

3rd Year

SEMESTER – VI

EC-305-A	Embedded System Design	L T P	Cr
		3-0-0	3

Objective: The course intends to cover the design issues involved in embedded systems and system-on-chip technologies. The course also deals with the applications and programming languages and processor architectures used for embedded systems. This course introduces the students to standard Embedded System Development tools and gives a hands-on experience in developing various embedded applications.

Course Outcomes:

- CO1. Be familiar with the composition, design, and implementation of embedded systems,
- CO2. Be familiar with both medium level and high level languages appropriate for embedded systems development techniques (e.g., C and Python),
- CO3. Be familiar with reading and understanding processor and component datasheets
- CO4. Be familiar with driving use contexts, including human-computer interaction, environmental sensing and actuation, etc.,
- CO5. Be familiar with the basics of interfacing hardware and software

UNIT-1 INTRODUCTION:

Different types of microcontrollers: Embedded microcontrollers; External memory microcontrollers; Processor Architectures: Harvard V/S Princeton; CISC V/S RISC; microcontrollers memory types; Introduction to Real Time Operating System.

UNIT-2 8051 MICROCONTROLLER ARCHITECTURE:

Architecture; memory considerations; Addressing modes; clocking; i/o pins; interrupts; timers; peripherals; serial communication; Instruction set; simple operations.

UNIT-3 PIC MICROCONTROLLER ARCHITECTURE:

Introduction to PIC microcontrollers; Architecture and pipelining; program memory considerations; Addressing modes; CPU registers; Instruction set; simple operations.

UNIT-4 INTERRUPTS AND I/O PORTS:

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.

SOFTWARE: Development tools/ environments; Assembly language programming style; Interpreters; High level languages; Intel hex format object files; Debugging.

UNIT-5 PROGRAMMING WITH MICRO-CONTROLLERS:

Arithmetic operations; Bit addressing; Loop control; Stack operation; Subroutines; interfacing of 8051 with LCD; LED; keyboard; motors; seven segment and other interfacing; PIC simple operations.

DESIGNING USING MICROCONTROLLERS: Music box; Mouse wheel turning; PWM motor control; aircraft demonstration; ultra sonic distance measuring; temperature sensor; pressure sensor; magnetic field sensor.

TEXT BOOK

John B. Peatman, —Design with PIC Microcontrollers, Pearson Education, 4th edition, 2005.

REFERENCE BOOKS

1. Mazidi, —8051 Microcontroller, 2nd Edition, Prentice Hall, 2005
2. Predko, —Programming and Customizing the 8051 Microcontroller, 2nd Edition, McGraw Hill, 2002.
3. Catsoulis John, —Designing Embedded Hardware, 2nd Edition, O'Media, 2005.
4. Barr Michael, —Programming Embedded Systems in C and C++, Shroff Pub. and Distr., 3rd Edition, 2003.
5. Ayala A. J., —The 8051 Microcontroller: Architecture, Programming, and Applications, Pap/Dsk edition, West Publishing Company, 1991
6. Udai Shankar; —8051 Microcontrollers, CSVTU Research Journal, Chhattisgarh Swami Vivekanand Technical University, 2010.

EC-306-A	Communication Engineering	L T P	Cr
		3-1-0	4

Objective: To study about the behavior and noise performance characteristics of the various methods; processes involved in the communication equipments. It includes the mathematical analysis of various principles and processes; their merits and demerits. It also involves the coding and decoding of information to be transmitted.

Course Outcomes:

- CO1. Understand the type of signals and systems.
- CO2. Concept of Basic random signals and analysis of random signals
- CO3. Understanding of multiple random variables, PDF, CDF etc
- CO4. Basic concept of Information coding theory
- CO5. Application of communication system in real time application.

1. **INTRODUCTION TO SIGNALS:** Classification of signals; basic operations of signals; Fourier-Series; Fourier Transforms;
2. **INTRODUCTION TO SYSTEMS:** Classifications of systems; LTI systems; convolution Theorem; Correlation; Cross-correlation and autocorrelation.
3. **BASIC OF RANDOM VARIABLE:** Representation of random signals; concepts of probability; probability of joint occurrence; conditional

probability; discrete probability theory; continuous random variables; probability distribution function; probability density functions; joint probability density functions.

RANDOM PROCESSES: Statistical average and moments. Ergodic processes; correlation function; power spectral density. central limit theory; response of linear system to random signals. Error function; regularity; covariance relation among the spectral densities of the two input-output random processes. Cross spectral densities; optimum filters.

4. **MULTIPLE RANDOM VARIABLES:** Introduction to multiple random variable; joint density function; joint distribution function; condition distribution function; conditional mean and variance functions.

5. **INFORMATION THEORY:** Introduction to information and entropy; information rate; joint and conditional entropy and redundancy; mutual information; channel capacity for discrete and continuous channels; Shannon's Theorem; Shannon-Hartley Theorem; Noisy-channels.

CODING THEORY: Source coding; fixed and variable length code words; Shannon-Fano coding; minimum redundancy (Huffman) coding; Hamming Codes; Cyclic Codes; Cyclic Redundancy Code (CRC); maximization of entropy of a continuous message transmission rate; effect of medium on the information; selection of channels; effect of noise and its minimization.

TEXT BOOK Haykins, Syman, *Communication Systems*, 8th Edition, Wiley, 2009. **REFERENCE BOOKS**

1. Lathi, B.P., —*Modern Digital and Analog Communication Systems*, 3RD Edition, Oxford University Press, USA, 1998
2. Taub and Schilling, —*Principles of Communication Systems*, 2nd edition, Tata McGraw Hill, 1986
3. Singh and Sapre, —*Communication Systems: Analog and Digital*, 2st Edition, Tata McGraw Hill, 2008

EC-307-A	Wireless Communication	L T P	Cr
		3-0-0	3

Objective: To cover the entire concept behind the cellular technology, including, the standards like GSM; CDMA and various design parameters for wireless system. Going through these topics will help the students to face telecom sector and software companies.

Course Outcomes:

- CO1. Comprehend basic principles and standards of mobile communication systems.
- CO2. Comprehend the various methods for enhancing the cellular system capacity.
- CO3. Analyze coding techniques for various wireless applications.
- CO4. Examine different multiple access techniques.
- CO5. Comprehend the wireless and cellular radio application

1. **INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS:** Evolution of mobile radio communications; examples of wireless comm. systems; paging systems; Cordless telephone systems; comparison of various wireless systems.

MODERN WIRELESS COMMUNICATION SYSTEMS: Second generation cellular networks; third generation wireless networks; wireless in local loop; wireless local area networks; Blue tooth and Personal Area networks.

2. **INTRODUCTION TO CELLULAR MOBILE SYSTEMS:** Spectrum Allocation; basic Cellular Systems; performance Criteria; Operation of cellular systems; analog cellular systems; digital Cellular Systems.

CELLULAR SYSTEM DESIGN FUNDAMENTALS: Frequency Reuse; channel assignment strategies; handoff Strategies; Interference and system capacity; tracking and grade off service; improving coverage and capacity.

4. **MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION:** Introduction to Multiple Access; FDMA; TDMA; Spread Spectrum multiple Access; space division multiple access; packet ratio; capacity of a cellular systems.

5. **WIRELESS NETWORKING:** Difference between wireless and fixed telephone networks; development of wireless networks; fixed network transmission hierarchy; traffic routing in wireless networks; wireless data services; common channel signaling; ISDN (Integrated Services digital Networks); advanced intelligent networks.

INTELLIGENT CELL CONCEPT AND APPLICATION: Intelligent cell concept; applications of intelligent micro-cell Systems; in-Building Communication; CDMA cellular Radio Networks.

TEXT BOOK

Rappaport, Theodore S., ||Wireless Communications||, 5th Edition, Pearsons, 2008.

REFERENCE BOOK

1. Schiller, Jochen, —Mobile Communications||, 2nd Edition, Addison Wesley, 2003

2. Lee, W.C.Y., —Mobile Cellular Telecommunication||, 2nd Edition, McGraw Hill, 1998

EC-308-A	MOS IC's and Technology	L T P	Cr
		3-1-0	4

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.

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.

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

- 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

- Sze, S.M., "VLSI Technology", 2nd Edition, Tata McGraw Hill, 2001.
- Sze, S.M., "Physics of Semiconductor Devices", Wiley
- Sorab K. Ghandhi, "VLSI Fabrication Principles" 1994
- Botkar, K.R., "Integrated Circuit", 4th Edition, Prentice Hall of India, 2000
- Weste, N.H.F and Eshraghian, "Principal of CMOS VLSI Design", 2nd Edition, John Wiley & sons, 2000
- Pucknell, Douglas A., "Basic VLSI Design", Kamsan Eshraghian, 5th Edition, Prentice Hall of India, 2005.
- Wolf, Wayne, "Modern VLSI Design", Prentice Hall.

EC-309-A	Digital Signal Processing	L T P	Cr
		3-1-0	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.

Course Outcomes:

- CO1. Able to obtain different Continuous and Discrete time signals.
- CO2. Able to calculate Z-transforms for discrete time signals and system functions.
- CO3. Ability to calculate discrete time domain and frequency domain of signals using discrete Fourier series and Fourier transform.
- CO4. Ability to develop Fast Fourier Transform (FFT) algorithms for faster realization of signals and systems.
- CO5. Able to design Digital IIR/FIR filters from Analog filters using various techniques (Butterworth and Chebyshev).

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:

1. Digital Signal Processing: Principles, Algorithms & Applications J.G.Proakis & D. G.

Manolakis, 4thEd., PHI.

2. Discrete Time Signal Processing Alan V Oppenheim & R. W Schaffer, PHI.

3. DSP –A Practical Approach –Emmanuel C. Ifeacher, Barrie. W. Jervis, 2nd 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.

EC- 310-A	TV Engineering	L T P	Cr
		3-0-0	3

Objective: To provide an insight of fundamentals of TV systems and get indepth knowledge of various applications of TV – Cable TV; Satellite TV; VCR; TV games; Digital TV; HDTV.

Course Outcomes:

- CO1. Understand the fundamental concepts of television transmitter and receiver systems, the transmission of video signals and importance of television standards to effectively work with broadcasting applications, trouble shooting of television systems.
- CO2. Understand different colour television systems used worldwide and its compatibility.
- CO3. Understand principles of digital video and component video signal.
- CO4. Understand advanced TV technology, MAC signals and DTH technology.
- CO5. Describe and differentiate working principles of latest digital TV, HDTV, and WDTV.
- CO6. Understand the working principles and applications of latest display like LCD, LED, Plasma and large flat panel monitors.

1. **ELEMENTS OF A TELEVISION SYSTEM:** Picture transmission; sound transmission; picture reception; sound reception; receiver controls. Aspect Ratio; Scanning; Number of Scanning Lines; Flicker; Fine Structure; Interlace Scanning; Tonal gradation.

COMPOSITE VIDEO SIGNAL: Positive and Negative modulation; Video signal dimensions; horizontal sync details; vertical sync details; scanning sequence details; functions of vertical pulse train; sync details of 525 line system.

3. **SIGNAL TRANSMISSION AND CHANNEL BANDWIDTH:** Amplitude Modulation; channel bandwidth; vestigial side band transmission; Transmission efficiency; complete channel bandwidth; frequency modulation; FM

channel bandwidth; channel bandwidth for color transmission; allocation of frequency bands for television signal transmission; television standards.

CAMERA TUBE AND PICTURE TUBE: Camera Tube- image orthicon; Vidicon; Monochrome picture tube; Beam deflection; screen phosphor; face plate; pincushion effect; implosion.

4. COLOR TELEVISION FUNDAMENTALS: Compatibility; the luminance signal; Chrominance Signal; Additive Mixing of Colours; Grassman's Law; chromaticity diagram; bandwidth for color signal transmission; three color television camera.

. COLOR SIGNAL TRANSMISSION AND RECEPTION: Basic block diagram of color transmitter and color receiver; color picture tube –Trinitron.

5. TELEVISION APPLICATIONS AND MODERN TELEVISION: Cable television; television via satellite; microprocessor controlled TV games; Introduction to LCD and Plasma TV.

TEXT BOOK Gulati, R.R., —Monochrome and Color Television!; 4th Edition, New Age, 2000. **REFERENCE BOOKS**

1. Bali, S.P., —Color TV theory and Practicel, 3rd Edition, Tata McGraw Hill, 2001.

2. Dhake, —TV and Video Engineering! 2nd Edition, Tata McGraw Hill, 2002.

EC-355-A	Embedded System Design Lab	L T P	Cr
		0 0 2	1

Course Outcomes:

- CO1. Identify the functionality of development boards to implement embedded applications.
- CO2. Compile bug free assembly or C language programs for microcontrollers to a required task.
- CO3. Design an electronic circuit for diverse I/O devices used in real time embedded applications.
- CO4. Develop a product with all sub systems of functional requirements in optimal hardware and software components.

LIST OF EXPERIMENTS 8051 Micro Controller

1. Write an Assembly language Programme (ALP) to generate 10kHz square wave.
2. Write an ALP to generate 10 kHz frequency using interrupts.
3. Write an ALP to interface one Microcontroller with other wring serial/parallel communication.
4. Write an ALP for temperature and pressure measurement and to display on intelligent LCD display
5. Study of Development tools/environment for Microcontroller Programme.
6. Develop an embedded system for traffic light controller using Micro controller
7. Develop an embedded system for the automatic motion of a car (Model of car) and Subsequent display on LCD using Microcontroller.

PIC Microcontroller

8. Write an ALP for PWM based speed control of motor.
9. Write an ALP for PWM based regulator of voltage.
10. Write an ALP to send/receive the data from an computer to MC through serial communication

EC-358-A	MOS IC's and Technology Lab	L T P	Cr
		0 0 2	1

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

EC-359-A	Digital Signal Processing Lab	L T P	Cr
		0 0 2	1

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.

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.

PDP-392-A/392-A	Problem Solving Skills/ Advanced Professional Development**	L T P	Cr
		0 0 2	1
PD-391-A	Co-curricular Activities	L T P	Cr
			1

4th Year

SEMESTER – VII

EC-401-A	Mobile Communication	L T P	Cr
		3 0 0	3

OBJECTIVE

This subject covers the entire concept behind the cellular technology. It covers the different standards like GSM; CDMA and going through these topics will help the students to face telecom sector and software companies.

COURSE OUTCOMES

CO1: discuss the cellular system design and technical challenges.

CO2: analyze the Mobile radio propagation, fading, diversity concepts and the channel modeling.

CO3: analyze the design parameters, link design, smart antenna, beam forming and MIMO systems.

CO4: analyze Multiuser Systems, CDMA, network planning and TCP/IP Concepts.

CO5: summarize the principles and applications of wireless systems and standards

1. **MOBILE RADIO SYSTEM:** reference model; frequencies for radio transmission; signals; antennas; signal propagation; multiplexing; Modulation

CHARACTERISTICS OF RADIO WAVES:

Multipath characteristics of radio waves; signal fading; time dispersion; Doppler spread ; coherence time; LCR; fading statistics; diversity Techniques

2. **WIRELESS SYSTEMS:** GSM: architecture; services; frame structure; signal processing Wireless data services :RAM ;CDPD; GPRS

WI-FI AND THE IEEE STANDARD 802.11:

802.11 architecture; MAC layer; PHY layer; Bluetooth and the IEEE standard 802.15

3. **MOBILE NETWORK LAYER: MOBILE IP:** Goals and requirements; IP packet delivery; agent discovery; registration; tunneling and encapsulation; optimization; reverse tunneling; IPV6; Mobile ad-hoc networks

4. **MOBILE TRANSPORT LAYER:** Traditional TCP; classical TCP improvement; TCP over 2.5 G/3G wireless networks; performance enhancing Proxies

5. **CDMA IN MOBILE COMMUNICATIONSYSTEMS:**

Introduction, spreading sequences, basic transmitter and receiver schemes in the CDMA system, RAKE receiver, joint detection of CDMA signals, basic properties of a CDMA mobile system

TEXT BOOK

Rappaport T. S., “Wireless Communication: Principles and Practice”, 2nd Edition, Prentice Hall of India, 2001

REFERENCE BOOK

1. Schiller Jochen, “Mobile Communication”, 2nd Edition, Pearson Education, 2005.
2. William C. Y. Lee, “Mobile Cellular Telecommunications”, 2nd Edition, McGraw Hill, 1995.

EC-402-A	Microwave and Radar Engineering	L T P	Cr
		3-1-0	4

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.

COURSE OUTCOMES

- CO1. CO1.Explain different types of waveguides and their respective modes of propagation.
- CO2. CO2. Analyze typical microwave networks using impedance, admittance, transmission and scattering matrix representations.
- CO3. CO3. Design microwave matching networks using L section, single and double stub and quarter wave transformer.
- CO4. CO4. Explain working of microwave passive circuits such as isolator, circulator, Directional couplers, attenuators etc.
- CO5. CO5. Learn working of microwave tubes and solid-state devices.
- CO6. CO6. Learn the operation of RADAR systems and recite their applications.

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.

2. MICROWAVE COMPONENTS:

S-parameters; Directional couplers; tees; hybrid ring; attenuators; cavity resonators; mixers and detectors; phase shifter; Ferrite devices: Isolators; circulators and gyrators.

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.

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.

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", Pearson Education Inc., 2011
3. D.M. Pozar, " Microwave Engg. ", 2nd edition, John Wiley and Sons, 1999

EC-404-A	Data Communication	L T P	Cr
		3-0-0	3

OBJECTIVE The subject focuses on the basic concepts involved in data communication particular attention is paid to be aspects of coding, modulation techniques, networks used, flow of data along with its security and multiplexing techniques.

COURSE OUTCOMES

- CO1. Understand the basics of data communication, networking, internet and their importance
- CO2. Analyze the services and features of various protocol layers in data networks.
- CO3. Differentiate wired and wireless computer networks
- CO4. Analyse TCP/IP and their protocols.
- CO5. Identify the basic security threats of a network.
- CO6. Learn the congestion control mechanism to improve quality of service.

- DIGITAL COMMUNICATION:** Introduction; digital communication; Shannon limit for information capacity; digital radio; digital amplitude modulation; frequency shift keying (FSK); phase shift keying (PSK); quadrature amplitude modulation (QAM); band width efficiency; carrier recovery; differential phase shift keying;(DPSK); clock recovery; probability of error and bit error rate; trellis encoding. NRZ Encoding Operation; Bandwidth; Use with synchronous and asynchronous circuits.
- DATA COMMUNICATIONS:** Introduction; history of data communication; standard organization for data communication; data communication circuits; data communication codes; error control; synchronization; data communications hardware;
DATA COMMUNICATION INTERFACES: Serial interfaces: RS-232; RS-449 and RS-530; CCITT X.21; parallel interfaces: centronics parallel interfaces. the telephone network: DDD network; private- line service; the telephone circuit; data modems: synchronous modems; asynchronous modems; modem synchronization.
- DATA COMMUNICATIONS PROTOCOLS AND NETWORK CONFIGURATIONS:** Introduction; open system interconnection (OSI); data transmission mode; asynchronous protocols; synchronous protocols; public data network; integrated services digital network (ISDN); local area networks; token pass ring; Ethernet. Packet headers; pipelining; datagram networks; (e.g. Internet) Communications between layers Protocols Peer to Peer Communication between Remote Layers Service Access Points Service Primitives and Communication Between Adjacent Layers
- MULTIPLEXING:** Introduction; time division multiplexing; T1 digital carrier system; CCITT time division multiplexed carrier systems; CODECS; COMBO chips; line encoding; T-CARRIERS; frame synchronization; Drawing Frame Transition Diagrams Time Axis; Effect of data rate; Effect of propagation delay. Calculating Utilisation Size of frame headers; Transmission delay. Calculating Throughput bit interleaving VS word interleaving; frequency division multiplexing; ATandT's FDM hierarchy; composite base band signal; formation of a master group.
- INTERNET AND TCP/IP:** Introduction; history; use of Internet; accessing the Internet; Internet addresses; security on the internet; authentication; firewalls; intranet and extranet;
TCP/IP: Introduction to TCP/IP reference model; domain name service; World Wide Web. IP over Ethernet Encapsulation; Protocol headers added on transmission. Hardware Address (i.e. MAC address)

TEXT BOOK Thomasi, Wayne, —Electronic Communications Systems, 4th Edition, Pearson Education, 2001.

REFERENCE BOOKS

- Forouzan and Thomasi, —Data Communication and Networking, 2nd Edition, Pearson Education, 2004.
- Singh and Sapre, —Communication Systems, Tata McGraw Hill, 2002.
- Bruce, A. Carlson, —Communication Systems, 4th Edition, Tata McGraw Hill, 2003

EC-452-A	Microwave & Radar Engineering Lab	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

- To study of wave guide component
- To Study the characteristics of reflex Klystron and determine its timing range
- 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

EC-454-A	Data Communication Lab	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. To study different types of transmission media
2. To study Quadrature Phase Shift Keying Modulation.
3. To study Quadrature Amplitude Modulation.
4. To Study Quadrature Amplitude Multiplexing.
5. To Study Serial Interface RS-232 and its applications.
6. To study the Parallel Interface Centronics and its applications.
7. To configure the modem of a computer.
8. To make inter-connections in cables for data communication in LAN.
9. To install LAN using Tree topology.
10. To install LAN using STAR topology.
11. To install LAN using Bus topology.
12. To install LAN using Token-Ring topology

13. To install WIN NT

14. To configure a HUB/Switch.

EC-491-A	Project+(project based seminar*)	L T P	Cr
		0 0 (4+2*)	(3+1*)

The student(s), either individually or in groups, are expected to take up a project that uses engineering and/or technological principles related to the field of study and that should be useful for solving real life problems in their neighbourhood. The student has to go through some process of minimal level of evaluation and also the minimum attendance requirement, as stipulated by the Course A student may perform experimental/design task of relatively minor intensity and scope as compare to the major project. The project may be extended to Major Project.

PD-492-A	Professional Career Skill	L T P	Cr
		0-0-2	1

PD-491-A	Co-curricular Activities	L T P	Cr
			2*

LIST OF DEPT. ELECTIVES

Dept. Elective – I

EC-434-A	PRINCIPLE OF ADVANCED LONG TERM EVOLUTION (LTE) SYSTEM	L T P	Cr
		3-0-0	3

UNIT-1

LTE Introduction:

Introduction to Wireless technology (2G & 3G), LTE Evolution, LTE Releases, LTE Objectives

UNIT-2

4G LTE Architecture:

Radio Link, RF Model for LTE Design, RAN Architecture, eNode B Functions, EPS Bearer, Evolved Packets Core, Modelling LTE Network

4G LTE Network Description:

Network Interfaces, Components Functionalities, Network Description

UNIT-3

4G LTE Key points:

LTE Technical Standards, MIMO Technology, Modulation, UE Categories, Radio Parameters,

LTE Frequency Bands, LTE Band Allocations, Flexible Frequency Bandwidth, Frequency band Attributes, FDD Mode, TDD Mode

UNIT-4

4G Planning & 4G Optimization

Planning of Radio Network, Identification of cell, Optimization of KPI's, Optimization at Site Level, Cluster level & Market Level.

UNIT-5

Introduction to Future 5G Technology:

5G Introduction, Goal & Challenges, 5G Services

5G Technologies

MIMO, Software Defined Networking (SDN), Virtualisation & Network Function Virtualisation, CIOT

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)

EC-403-A	OPTICAL COMMUNICATION	L T P	Cr
		3-0-0	3

OBJECTIVE

The aim of this course is to describe the various technologies, implementation, methodologies and performance measurement techniques that make optical fibre communication system possible.

COURSE OUTCOMES

CO1: understand the modulation and demodulation schemes in the coherent optical systems.

CO2: understand the various types of the optical amplifiers

CO3: analyse various multiplexing techniques used and evaluate the recent advances in this field

CO4: compare the merits and demerits, potential applications of microwave semiconductor devices.

CO5: analyse the operating principle of optical amplifiers.

1. **INTRODUCTION TO OPTICAL COMMUNICATION SYSTEMS:** Electromagnetic spectrum used for optical communication; block diagram of optical communication system. Basics of transmission of light rays. Advantages of optical fiber communication.

2. **OPTICAL FIBERS:** Optical fibers structures and their types; fiber characteristics : attenuation; scattering; absorption; fiber bend loss; dispersion; fiber couplers and connectors; splicing jointing

LED LIGHT SOURCE: Light emitting diode :recombination processes; the spectrum of recombination radiation; LED characteristics; internal quantum efficiency; external quantum efficiency; LED structure; lens coupling to fiber; behavior at high frequencies.

3. **LASER LIGHT SOURCE:** Basic principles of laser action in semi -conductors; optical gain; lasing threshold; laser structures and characteristics; laser to fiber coupling; comparison with LED source.

AVALANCHE AND PIN PHOTODETECTORS:

Principles of optical detection; quantum efficiency; responsivity; general principles of PIN photodetector; intrinsic absorption; materials and designs for PIN photodiodes; impulse and frequency response of PIN photodiodes; noise in PIN Photodiodes; multiplication process; APD Design; APD bandwidth; APD noise.

4. **OPTICAL AMPLIFIERS:** optical amplifier; optical cavity; Laser amplifiers; Doped fibre amplifiers; Noise Gain saturation Inhomogeneous broadening effects Polarization effects Erbium-doped fibre amplifiers Doped fibre amplifiers for other wavelength ranges Semiconductor optical amplifier (SOA) Vertical-cavity SOA Raman amplifier Optical parametric amplifier.

5. **OPTICAL MODULATORS and DEMODULATORS:** Optical modulator Electrooptic modulator ; Spatial light modulator Optical tweezers Modulating retro-reflector Optical DPSK demodulator Delay line interferometer Michelson interferometer Optical hybrid Phase detector (section Optical phase detectors) Laserdisc Phase-shift keying T-carrier Photoelastic modulator Superheterodyne receiver Symbol rate Lock-in amplifier Orthogonal frequency-division multiplexing (redirect Optical Orthogonal Code) Telecommunication

REFERENCES BOOK

1. Selvarajan, Kar Srinivas, "Optical Fiber Communication", 4th Edition, Tata McGraw Hill, 2003.
2. Keiser, G., "Optical fiber communication", Tata McGraw Hill, 2000.
3. Senior, J.M., "Optical fiber Communication Principles and Practice", Prentice Hall of India, 199

Dept. Elective – II

EC-433-A	SATELLITE COMMUNICATION	L T P	Cr
		3-0-0	3

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.

COURSE OUTCOMES

CO1.Explain the orbits of satellites, satellite mechanism, satellite hardware and Earth station design.

CO2. Describe the concepts of signal propagation effects, frequency and noise considerations, which affect satellite link design.

CO3. Investigate various multiple access techniques used for satellite communication.

CO4. Describe the fundamentals underlying the operation of VSAT systems and MSAT

CO5.Learn the satellite link design

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.

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.

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 superframe; 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.

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.

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, 5th Edition, 2001.

REFERENCE BOOK

1. Gagliardi, "Satellite Communication", 4th Edition, CBS Publications, 2003.
2. Roddy, "Satellite Communication" 5th Edition, Tata McGraw Hill, 2006.

EC-514-A	DIGITAL IMAGE PROCESSING	L T P	Cr
		3 0 0	3

COURSE OUTCOMES

- CO1: understand the need for image transforms different types of image transforms and their properties.
- CO2: learn different techniques employed for the enhancement of images.
- CO3: learn different causes for image degradation and overview of image restoration techniques.
- CO4: understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.
- CO5: learn different feature extraction techniques for image analysis and recognition

- 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 filtering; generation of spatial marks; colour image processing.

- 3 **IMAGE RESTORATION:** Degradation model; digitalization of circulate and block circulate metrics; algebraic approved inverse 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, Refael 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, Refael C. and Woods, Richard E., "Digital Image Processing", FPearson Education, 2002.

Open Elective

EC-401-A	Mobile Communication	L T P	Cr
		3 0 0	3

OBJECTIVE

This subject covers the entire concept behind the cellular technology. It covers the different standards like GSM; CDMA and going through these topics will help the students to face telecom sector and software companies.

COURSE OUTCOMES

- CO1. Evaluate the parameters of the GSM and GPRS technology.
- CO2. Explain the Mobile networking layer working.
- CO3. Learn CDMA technology.
- CO4. Learn Transport layer working.
- CO5. Learn Wi-Fi and Bluetooth technology

1. **MOBILE RADIO SYSTEM:** reference model; frequencies for radio transmission; signals; antennas; signal propagation; multiplexing; Modulation

CHARACTERISTICS OF RADIO WAVES:

Multipath characteristics of radio waves; signal fading; time dispersion; Doppler spread ; coherence time; LCR; fading statistics; diversity Techniques

2. **WIRELESS SYSTEMS:** GSM: architecture; services; frame structure; signal processing Wireless data services :RAM ;CDPD; GPRS **WI-FI AND THE IEEE STANDARD 802.11:**

802.11 architecture; MAC layer; PHY layer; Bluetooth and the IEEE standard 802.15

3. **MOBILE NETWORK LAYER: MOBILE IP:** Goals and requirements; IP packet delivery; agent discovery; registration; tunneling and encapsulation; optimization; reverse tunneling; IPV6; Mobile ad-hoc networks

4. **MOBILE TRANSPORT LAYER:** Traditional TCP; classical TCP improvement; TCP over 2.5 G/3G wireless networks; performance enhancing Proxies

5. **CDMA IN MOBILE COMMUNICATIONSYSTEMS:**

Introduction, spreading sequences, basic transmitter and receiver schemes in the CDMA system, RAKE receiver, joint detection of CDMA signals, basic properties of a CDMA mobile system

TEXT BOOK

Rappaport T. S., “Wireless Communication: Principles and Practice”, 2nd Edition, Prentice Hall of India, 2001

REFERENCE BOOK

1. Schiller Jochen, “Mobile Communication”, 2nd Edition, Pearson Education, 2005.
2. William C. Y. Lee, “Mobile Cellular Telecommunications”, 2nd Edition, McGraw Hill,1995.

EC-305-A	Embedded System Design	L T P	Cr
		3-0-0	3

OBJECTIVE The course intends to cover the design issues involved in embedded systems and system-on-chip technologies. The course also deals with the applications and programming languages and processor architectures used for embedded systems. This course introduces the students to standard Embedded System Development tools and gives a hands-on experience in developing various embedded applications.

COURSE OUTCOMES

CO1: Acquire a basic knowledge about fundamentals of microcontrollers

CO2: Acquire a basic knowledge about programming and system control to perform a specific task.

CO3: Acquire knowledge about devices and buses used in embedded networking

CO4: Develop programming skills in embedded systems for various applications.

CO5: Learn the programming and simulation

CO6: Learn the application of microcontroller in electronic appliances.

1. **INTRODUCTION:** Different types of microcontrollers: Embedded microcontrollers; External memory microcontrollers; Processor Architectures: Harvard V/S Princeton; CISC V/S RISC; microcontrollers memory types; Introduction to Real Time Operating System.
2. **8051 MICROCONTROLLER ARCHITECTURE:** Architecture; memory considerations; Addressing modes; clocking; i/o pins; interrupts; timers; peripherals; serial communication; Instruction set; simple operations.
3. **PIC MICROCONTROLLER ARCHITECTURE:** Introduction to PIC microcontrollers; Architecture and pipelining; program memory considerations; Addressing modes; CPU registers; Instruction set; simple operations.
4. **INTERRUPTS AND I/O PORTS:** 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.
SOFTWARE: Development tools/ environments; Assembly language programming style; Interpreters; High level languages; Intel hex format object files; Debugging.
5. **PROGRAMMING WITH MICRO-CONTROLLERS:** Arithmetic operations; Bit addressing; Loop control; Stack operation; Subroutines; interfacing of 8051 with LCD; LED; keyboard; motors; seven segment and other interfacing; PIC simple operations.
DESIGNING USING MICROCONTROLLERS: Music box; Mouse wheel turning; PWM motor control; aircraft demonstration; ultra sonic distance measuring; temperature sensor; pressure sensor; magnetic field sensor.

TEXT BOOK John B. Peatman, —Design with PIC Microcontrollersl, Pearson Education, 4th edition, 2005.

REFERENCE BOOKS

1. Mazidi, —8051 Microcontrollerl, 2nd Edition, Prentice Hall, 2005
2. Predko, —Programming and Customizing the 8051 Microcontrollerl, 2nd Edition, McGraw Hill, 2002.
3. Catsoulis John, —Designing Embedded Hardwarel, 2nd Edition, O'Media, 2005.
4. Barr Michael, —Programming Embedded Systems in C and C++l, Shroff Pub. and Distr., 3rd Edition, 2003.
5. Ayala A. J., —The 8051 Microcontroller: Architecture, Programming, and Applicationsl, Pap/Dsk edition, West Publishing Company, 1991
6. Udai Shankar; —8051 Microcontrollersl, CSVTU Research Journal, Chhattisgarh Swami Vivekanand Technical University, 2010

4th Year

SEMESTER – VIII

SN	Course No.	Course Name	L-T-P	Cr.
1	EC-483-A	Internship /Dissertation Phase	0-0-32	16
2	EC-484-A	Seminar based on Internship	0-0-2	1
3		Dept. Elective	3-0-0	3
			3-0-34 (37)	20

EC-483- A/EC-484A	Internship /Dissertation Phase	L T P	Cr
		0-0-32	16

Course Objective:-

- To enhance employ ability skills and become job ready along with real corporate exposure.
- To enhance students' knowledge in core study.
- To Increase self-confidence of students and helps in finding their own proficiency
- To cultivate student's leadership ability and responsibility to perform or execute the given task.
- To provide knowledge of a real job situation.

Course Outcomes:-

- CO1. Capability to acquire and apply fundamental principles of engineering.
- CO2. Become updated with all the latest changes in technological world
- CO3. To be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills
- CO4. Ability to identify, formulate and model problems and find engineering solution based on a systems approach
- CO5. Awareness of the social, cultural, global and environmental responsibility as an engineer.
- CO6. Capability and enthusiasm for self-improvement through continuous professional development and life-long learning

EC-484A	Seminar based on Internship	L T P	Cr
		0-0-2	1

Course Outcomes:-

- CO1. Learn to demonstrate awareness of the ethics involved in doing an internship
- CO2 Learn to describe, analyze, and synthesize their learning experience in the internship in the form of presentation
- CO3 Articulate new learning from the internship experience in the form of an oral presentation.
- CO4 Learn to present understanding and assess the challenges carrying out an internship CO5 Learn to demonstrate meaningful and practical experience in their 6month duration of real industrial training.

Scheme for Diploma in Electronics & Electrical Engineering (EEE)

Diploma (EEE)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	CH-101D	Basics of Chemistry – I	3	1	0	4
2	EN-101D	Basics of Communication Skills – I	3	0	0	3
3	PH-101D	Basics of Physics – I	3	1	0	4
4	CS-101D	Basics of Information Technology	2	0	0	2
5	MA-101D	Basics of Mathematics – I	3	1	0	4
6	ME-151D	Engineering Drawing – I	0	0	4	2
7	CH-151D	Basics of Chemistry – I Lab.	0	0	2	1
8	PH-151D	Basics of Physics – I Lab.	0	0	2	1
9	EN-151D	Basics of Communication Skills – I Lab.	0	0	2	1
10	CS-151D	Basics of Information Technology Lab.	0	0	2	1
11	ME-152D	General Workshop Practice – I	0	0	2	2
Total			27	0	0	27
Diploma (EEE)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EE-101D	Basics of Electrical Engineering	3	0	0	3
2	EC-101D	Analog Electronics – I	3	1	0	4
3	EN-102D	Basics of Communication Skills – II	3	0	0	3
4	MA-102D	Basics of Mathematics – II	3	1	0	4
5	PH-102D	Basics of Physics – II	3	1	0	4
6	CH-102D	Basics of Chemistry – II	3	1	0	4
7	EE-151D	Basics of Electrical Engineering Lab.	0	0	2	1
8	EC-151D	Analog Electronics – I Lab.	0	0	2	1
9	EN-152D	Basics of Communication Skills – II Lab.	0	0	2	1
10	PH-152D	Basics of Physics – II Lab.	0	0	2	1
11	CH-152D	Basics of Chemistry – II Lab.	0	0	2	1
12	ME-155D	General Workshop Practice – II	0	0	4	2
Total			18	4	14	29

Diploma (EEE)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-201D	Analog Electronics – II	4	0	0	4
2	EC-202D	Principles of Communication Engineering	3	0	0	3
3	EC-203D	Digital Electronics – I	4	0	0	4
4	EC-204D	Electronics Instruments and Measurement	3	0	0	3
5	EE-201D	Electrical Machines	3	0	0	3
6	EE-251D	Electrical Machines Lab.	0	0	2	1
7	EC-251D	Analog Electronics – II Lab	0	0	2	1
8	EC-253D	Digital Electronics – I Lab	0	0	2	1
9	EC-254D	Electronics Instruments and Measurement Lab	0	0	2	1
10						
Total			17	0	8	23

Diploma (EEE)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EE-204D	Linear and Digital Integrated Circuits	4	0	0	4
2	EE-205D	Instrumentation	3	0	0	3
3	EC-207D	Network Filters and Transmission Lines	4	0	0	4
4	EC-208D	Digital Electronics – II	4	0	0	4
5	EC-209D	Microprocessors and Peripheral Devices	3	0	0	3
6	EE-255D	Instrumentation Lab	0	0	2	1
7	EE-254D	Linear and Digital Integrated Circuits Lab	0	0	2	1
8	EC-258D	Digital Electronics – II Lab	0	0	2	1
9	EC-259D	Microprocessors and Peripheral Devices Lab	0	0	2	1
10	EC-260D	Electronics Design and Fabrication Techniques	0	0	4	2
11	PD293A	Inter personnel skills	0	0	4	2
Total			18	0	16	26

Diploma (EEE)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EL-301D	Control System	3	0	0	3
2	EE-301D	Power Electronics & Drives	3	0	0	3
3	EC-301D	Microcontroller & Drives	3	0	0	3
4	EE-302D	Power System	3	0	0	3
5	CEA-101D	Environmental Science & Ecology	2	0	0	2
6	EL-351D	Control System Lab.	0	0	2	1
7	EC-352D	Micro Controller Devices Lab.	0	0	2	1
8	EE-352D	Power Electronics Lab.	0	0	2	1
9	EE-356D	Industrial Training	0	0	4	2
10	EC-360D	Minor Project Work	0	0	4	2
11	PD-391D	Employability Skill Lab.	0	0	6	3
Total			14	0	20	24

Diploma (EEE)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-304D	Digital & Computer Networks	3	0	0	3
2	EC-305D	Optical Fiber Communication	3	0	0	3
3	EC-306D	Microwave & Radar System	3	0	0	3
4	EC-355D	Digital & Computer Networks Lab	0	0	2	1
5	EC-361D	Major Project Work	0	0	16	8
6	BA-276D	Entrepreneurship Development and Management	3	0	0	3
7	HD-392D	Employability Skill – II	0	0	4	2
Total			12	1	18	22

Scheme for M.Tech. Electronics & Communication Engineering (ECE)

M.Tech. Electronics & Communication Engineering (ECE)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-501A	Numerical Techniques	3	1	0	4
2	EC-518A	Advanced Microprocessor	3	1	0	4
3	EC-511A	Embedded System and applications	3	1	0	4
4	EC-510A	Digital System Design	3	1	0	4
5	EC-560A	Digital System Design Lab	0	0	2	1
6	EC-556A	Advanced Microprocessor Lab	0	0	2	1
Total			12	4	4	18

M.Tech. Electronics & Communication Engineering (ECE)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-601A	General and special purpose digital signal processors	3	1	0	4
2	EC-519A	Advanced Embedded system	3	1	0	4
3	EC-520A	Embedded system for wireless and mobile communications	3	1	0	4
4	EC-521A	Hardware software Co- design	3	1	0	4
5		Elective – I	3	0	0	3
6	EC-651A	DSP processors and application Lab	0	0	2	1
7	EC-557A	Advanced Embedded system Lab	0	0	2	1
8	EC-565A	Seminar-I	0	0	2	1
9	EC-657A	Minor Project	0	0	6	3
Total			15	4	12	25

M.Tech. Electronics & Communication Engineering (ECE)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-606A	Embedded control system	3	1	0	4
2	EC-607A	Microcontroller System Design and applications	3	1	0	4
3	EC-608A	Mixed Signal Embedded system	3	1	0	4
4		Elective – II	3	0	0	3
5	EC-662A	Microcontroller System Lab	0	0	2	1
6	EC-658A	Seminar-II	0	0	4	2
7	EC-653A	Dissertation Preliminary	0	0	16	8
Total			12	3	22	26

M.Tech. Electronics & Communication Engineering (ECE)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-656A	Dissertation	0	0	54	27
2	EC-658A	Seminar-III	0	0	4	2
3	EC-660A	Teaching Practice-I	0	0	4	2
4	EC-661A	Teaching Practice-II	0	0	4	2
Total			0	0	66	33

List of Elective of M.Tech.

Elective – I			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-506	Advanced Digital signal processing	3	0	0	3
2	EC-522	Embedded system software in 'C'	3	0	0	3
3	EC-523	Embedded Wireless Sensor Networks	3	0	0	3
4	EL-508	Bio-Medical Instrumentation	3	0	0	3
Total			12	0	0	12

Elective – II			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-514	Digital Image Processing	3	0	0	3
2	EC-507	Wireless Communication	3	0	0	3
3	EC-609	Embedded Networking	3	0	0	3
4	EC-508	Artificial Intelligence	3	0	0	3
Total			12	0	0	12



Scheme for M.Tech. (Signal Processing) Electronics & Communication Engineering (ECE)

M.Tech. (Signal Processing) (ECE)			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	Signal Theory	3	1	0	4
3	EC-502-A	Digital Signal Processing	3	1	0	4
4	EC-504-A	Digital Communication & Information Theory	3	1	0	4
5	EC-552-A	Digital Signal Processing Lab	0	0	2	1
6	EC-553-A	Simulation Lab	0	0	2	1
Total			12	4	4	18

M.Tech. (Signal Processing) (ECE)			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	2	1
8	EC-565-A	Seminar-I	0	0	2	1
9	EC-657-A	Minor Project	0	0	6	3
Total			15	4	12	25

M.Tech. (Signal Processing) (ECE)			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	DSP Processors 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	16	8
Total			12	3	22	26

M.Tech. (Signal Processing) (ECE)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-656-A	Dissertation	0	0	54	27
2	EC-658-A	Seminar-III	0	0	4	2
3	EC-660-A	Teaching Practice-I***	0	0	4	2
4	EC-661-A	teaching Practice-II	0	0	4	2
Total			0	0	66	33

List of Elective of M.Tech. (Signal Processing)

Elective – I			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-507-A	Wireless Communication	3	0	0	3
2	EC-508-A	Artificial Intelligence	3	0	0	3
3	EC-509-A	Optical Fiber Communication System	3	0	0	3
Total			12	0	0	12

Elective – I			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-512-A	Radar System Analysis and Design	3	0	0	3
2	EC-513-A	Sonar Signal Processing	3	0	0	3
3	EC-514-A	Digital Image Processing	3	0	0	3
Total			12	0	0	12

B.A. (Hons) English

B.A. (HONORS) ENGLISH			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BEN-101	English Communication Skills-1	4	0	0	4
2	BEN-102	History of English Literature: An Overview	4	1	0	5
3	BEN-103	British Poetry and Drama: 14 th to 17 th Century	4	1	0	5
4	BEN-104	Modern Indian Writings in English Translations	4	1	0	5
5	BEN-151	English Communication Lab-1	0	0	2	1
6	CEA-101	Environmental Science and Ecology	0	0	2	2
7	PD-191A	Hobby Club	0	0	2	2
Total			16	3	6	24

B.A. (HONORS) ENGLISH			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BEN-111	Indian Writing in English- An Overview	4	1	0	5
2	BEN-112	Popular Literature	4	1	0	5
3	BEN-113	Media & Communication Skills	3	0	0	3
4	BEN-114	English Communication Skills-II	2	0	0	2
5	BEN-111B	Seminar I	1	0	0	1
6	BEN-112B	Seminar II	1	0	0	1
7	BEN-113A	Media & Communication Skills Lab	0	0	2	1
9	PD192A	Personality Skills	0	1	0	1
Total			15	3	2	19

B.A. (HONORS) ENGLISH			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BEN-201	Soft Skills-1	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 th to 18 th Century	4	1	0	5
5	BEN-202 B	Seminar III	0	0	2	1
6	BEN-251	Soft Skills Lab	1	0	0	1
7	PDP-293	Intra-Interpersonal Skills	0	1	0	1
Total			17	4	0	22

B.A. (HONORS) ENGLISH			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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 th Century & Early 20 th 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	0	1	0	1
Total			20	6	2	27

B.A. (HONORS) ENGLISH			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BEN-301	Applied Language Skills	4	1	0	5
2	BEN-302	Postcolonial Literature	4	1	0	5
3	BEN-303	Language Literature & Culture	4	1	0	5
4	BEN-304	Literary Theory	4	1	0	5
5	BEN-305	Indian Classical Literature	4	1	0	5
6	BEN-351	Applied Language Skills Lab	4	1	0	5
7	PD-492	Professional Career Skills	0	1	0	1
Total			24	7	0	31

B.A. (HONORS) ENGLISH			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
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	1	0	1
Total			24	7	0	31

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
1	BEN-101	British Poetry and Drama:14 th to 17 th Century	5-1-0	6

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 1: Historical overview (i) the period is remarkable in many ways: 14th century poetry evokes an unmistakable sense of “modern” and the spirit of Renaissance is marked in the Elizabethan Drama. The Reformation brings about sweeping changes in religion and politics. A period of expansion of horizons: intellectual and geographical.

UNIT 2: Geoffrey Chaucer (i) The Pardoner’s Tale

UNIT 3: Spenser: “Sonnet 34 (Amoretti)” (i) Shakespeare: “That time of the year...” (Sonnet 73) (ii) Ben Jonson: “Song to Celia” (iii) John Donne: “Sunne Rising”

UNIT 4: Shakespeare (i) Macbeth

UNIT 5: Spencer: The Faerie Queene

Text Books • Texts as prescribed in Units 2, 3, 4 Reference Books • The Pelican Guide to English Literature. Ed. Boris Ford.Vol 1 • the Age of Chaucer English Literature in Context. Paul Poplawski. Cambridge UP, 2008 • Routledge History of Literature in English.Ronald Carter & John Mc Rae. London: Routledge, 1997 • Shakespeare for Beginners by Brandon Toropov • English Literature by Jonathan Bate (Ch. 7 “Shakespeare and the Dramatic Literature”)

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
2	BEN-102	British Poetry and Drama:17 th to 18 th 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: Historical overview (i) 17th C: Period of the English Revolution (1640–60); the Jacobean period; metaphysical poetry; cavalier poetry; comedy of humors; masques and beast fables (ii) 18th C: Puritanism; Restoration; Neoclassicism; Heroic poetry; Restoration comedy; Comedy of manners

UNIT 2: Milton: “Lycidas” (i) Andrew Marvell: “To His Coy Mistress” (ii) Alexander Pope: “Ode On Solitude”(iii) Aphra Behn: “I Led my Silvia to a Grove” (iv) Robert Herrick: “His Return to London”

UNIT 3: Ben Jonson (i) Volpone

UNIT 4: Dryden (i) All For Love

UNIT 5: Congreve: The Way of the World

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
3	BEN-103	Academic Writing and Composition	5-1-0	6

Course Objectives: The course challenges students to...

- Understand and analyze 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.
- Analyze, 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...

1. 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.
2. Practiced rhetorical analysis of genre conventions of multiple types of work that demonstrates an understanding of purpose, audience, and context of the genre convention.
3. Composed a finished project that substantially and effectively analyzes, incorporates, and attributes credible texts produced by others.
4. Reflected on and described students' individual writing processes and how they contribute to students' continued literacy development.

UNIT 1: Introduction to the Writing Process: with a focus on Academic Writing

UNIT 2: Writing in one's own words: Summarizing and Paraphrasing

UNIT 3: Critical Thinking: Synthesis, Analysis, And Evaluation

UNIT 4: Citing Resources: Editing, Book and Media Review

UNIT 5: Citations

SN	COURSE CODE	COURSE NAME	L-T-P	Cr.
4	BEN-104	Literature of the Indian Diaspora	2-0-0	2

Course Objective:

- To introduce the students to the process of emigration, settlement and identity formation in host societies.
- To understand the ethnicity of Indian diasporic communities in relation to the changing power structures, under which ethnic identity is an integrating or divisive force.
- To understand the transnational networks and linkages between India and the Indian diaspora, and between diasporic communities.

Learning Outcome:

1. Develop a complex understanding of the contributions of Asian Diaspora literature and cultures to the field of English Studies.
2. Understand and critically interrogate vital concepts of subjectivity such as hybridity, diaspora, exile, and orientalism.
3. Make informed notions of, and debate on the vicissitudes of diaspora and its complementary concepts in both their tutorial interactions and their assignments and exam.

UNIT 1. M. G. Vassanji *The Book of Secrets* (Penguin, India)

UNIT 2. Rohinton Mistry *A Fine Balance* (Alfred A Knopf)

UNIT 3. Meera Syal *Anita and Me* (Harper Collins)

UNIT 4. Jhumpa Lahiri *The Namesake* (Houghton Mifflin Harcourt)

UNIT 5. Hari Kunzru *Transmissions* (Penguin Books)

SN	Course No.	Course Name	L-T-P	Cr.
1	BEN-201	British Literature 18 th Century	3-2-0	4

Course Objectives

- To provide a working knowledge of the characteristics of various literary genres.
- To develop analytical skills and critical thinking through reading, discussion, and written assignments.
- To broaden a student's intercultural reading experience.
- To deepen a student's awareness of the universal human concerns that are the basis for literary works.
- To stimulate a greater appreciation of language as an artistic medium and of the aesthetic principles that shape literary works.
- To understand literature as an expression of human values within an historical and social context.

Learning Outcome

- Identify characteristics of different genres
- Write about and discuss elements of poetry, novel(s), short stories and drama and how the elements relate to the theme and work as a whole
- Read and discuss works of literature from various world cultures
- Identify and discuss universal themes and human conditions in poetry, novel(s), drama and short stories
- Identify and discuss a historical and social context that affects a work of literature

Unit-1: Alexander Pope: The Rape of the Lock

Unit-2: Jonathan Swift: Gulliver's Travels

Unit-3: Daniel Defoe: Robinson Crusoe

Unit-4: Henry Fielding: Joseph Andrews

Unit-5: Oliver Goldsmith: The Deserted Village

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, etal.

SN	Course No.	Course Name	L-T-P	Cr.
2	BEN- 202	Women's Writing	5-1-0	6

Course Objective

- The course will provide a selection of novels and/or short stories by and/or about women that explicate the significance of works of literature in terms of the intellectual and cultural contexts from which they originated.
- The course will demonstrate the development and thematic context of feminist fiction and its contribution to the development of new narrative techniques.

Learning outcome

- The students will exhibit an understanding of the developments, themes, and narrative strategies of English language feminist fiction.
- The students will be able to engage in literary textual analysis and will develop an understanding of how women writers have contributed to the manner in which society perceives the role of women in society

Unit-I: Sylvia Plath, Emily Dickinson

Unit-II: Toni Morrison: Beloved

Unit-III: Anita Desai: Clear Light of the Day

Unit-IV: Taslima Nasrin: Shame

Unit-V: Alice Walker: In Search of our Mother's Garden

SN	Course No.	Course Name	L-T-P	Cr.
3	BEN- 205	British Romantic Literature	5-1-0	6

Course Objectives:

- To reveal the influence of socio-political factors on literature during the Romantic Period.
- To acquaint the students with the significant nature and literary features of works prescribed in this course.
- To enable students to appreciate important and critically representative romantic literary works. • To encourage close reading of the prescribed texts of the period to gain insightful literary perspectives.

Learning Outcomes:

The course endeavors to introduce to the student the rich literary culture of the Romantic Period by examining some of the most distinguished writers who exemplify the romantic spirit.

Unit-1: Wuthering Heights: Emily Bronte

Unit-2: Frankenstein: Mary Shelly

Unit-3: William Wordsworth: Lucy Poems

Unit-4: S T Coleridge: Rhyme of the Ancient Mariner

Unit-5: Shelly: Ode to a Nightingale

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)

SN	Course No.	Course Name	L-T-P	Cr.
4	BEN- 206	Creative Writing	2-0-0	2

Course Objective:

- To teach students how to read critically as writers – to understand other writers' craft, purposes, and aesthetic choices, toward the creation of the students' own original works.
- To offer students the opportunity for frequent and extensive writing, guided by teachers, supported by classmates, building upon reading and study, in order to provide an apprenticeship in the art.
- To produce graduates able to effectively communicate what it is they, as writers, do, and to effectively present literary works, their own as well as the works of others.

Learning Outcome:

1. Students will examine how texts function across a range of genres, contexts, and cultures.
2. Develop and hone skills in creating, editing and revising in the student's primary genre.
3. Demonstrate ability to read and respond thoughtfully and critically in both oral and written form to other writers' works.

UNIT: 1 Pre writing Strategies

UNIT: 2 Building a Story

UNIT:3 Constructing a Poem

UNIT:4 Blurring the Boundaries

UNIT: 5 Understanding Your Audience

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 No.	Course Name	L-T-P	Cr.
5	BEN-203	Language and Linguistics	5-1-2	6

Course Objective: • To introduce the basic concepts in areas of linguistics, syntax, morphology, phonetics, and phonology and the interaction between them. • To provide an understanding of the main communicative functions of language, and the formal ways to achieve them

Learning Outcome: At the end of this course - • The student will be able to apply the basic concepts of linguistics, syntax, morphology, phonetics, and phonology and appreciate their use. • The student will be able to comprehend foundational linguistic concepts and their relation with the human mind. • The students will understand how research in linguistics can be used to address real world problems.

UNIT 1: Definition and branches of Linguistics; Methods applied in Linguistics: Synchronic, Diachronic and Panchronic studies of language; Paradigmatic & syntagmatic relationship; Levels of linguistic analysis; Definition and importance of language; Characteristics of language;

UNIT2: Origin of language; Definition of dialect; Relationship between language and dialect; Types of dialect; Standardization of dialect; Types of language: Spoken, Written, Natural, Artificial, Mixed

UNIT 3: Language and society; Language and mind; Language and culture; Direction and causes of linguistic change; Phonetic change; Semantic change

UNIT 4: Different stages of writing; Syllabic writing; Alphabetic writing; Differences between spoken and written language

UNIT 5: Relationship between writing and language; Graph; Graphem

SN	Course No.	Course Name	L-T-P	Cr.
1	BEN-301	British Literature: The Early 20 th Century	5-1-0	6

Course Objectives

This course traces the development of British Literature from the beginning of the 19th Century to the present through the examination of representative literary and historical/cultural texts from a diverse range of writers and perspectives.

Learning Outcomes: Students will:

1. analyse literature through discussion and writing [Critical Thinking & Arts/Humanities];
2. demonstrate an understanding of such literary terms, themes, strategies, and issues as are relevant to the works being studied;
3. express their understanding of the relationship between literature and the historical/cultural contexts in which it was written [Arts/Humanities];
4. demonstrate basic knowledge of the chronology of authors and literary periods/movements;
5. interpret literature through the lens of their own experience and through the lenses of various schools of literary criticism;
6. demonstrate an understanding of the relevance of literature of the period to the broader history of British literature and to contemporary culture.

UNIT 1: Historical overview (i) Developments in society and economy, leading to a crisis in western society known as the First World War and the resultant change in the ways of knowing and perceiving. Marx's concept of class struggle, Freud's theory of the unconscious are to be discussed.

UNIT 2: Poetry (i) T.S. Eliot "Love Song of J. Alfred Prufrock", (ii) Yeats: "Second Coming", (iii) Wilfred Owen: "Strange Meeting", (iv) Siegfried Sassoon, "Suicide in the Trenches" (v) Criticism: T.S. Eliot: "Tradition and the Individual Talent"

UNIT 3: (i) Virginia Woolf: Mrs. Dalloway

UNIT 4: (i) J M Synge Ryders to the Sea

UNIT5: TS Eliot: The Wasteland

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: Historical Review (i) Classical Antiquity: ancient Greece, the rise and decline of the Roman Empire; Geographical space: cultural history of the Greco-Roman world centered on the Mediterranean Sea

UNIT 2: Epic poetry (i) Homer: Odyssey (Book I)

UNIT 3: Tragedy: (i) Sophocles: Oedipus the King

UNIT 4: Criticism: (i) Aristotle: Poetics (Chapters: 6, 7, 8)

UNIT 5: Homer: Iliad

Text Books • Texts prescribed in Units 2, 3, 4 (All texts are available for free access on Project Gutenberg <https://www.gutenberg.org/>) **Reference Books:** • H.D.F. Kitto, Form and Meaning in Greek Drama • H.D.F. Kitto, The Greeks • Eric Auerbach, Mimesis: The Representation of Reality in Western Literature • Gilbert Murray, A History of Ancient Greek Literature, Andesite Press, 2017. • Classicism: A Very Short Introduction OUP

SN	Course No.	Course Name	L-T-P	Cr.
3	BEN-303	Literary Theory	4-2-0	6

Course Objectives

To introduce contemporary literary theories through the seminal works of major theorists

To strengthen the theoretical awareness and sharpen the critical insights of the students for a better understanding of literary works.

Learning Outcomes

- Demonstrate familiarity with the history of literary theory in the West, including prominent theorists and critics, important schools and movements, and the historical and cultural contexts important to those theories.

- Demonstrate an understanding of key concepts in literary theory.
- Explain to others the meaning, significance, and value of specific literary theoretical works.
- Use literary theoretical concepts to develop your own interpretations of literary texts.
- Analyse specific literary theories in order to distinguish them from other theories and to identify the structure and logic of their arguments.
- Think critically about a range of literary theories.
- Write in an insightful and informed way about specific literary theoretical works.

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, 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 objectives

The primary objective of this course is to develop a research orientation among the scholars and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them to the basic concepts used in research and to scientific social research methods and their approach. It includes discussions on sampling techniques, research designs and techniques of analysis

Learning Outcomes

- To develop understanding of the basic framework of research process.
- To develop an understanding of various research designs and techniques.
- To identify various sources of information for literature review and data collection.
- To develop an understanding of the ethical dimensions of conducting applied research.
- Appreciate the components of scholarly writing and evaluate its quality.

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 etc. in 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 Repo

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 I: Nature and scope of translation. History, Issues in translation: autonomy, linguistic, textual and cultural equivalence, transcreation, inter-cultural transference, translation as metatext. Translation and Multilingualism.

Unit II: Short Stories Premchand: The Shroud IsmatChughtai: The Quilt, in Lifting the Veil: Selected Writings of IsmatChughtai, Gurdial Singh: A Season of No Return Fakir Mohan SenapatiRebati

Unit III: Poetry RabindraNath Tagore: Light, Oh Where is the Light. and When My Play was with thee G.M. Muktibodh: The Void and So Very Far Amrita Pritam: I Say Unto Waris Shah ThangjamIbopishak Singh: Dali, Hussain, or Odour of Dream, Colour of Wind' and 'The Land of the Half-Humans'

Unit IV: Fiction G. KalyanRao: Untouchable Spring Learning Outcome • The students will be able to understand the relation between translation and multilingualism. • The students will understand the cultural turn in translation studies.

Unit V: RabindraNath Tagore:

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

1. Self-introduction
2. Exercises on speaking: JAM
3. Exercises on speaking: Extempore
4. News paper reading and preparing writeup
5. Debate
6. Reading Comprehension
7. Speech on current affairs
8. Group Discussion
9. Listening Comprehension
10. 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: 14th to 17th 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:

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

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. 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-Andha Yug, tr. Alok Bhalla.

Unit-5: Drama- G. Kalyan Rao 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.

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, Make up 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", PustakMahal, 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; Rohinton Mistry: 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: ShyamSevadurai :Funny Boy

UNIT 5: DurgabhaiVyam&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&ChhabraSujeeth Publications, 1989
8. The Screenwriter's Workbook Syd Field Dell Publishing, 1984
9. E-Writing Dianna Boother Macmillan, 2008 10 Mass Communication Theory Denis McquailVistaar 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,etal.

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 on 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. Ilona Leki, *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 paperHead 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. RobertFagles 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 20th 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* 2nd 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.Foreg.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. VIIedn. 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.htmml www.textec.com/criticism.html
www.ipl.org/div/litcrit www.assumption-edu/users/ady/HHGateway/Gateway/Approaches.html
www.maitespace.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 :InspectorGhote Goes by Train

Books for Reading:

1. J.Edmund Wilson : Who Care Who Killed Roger Ackroyd
 2. George Orwell: Raffles & Miss Blandish
 3. W.H.Auden : The Guilty Vicarage 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, Bargraph, 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”, 3rd 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: MamangDai : 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: Abhijanamshakuntalm

UNIT 3: Mahabharat: Dicing, Dicing sequel

UNIT 4: [IlangoAdigal](#): 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, GayatriChakravorty: "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 *FirozshahBagh*

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 19th and 20th 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 forma 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

MA English

M.A. ENGLISH			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MEN-101	Modern British Literature	5	1	0	6
2	MEN-102	Indian Writing in English	5	1	0	6
3	MEN-103	History of Language and Linguistics	5	1	0	6
4	MEN-104	English Drama	5	1	0	6
Total			20	4	0	24

M.A. ENGLISH			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MEN-105	English Poetry	5	1	0	6
2	MEN-106	American Literature: A Review	5	1	0	6
3	MEN-107	Advanced Communication in English	5	1	0	6
4	MEN-108	English prose and Fiction	5	1	0	6
Total			20	4	0	24

choose to know

M.A. ENGLISH			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MEN-109	From Chaucer to Jane Austen	5	1	0	6
2	MEN-110	Literary Criticism	5	1	0	6
3	MEN-111	Commonwealth Literature	5	1	0	6
4	MEN-112	Indian Writing in Translation	5	1	0	6
Total			20	4	0	24

M.A. ENGLISH			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MEN-113	English Novel	5	1	0	6
2	MEN-114	English Language and Linguistics	5	1	0	6
3	MEN-115	American Literature-II	5	1	0	6
4	MEN-116	Literary Theory	5	1	0	6
Total			20	4	0	24

MA ENGLISH SYLLABUS

SEMESTER I

MEN 101 English Literature from Chaucer to Milton

1. Geoffrey Chaucer The Canterbury Tales: 'The General Prologue', 'The Miller's Prologue and Tale', 'The Pardoner's Prologue and Tale', 'The Nun's Priest's Tale'.
2. Edmund Spenser 'April Eclogue' in The Shepheardes Calender; 'Letter to Raleigh', The Faerie Queene: Books III, V (Cantos 5, 6, and 7), and Book VI. Baldassare Castiglione From The Courtier, tr. George Bull (Harmondsworth: Penguin, 1967): 'Nobility of Birth' (pp.54-55), 'Acquiring Grace', 'Avoiding Affectation' (pp. 65-68); 'Friends and Flatterers' (pp. 90-92); 'Playing a Part' (pp. 119-20); 'Favours and Honours', 'Arrogance at Court', 'When to Obey' (pp. 125-33); 'The Prince' (pp. 284-87); 'Invocation of Love', 'Proofs of Love' (pp. 333-35).
3. William Shakespeare Sonnets 18, 29, 73, 94, 110, 116, 129, 130, 138. John Donne 'Satyre: Of Religion', 'The Ecstasie', 'The Relique', 'Good Friday 1613. Riding Westward'. Andrew Marvell 'To His Coy Mistress', 'The Garden', 'Bermudas'.
4. John Milton Paradise Lost : Books 1, 2, 3, 4, 5, 9, 10, 11, and 12. Martin Luther Sections III, IV, V, IX, from On the Bondage of the Will, in Martin Luther: Selections From His Writings, tr. Packer and Johnston, ed. John Dillenberger (Anchor, 1961), pp. 175-90. 7

MEN 102 Eighteenth Century English Literature

1. John Dryden Absalom and Achitophel, I Anthony Ashley Cooper, Third Earl of Shaftesbury 'An Inquiry Concerning Virtue or Merit', in Characteristics of Men, Manners, Opinions, Times, ed. J. M. Robertson (Gloucester, Mass.: Peter Smith, 1963), vol. 1, pp. 237-64.
2. Jonathan Swift A Tale of a Tub
3. Alexander Pope From Moral Essays: Epistle II. 'To a Lady: Of the Characters of Women'; Epistle IV. 'Of the Use of Riches: To Richard Boyle, Earl of Burlington'. 'Epistle to Dr. Arbuthnot'. Bernard Mandeville 'An Enquiry into the Origin of Moral Virtue' [including the Introduction], in The Fable of the Bees, ed. F. B. Kaye (Oxford: Clarendon, 1957), vol. 1, pp. 39-57.
4. Henry Fielding Tom Jones

MEN 103 Literary Criticism

1. Plato *The Republic*, Book X, tr. Benjamin Jowett (New York: Random House, 1957). Aristotle *The Poetics*, tr. Ingram Bywater (New Delhi: Oxford University Press.)
2. Philip Sidney *An Apology for Poetry* Samuel Johnson *Preface to Shakespeare*
3. William Wordsworth *Preface to Lyrical Ballads* (1802) Samuel Taylor Coleridge *Biographia Literaria*, Chapters IV, XIII, and XIV.
4. Percy Bysshe Shelley *A Defence of Poetry* Matthew Arnold 'The Function of Criticism at the Present Time'; 8 'Barbarians, Philistines, Populace', in *Culture and Anarchy*. Paper

MEN 104 Seventeenth and Eighteenth Century Drama

1. Ben Jonson *The Alchemist* Robert Burton *From The Anatomy of Melancholy*, ed. with an introduction by Holbrook Jackson (London: J. M. Dent, Everyman's Library, 1972): Extract from 'Democritus Junior to the Reader' (pp. 15-22); Partition III, Section 3: Member I, Subsection 2: 'Causes of Jealousy'; Member II: 'Symptoms of Jealousy'; and Member III: 'Prognostics of Jealousy' (pp. 264-88).
2. Thomas Middleton and William Rowley *The Changeling*
3. George Etherege *The Man of Mode* Thomas Hobbes *From Leviathan*, eds. Richard Flathman and David Johnston (New York: Norton, 1997): 'Of the difference of manners' (pp. 55-60); 'Of the natural condition of mankind, as concerning their felicity and misery', 'Of the first and second natural laws and of contracts', 'Of other laws of nature' (pp.68-88); 'Of the causes, generation, and definition of a commonwealth' (pp. 93-96).
4. John Gay *The Beggar's Opera*

Semester III

MEN 201 Nineteenth Century Novel

1. George Eliot Middlemarch Harriet Taylor 'The Enfranchisement of Women', in John Taylor Mill and Harriet Taylor Mill, Essays on Sex Inequality, ed. Alice Rossi (Chicago: Chicago University Press, 1970).
2. Leo Tolstoy Anna Karenina, tr. Rosemary Edmonds (Harmondsworth: Penguin).
3. Stendhal Red and Black , tr. and ed. Robert M. Adams (Norton) Karl Marx 'The Fetishism of Commodities and the Secret Thereof', in The Marx-Engels Reader, ed. Robert C. Tucker (New York: Norton, 1978), pp. 319-29.
4. Mark Twain Huckleberry Finn

MEN 202 Twentieth Century Poetry and Drama

1. W. B. Yeats 'Adam's Curse', 'The Wild Swans at Coole', 'Easter 1916', 'A Dialogue of Self and Soul', 'Byzantium', 'Lapis Lazuli', 'The Circus Animals' Desertion'. W. H. Auden 'Lullaby', 'Musée des Beaux Arts', 'In Memory of W. B. Yeats', 'September 1 1939'. Theodor Adorno 'Lyric Poetry and Society', Telos, no. 20 (Summer 1974), pp. 56-70.
2. T. S. Eliot The Waste Land Jürgen Habermas 'Modernity: An Unfinished Project', in Habermas and the Unfinished Project of Modernity: Critical Essays on 'The 16 Philosophical Discourse of Modernity', eds. Maurizio Passerind'Entreves and SeylaBenhabib (Cambridge: Polity Press, 1996), pp. 38-55.
3. Ezra Pound 'Hugh Selwyn Mauberley' Elizabeth Bishop The Map', 'The Monument', 'Arrival at Santos', 'Brazil, Jan 1, 1502', 'Questions of Travel', 'Squatter's Children', 'Crusoe in England'.
4. Luigi Pirandello Henry IV, tr. Julian Mitchell (London: Eyre Methuen, 1979). Bertolt Brecht Life of Galileo, in Collected Plays, vol. 5, ed. and tr. John Willett (London: Methuen, 1999).

MEN 203 Language and Linguistics

The main objective of this course is to introduce the student to the basic tools essential for a systematic study of language. While the course will include, under various topics, an illustrative discussion of the specific features of English language, the multilingual context of the classroom will also be kept in mind.

Unit 1 Language: language and communication; properties of human language; language varieties: standard and non-standard language, dialect, register, slang, pidgin, Creole; varieties of English; language change Mesthrie, Rajend and Rakesh M Bhatt. 2008. World Englishes: The study of new linguistic varieties. Cambridge: Cambridge University Press. Chapter 1: The spread of English Pinker, Steven. 1994 The language instinct. Harmondsworth: Penguin. Chapter 1: An instinct to acquire an art Chapter 2: Chatterboxes Chapter 3: Mentalese

Unit 2 Structuralism: Ferdinand de Saussure; synchronic and diachronic approaches; langue and parole; sign, signifier, signified and semiology; syntagmatic and paradigmatic relations de Saussure, Ferdinand.

1966. Course in general linguistics. New York: McGraw Hill Introduction: Chapter 3 Part I: Chapters 1 & 2 17
Part II: Synchronic linguistics Part III: Diachronic linguistics

Unit 3 Phonology and Morphology: phoneme, classification of English speech sounds, suprasegmental features, syllable; morpheme, word, word classes, inflection, derivation, compounding, English morphology Akmajian, A., R. A. Demers and R. M. Harnish, *Linguistics: An Introduction to Language and Communication*, 2nd ed. (Cambridge, Mass.: MIT Press, 1984; Indian edition, Prentice Hall, 1991). Chapters 3 & 4 Fromkin, Victoria ed. 2000. *Linguistics: An introduction to linguistic theory*. Malden, MA: Blackwell. Chapters 2, 11 & 12 Fromkin, V., and R. Rodman, *An Introduction to Language*, 2nd ed. (New York: Holt, Rinehart and Winston, 1974). Chapters 3, 6 & 7

Unit 4 Syntax and semantics: categories and constituents, predicates and argument structure, thematic roles, case; phrase structure; lexical meaning relations; implicature, entailment and presupposition; maxims of conversation, speech act Akmajian, A., R. A. Demers and R. M. Harnish, *Linguistics: An Introduction to Language and Communication*, 2nd ed. (Cambridge, Mass.: MIT Press, 1984; Indian edition, Prentice Hall, 1991). Chapters 5 & 6 Chierchia, Gennaro and Sally McConnell-Ginet. 2000. *Meaning and grammar: An introduction to semantics*. Cambridge, Massachusetts: MIT Press. Chapter 1: The empirical domain of semantics Chomsky, Noam. 1965. *Aspects of the theory of syntax*. Cambridge, Massachusetts: MIT Press. Chapter 1: Methodological preliminaries Fromkin, Victoria ed. 2000. *Linguistics: An introduction to linguistic theory*. Malden, MA: Blackwell. Chapters 4 & 5 Fromkin, V., and R. Rodman, *An Introduction to Language*, 2nd ed. (New York: Holt, Rinehart and Winston, 1974). Chapters 4 & 5 Eng

MEN 204 American Literature

1. Nathaniel Hawthorne *The Scarlet Letter* Ralph W. Emerson 'The American Scholar', in *The Complete Essays and Other Writings of Ralph Waldo Emerson* (New York: Random House, 1940), pp. 45-66.
2. Herman Melville *Moby Dick*
3. Walt Whitman *Song of Myself* [1,5,6,10,11,14,16,24,52] Langston Hughes 'Madam's Calling Cards', 'Madam and the Census Man', 'The Negro Speaks of Rivers', 'Theme for English B', 'Harlem', in *Selected Poems* (New York: Random House, 1990). Denise Levertov 'Overheard Over S. E. Asia', 'In Thai Binh (Peace) Province', 'Ache of Marriage', 'The Goddess', in *The Norton Anthology of Literature by Women: The Tradition in English*, eds. Sandra M. Gilbert and Susan Gubar (New York: Norton, 1985).
4. Edward Albee *Who's Afraid of Virginia Woolf?* Frederick Douglass *A Narrative of the Life of Frederick Douglass*, Chapters 1-7 (Harmondsworth: Penguin, 1982), pp. 47-87. Hector St John 'What is an American?' (Letter III), in *de Crevecoeur Letters from an American Farmer* (Harmondsworth: Penguin), pp. 66-105

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
PRACTICAL						
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	0	0	4	2
Total			28	2	8	34

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
PRACTICAL						
1	PD-196A	PERSONALITY SKILLS	0	1	0	1
Total			24	1	0	25

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
PRACTICAL						
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
Total			27	2	10	34

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
PRACTICAL						
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
Total			24	2	18	35



SPECIALISATION OFFERED IN 3RD AND 4TH SEMESTERS (HUMAN RESOURCE MANAGEMENT):
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
Total			12	0	0	12

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
Total			12	0	0	12

SPECIALISATION OFFERED IN 3RD AND 4TH 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
Total			12	0	0	12

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
Total			12	0	0	12

SPECIALISATION OFFERED IN 3RD AND 4TH 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
Total			12	0	0	12

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
Total			12	0	0	12

SPECIALISATION OFFERED IN 3RD AND 4TH 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
Total			12	0	0	12

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
Total			12	0	0	12

Syllabus for MBA

BA-101A	MANAGEMENT CONCEPTS AND APPLICATIONS
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OBJECTIVE

The objective of this course is to expose the students to basic concepts of management to enable them to gain appreciation for emerging ideas, techniques, procedures and practices in the field of management.

1. **INTRODUCTION:** Concept and nature of management; management process; functions; skills and roles; evolution of management thought; social responsibility of business
2. **A PLANNING TOOL:** Planning; decision making, Nature and elements of planning, stages in planning; levels of planning, decision making process; models of decision making.
3. **ORGANIZING:** basic issues in organizing—chain of command; delegation; decentralization; span of control; basis for departmentation, ethics in management.
4. **MOTIVATION& LEADERSHIP:** Motivation-types, models, methods, Leadership-characteristics of leadership, leadership theories
5. **MANAGEMENT CONTROL:** Management control—concept and process; overview of control techniques; effective control system.

REFERENCE BOOKS

1. Robbins, S.P. and Decenzo, D.A., “Fundamentals of Management” Pearson Education Asia, New Delhi
2. Chhabra, T.N., “Principles and Practice of Management”- Dhanpat Rai Publishers
3. Hellreigel, “Management”, Thomson Learning, Bombay
4. Koontsz, H and Wechrich, H; “Management” Tata McGraw Hill
5. Stoner, J et. Al, “Management”, New Delhi, PHI, New Delhi.

BA-102A	MANAGERIAL ECONOMICS
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OBJECTIVE

The paper seeks to equip the students with the analytical tools of Economics and apply the same to rational managerial decision-making. It further seeks to develop economic way of thinking in dealing with practical business problems and challenges.

1. **BASIC:** Nature and scope of managerial economics, functions; derivatives (differential); partial differentiation; maxima; minima; optimization; equation of a straight line; slope of a curve at a point; basic trigonometry; marginal concept in differential calculus; linear equation; quadratic equation; locus concept, theory of firm, profit maximizing firm & sales maximization firms
2. **DEMAND ANALYSIS:** Theory of demand and demand function, income and substitution effect, demand elasticities, demand forecasting, indifference curve technique, consumer surplus; relationship between price elasticity and marginal revenue.
3. **THEORY OF PRODUCTION:** Law of variable proportions; laws of returns to scale; production functions; cost curves; revenue curves of a firm.
4. **MARKET STRUCTURE:** Market structure types; perfect competition, monopoly, oligopoly non-price competition; price output decision under alternative market structures; product differentiation and price discrimination; collusive behavior of firms; cartel behavior.
5. **MACRO ECONOMICS:** Aggregates and concepts; GNP, GDP, aggregate consumption, gross domestic savings, gross domestic capital formation, WPI, CPI and inflation concept and measurement of national income, business cycles, general pricing strategies.

REFERENCE BOOKS

1. Hirshey, M., "Managerial Economics", Thomson Learning, Bangalore
2. Salvatore, Dominick "Managerial Economics in Global Economy", Thomson Learning, Hyderabad
3. Keat, Paul B, and Philip K.Y. Young, "Managerial Economics- Economic Tools for Today's Decision Makers", Pearson Education,
4. Monroe, Kent B, "Pricing Making Profitable Decisions", McGraw Hill, New York.

BA-103A	ACCOUNTING FOR MANAGERS
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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

BA-123A

ORGANISATIONAL BEHAVIOUR

Objective: The main objective of this paper is to familiarize the students with the basic concepts of management and factors underlying organizational behaviour.

1. INTRODUCTION: Meaning of Organisation Behaviour; Models of Organisation Behaviour, Disciplines Contributing to Organisation Behaviour field; Role of Organisation Behaviour in today's business organizations. Understanding Self: Perception: Nature and Importance; Perceptual selectivity; Social Perception; Personality: Meaning; Personality determinants; Personality characteristics; Personality development theories

2: MOTIVATION: Primary and secondary motives; Theories of motivation: Content and process-theories – V-room's expectancy theory; Porter-Lawler model; Equity theory of work motivation; Alderfers ERG theory; McClelland's Need theory

3: LEARNING: Theories of learning; principles of learning; Group Dynamics: Theories of groups; group norms and roles; cohesiveness the dynamics of informal groups

4: LEADERSHIP: Leaders versus Managers; Theories of leadership: Trait theory; behavioural theory; Fiedler's contingency theory; Hersey and Blanchard's; Leadership styles; Managerial Grid; Likert's systems of leadership. Management of Conflicts: Reasons and types of conflicts; Management of Interpersonal conflicts and organisational conflicts

5: ORGANISATIONAL CHANGE: Reasibs forces of change; Resistance to change; Process of change; Change Model. Power: Meaning of Power; Source of power;

Suggested Readings:

1. Management and Organisation behaviour by Dr Rajinder Sharma ; Year Of Publication : 2006 ; Edition : First
2. Managing Organisational Behaviour People skills for success S K Bhatia ; Year Of Publication : 2008
3. Organisational Behaviour by S Fayyaz Ahmad and Nazir Ahmad Gilkar and Javid Ahmad Darzi ; Year Of Publication : 2008
4. Organisational Behaviour Text and Cases by Uma Sekaran ; Year Of Publication : 2007; Edition : Second

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-271 A	HUMAN RESOURCE MANAGEMENT
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OBJECTIVE

The course aims to provide the insights into effective management of human resources to enable the students to meet the HR challenges in the present scenario.

1. **INTRODUCTION:** Meaning, scope, objective, functions, policies & roles and importance of Human Resource Management; HRM & HRD - a comparative analysis, personal management vs, HRM, evaluation of HRM, emerging challenges of HRM
2. **HUMAN RESOURCE PLANNING:** Definition, objectives; process and importance, factors effecting job analysis; job evaluation, Recruitment; selection; placement and introduction process; employee training & development, career planning & development process, method induction & orientation training career planning vis, HRP succession planning .
3. **PERFORMANCE MANAGEMENT:** concept and process, performance appraisal, Potential appraisal. Job Compensation; concept and significance; Promotions, demotions, transfers, separation, absenteeism and turnover; Quality of work life (QWL), Quality circle, stress in the workplace.
4. **JOB SATISFACTION AND MORALE:** Health, safety & employee welfare; Employee Participation & Empowerment: Concept, Relevance, Techniques, human resource development: definition, objectives & approaches to human relations; Employee grievances and discipline
5. **HR in KNOWLEDGE OVERVIEW:** Audit, IHRM. (A brief discussion) (global staffing, expatriate staffing) HRM practices in India-emerging trends in IHRM

TEXT BOOK

Rao V. S. P., "Human Resource Management", Excel Publications

REFERENCE BOOKS

1. C. B. Memoria "Personal Management", Himalaya Publications, New Delhi
2. Edwin B. Flippo, "Personal Management" Tata McGraw Hill
3. Aswathappa K., "Human Resource Management", Tata McGraw Hill

4. Dale Yoder, "Personnel Management & Industrial Relations", Tata McGraw Hill

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

MA-106A	QUANTITATIVE ANALYSIS
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OBJECTIVE

The objective of this paper is to acquaint the students with various statistical tools and techniques used to business decision making.

1. **MEASURE OF CENTRAL TENDENCY AND DISPERSION:** Construction of frequency distributions and their analysis in the form of measures of central tendency and variations, Types of measures; their relative merits; limitations and characteristics; skewness meaning and co-efficient of skewness.
2. **CORRELATION AND REGRESSION ANALYSIS:** Correlation analysis- meaning and types of correlation Karl Pearson's coefficient of correlation and Spearman's rank correlation; regression analysis-meaning and two lines of regression; relationship between correlation and regression co-efficient.
3. **TIME SERIES:** Time series analysis measurement of trend and seasonal variations; time series and forecasting.
4. **PROBABILITY:** Probability: basic concepts and approaches, addition, multiplication and Bayes' theorem, Probability distributions-meaning, types and applications, binomial, Poisson and normal distributions.
5. **HYPOTHESIS TESTING:** Tests of significance; hypothesis testing; large samples, small samples; Chi-square test, analysis of variance.

REFERENCE BOOKS

1. Gupta, S.P. & Gupta, M.P. "Business Statistics", Sultan Chand & Sons. Delhi
2. Levin and Rubin, "Statistics for Business", Prentice Hall of India.
3. Hooda. R.P., "Statistics for Business and Economics", McMillan India Ltd.

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

CS-111A	IT FOR MANAGERS
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Objective: The purpose of this paper is to acquaint the students with the functioning of the computers and their application in business.

1. INTRODUCTION TO INFORMATION AND IT: Changing decision making scenario and role of information needs and information systems; Information generation process; Quality of information – adding value to information; Role of IT in information generation and value addition; Computer hardware and personal computers – an overview.

2. COMPUTER SYSTEM AS INFORMATION PROCESSING SYSTEM: Types of computer systems; Hardware options – CPU, input devices, output devices, storage devices, communication devices; Configuration of these devices and their applications; Automatic devices for logistic bar coding and management system. Software Resources: Software needs; Operating systems; Application software programming languages.

3. INTERNET AND WORLD WIDE WEB: Internet technologies and access devices; Concept of World Wide Web and Internet browsing; www as a marketplace; Concept of e-commerce and business models of e-commerce.

4. DESKTOP APPLICATION – I: Word Processing-Meaning and role of word processing in creating of documents, editing, formatting and printing documents, using tools such as spelling check, thesaurus, etc. in word processors; Presentation and graphics on personal computers. Desktop Application– II: Electronic spreadsheet:- Structure of spreadsheet and its application to accounting finance and marketing functions of business; creating a dynamic/sensitive worksheet; Concept of absolute and relative cell reference; Using built in function; Goal seeking and solver tools; Using graphics and formatting of worksheet; Sorting data with other desktop applications: Strategies of creating error free worksheet.

5. DATA BASE MANAGEMENT SYSTEM: Concept of data base management system Data field, records and files; Sorting and indexing data, searching records designing queries and reports and linking of data files. Introduction to PC Based Software Packages: Accounting and Statistical Software Packages: Accounting software packages for maintenance of accounts, inventory records, preparation of vouchers, invoice and salary statement and final acccounts; Statistical software packages for computing measures of central tendency and dispersion, preparation of tables and graphs, and other statistical analysis structure of export documentation in software packages.

Suggested Readings:

1. Burch, J. and G. Gary, Information Systems: Theory and Practice, John Wiley and Sons, New York.,

2. Eliason, A.L., On-line Business Computer-Application Science Research Associates Chicago.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

EN-472A	ADVANCED BUSINESS COMMUNICATION
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Objective :The subject aims to strengthen and transform the communication ability of the students to nurture their business communication skills like verbal, written, presentation skills thus developing their holistic personality which will aid in better performance, developing managerial capacity.

UNIT 1: Comprehensive Communication & Presentation Skills

Principles of communication, Barriers of Communication.Removing the barriers.Difference between Verbal & Non-Verbal communication. Reading, Writing , Speaking and Listening Skills. Presentation Skills, effective Presentation, tools of presentation, oral presentation skill, removal of stage fear. Activities based on PowerPoint Presentation. Self introduction in front of the Interview board; Public speaking tips; Humorous speech

UNIT 2: Developing Communication Effectiveness & Personality Projection

Fluency Enhancement Game/Activities.Team Building skill, Leadership skill development.Body language in GD; Types of GD. Mock Group Discussion.Expressing opinions & disagreements; GD in the selection process; Creative Brainstorming.

UNIT3: Current Affairs & Internal Communication:-Meeting- Need and importance of Meeting. Role of the chairperson.; Agenda; Minutes; Notice; Memo; Memorandum; Circular, Role of the chairperson, Role of the Participants.

Fusion of Management, Technology and ICT, Case studies & Analysis, Case discussion & Presentation.

UNIT 4: Professional Writing -

CV & Job application; Covering letter; Inquiry, Order, Credit and Status enquiry; Complaints, Claims, Adjustment and Collection.

UNIT 5: Corporate communication & Aptitude Development:-Improving Mathematical Acumen, Logical & Analytical Reasoning, Voice Modulation, Public Relations(PR); Tools of PR; External and Internal Measures of PR

TEXT BOOKS:

1. Pal Rajender, Korlahalli,"Essentials of Business Communications" S.Chand and Sons
2. Lesikar,Pedit,"Business Communication and Managerial skills, All India Book Travellers

REFERENCE BOOKS:

- 1.Flatley,Lesikar" Basic Business Communication skills for empowering the internet generation", All India Traveller booksellers
- 2.Hewing Martin, "Advanced Business Communication ", Cambridge University Press

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

LINGAYA'S

BA- 264A	Managerial Skills
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choose to know

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

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.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-107A

FINANCIAL MANAGEMENT

OBJECTIVE

The objective of this course is to acquaint the students regarding financial management tools and techniques in financial decision making.

1. **INTRODUCTION:** Financial management—scope finance functions and its organization; objectives of financial management; time value of money.
2. **CAPITAL BUDGETING:** Investment decisions; importance, difficulties, Determining cash flows; methods of capital budgeting, Risk Analysis; sensitivity analysis, risk adjusted discount rate methods and certainty equivalent methods;
3. **COST OF CAPITAL:** Sources of long term finance; cost of different sources of raising capital; weighted average cost of capital; Capital structure decisions, Leverage & capital structure, financial and operating leverage; capital structure theories-Net Income approach; Net Operating Income approach, Traditional approach, MODIGLIANI-MILLER (M-M) theory.
4. **DIVIDEND DECISIONS:** Determinants of dividend policy; Dividend models; Walter, Valuation model, Gordon Growth model and MODIGLIANI-MILLER (M-M) model.
5. **WORKING CAPITAL MANAGEMENT:** Working Capital-meaning, need determinants; estimation of working capital need; Management of cash, Management of inventory and Management of receivables.

REFERENCE BOOKS

1. Pandey, I.M. “Financial Management”, Vikas Publishing House, New Delhi
2. Khan, M.Y. & Jain, P.K., “Financial Management”, Tata McGraw Hill, New Delhi.
3. Vanhorne, James, C, “Financial Management and Policy”, Prentice Hall of India Chandra, Prasanna, “Financial Management”, TMH, New Delhi

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-111A	MARKETING MANAGEMENT
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OBJECTIVE

This course is designed to promote understanding of concepts, philosophies, processes and techniques of managing marketing operation and to develop a feel of the market place

- 1. INTRODUCTION:** Nature and scope of marketing, evaluation of marketing, marketing concepts and core concepts in marketing, marketing mix, Marketing environment; marketing research and information system.
- 2. CONSUMER BEHAVIOUR AND STP:** Analyzing consumer markets and analyzing business markets and business buying behavior, Market segmentation, Positioning and Targeting; Basics and Strategies; tools of product differentiation.
- 3. PRODUCT DEVELOPMENT:** Product mix and product line decisions; new product development; product life cycle: branding and packaging decisions.
- 4. PRICING & DISTRIBUTION:** Setting of Prices, pricing strategies, functions & types of intermediaries, change design.
- 5. PROMOTION STRATEGIES:** Advertising and sales promotion; personal selling; service marketing mix; e-marketing, international marketing, green marketing, rural marketing.

REFERENCE BOOKS

1. Philip, Kotler and Keller, "Marketing Management", Prentice Hall of India, New Delhi
2. Kotler, Philip, Kevin Keller, A. Koshy and M. Jha "Marketing"
3. Kerin, Hartley, Berkowitz & Rudelius, "Marketing", Tata McGraw Hill, New Delhi
- Ettel, Michael J, "Marketing: Concepts and Cases", Tata McGraw Hill, New Delhi

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-131A	BUSINESS LEGISLATION
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OBJECTIVE

The objective of this paper is to familiarize the students with the various business legislations pertaining to corporate world so that the constraints of decision making as also the legal appreciation of the decision environment is fully known.

1. THE CONTRACT ACT, 1871: Nature and classification of contracts - Essential elements of a valid contract, void agreements, Provisions relating to performance and discharge of contract, Breach of contract - Meaning and remedies

2. SALES OF GOODS ACT, 1930/ LAW OF CARRIAGE :Contract for Sale of Goods - Meaning - Essentials of a Contract of Sale -Formalities of a Contract of sale, Provisions relating to conditions and Warranties, Provisions relating to transfer of property or ownership, Provisions relating to performance of Contract of Sale - Rights of Unpaid, Seller – Rules as to delivery of goods, meaning of consumer dispute, unfair trade practices, restrictive trade practice, right of consumers, consumer disputes redressal process and agencies.

3. THE NEGOTIABLE INSTRUMENTS ACT, 1881: Negotiable Instruments - Meaning, Characteristics, Types, Parties – Holder and holder in Due Course Negotiation and Types of Endorsements, Dishonor of Negotiable Instrument - Noting and Protest, Liability of parties on Negotiable Instrument

4:THE COMPANIES ACT, 1956/ COMPANY: Definition, Meaning, Features and Types of companies, Incorporation of a company -Memorandum of Association, Articles of Association and Prospectus,

5: THE INFORMATION TECHNOLOGY ACT, 2000: Digital Signature - Digital Signature Certificate, Electronic Governance Electronic Records, Certifying Authorities, Penalty & Adjudication, conceptual understanding of patents, copyrights, trademarks and design, RTI act 2005.

TEXT BOOK

Chawla, Garg, and Sareen, “Mercantile Law”, 7th Ed. Kalyani, Bros.

REFERENCE BOOKS

1. Kapoor. N.D., “Mercantile Law”, S. Chand & Co.
2. Jennings, “Business-Its legal Ethical & Global Environment”, Wadsworth

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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

CS-121A

MIS & DATA MANAGEMENT

To equip the students with skills to analyze information requirements for decision making and to familiarize students with the tools and techniques of data capturing. Storing, processing and dissemination for efficient functioning and continuation of business process, making use of case studies.

1:INTRODUCTION: MIS need; concepts role and factors influencing MIS and characteristics of MIS; technology and structure of MIS.

ANALYSIS AND DESIGN: Information SDLC; system testing and documentation; marketing and financial IS.

2: RESOURCE MANAGEMENT: ERP, BPR Functions and Processes of resource Management; IS for HR, Finance, Production, Marketing.

DSS: Concept, over view components; Role of DSS in business group DSS.

3: INFORMATION SYSTEM: Executive information system, CRM, SCM, artificial intelligence technologies in business, virtual reality.

4:DBMS: Introduction to data base; DBMS overview, data models; languages; advantages of DBMS over file processing systems, responsibility of database administrator; introduction to client server architecture; entity relationship diagrams.

DATA BASE ADMINISTRATION: Concept of data base administration

5: DATA WAREHOUSING: Data warehousing definition, usage and trends; file organization system, DBMS as data warehouse

DATA MINING: Data mining definition and task, KDD versus data mining: techniques, tools and applications.

TEXT BOOKS

1. SashikalaParimi, "Management Information System", Tata McGraw Hill, New Delhi

REFERENCE BOOKS

2. Jawadekar, "Management Information System", DreamTechPress, Kogent Learning solutions Inc.
3. Murdick and Ross, "Management Information System", Prentice Hall of India, New Delhi
4. Kroenke, "Database Processing", Pearson Education.
5. Rob, "Database System", Thomson Learning
6. Garcia, Ullman, "Data Base: The Complete Book", Pearson Education
7. Date, C.J., "Introduction to Database system", Pearson Education

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-121A	PRODUCTION AND OPERATIONS MANAGEMENT
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Objectives: To develop basic understanding of concepts, theories and techniques of production process and operation management.

Unit I

Introduction to Operation Management: Basic Concept of Production / Transformation, Types of Transformation

Product and Process Design :Product Development; Product Design Tools; Design of Services; Flexible Manufacturing; Systems; Process Design: Types of Process, Modern Production Technologies; Process Reengineering.

Unit II

Quality Management & Statistical Quality Control: TQM, Quality Specification, Design Quality, Quality at Source, Zero Defects, Cost of Quality, Continuous Improvement, Benchmarking, Poka-Yokes, Quality Awards; Statistical Quality Control: Acceptance Sampling, AQL & LTPD, P—Chart, X & R Chart.

Unit III

Facility Location and Layout: Issue in Facility Location, Plant Location Methods, Factor Rating, Centre of Gravity Methods, Analytic Delphi Method, Four Basic Layout Formats, Assembly Line Balancing, splitting Tasks, Problems in Facility Layout.

Unit IV

Project Scheduling :Project Management; Scheduling Project; Case Study: Scheduling at Bellop; Logic of PERT.

Waiting Line & Inventory Management: Economics of Waiting Line, Queuing System, Four Waiting Line Models along with application: Inventory management and Waiting Line Management, Inventory Models.

Unit V

Operations Planning and Scheduling Systems Aggregate Planning and its Process; Master Scheduling; Aggregate Planning or Service Organizations; Operating Schedules; Sequencing Rules; Optimized Production Technology and Synchronous Manufacturing; Just in Time (JIT) Manufacturing System; Basics of SCM and ERP.

Text Books

1. Muhleman, (2008), *Production and Operations Management*, 6th edition, Pearson Education.
2. B.Mahadevan, (2010), *Operations Management, Theory and Practical*, Pearson Education.

References Books

1. Kachru, Upender, (2006), *Production and Operation Management*, Excel Books.
2. Chary, S.N and Paneerselvam R., (2009), *Production and Operations Management*, McGraw Hill Education.
3. Stevenson, W. J, (2007), *Operations Management*, 9th Edition, McGraw Hill Education.
4. Gaither, Norman and Frazier, G., (2004), *Operations Management*, 9th Edition, Cengage Learning.

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MASTER OF BUSINESS ADMINISTRATION PROGRAMME
UNIVERSITY

BA-133A

BUSINESS RESEARCH METHODS

COURSE OBJECTIVE:

The objective of this paper is to impart knowledge about various stages of the research processes and their application in decision making.

Unit-I

Business research; its concept, nature, scope, need and managerial value of business research; definitions, concepts, constructs, variables, hypothesis, process of research and structure of research proposal.

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 analysis and interpretation, editing, coding, content analysis and tabulation, hypothesis testing – overview of parameter & non-parametric

Unit-IV

An overview of dependent and interdependent methods (multiple regression, discriminant analysis, conjoint analysis, factor analysis, cluster analysis).

Unit-V

Ingredients and constructions of research report; procedure of preparation of reference and bibliography, use of SPSS in BRM.

Suggested Readings:

1. Zikmund, Millian G., **Business Research Methods** , Thomson Learning , Bombay
2. Cooper, Donald R- and Pamels 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**

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-135A

CORPORATE GOVERNANCE AND CORPORATE SOCIAL RESPONSIBILITY

UNIT-I

Introduction – Concept of corporate governance, need for corporate governance, issues in corporate governance, corporate governance mechanism, international perspective on corporate governance: corporate governance in banks, Cadbury report, greenbury report, CII recommendations, OECD principle of corporate governance f) Sarbanes –Oxley (sox)

UNIT-II

Board of Director – and Corporate Governance, Composition and role of Board of Directors, legal aspects and liabilities of board in term of CG, role and responsibility of board in term of corporate governance

UNIT-III

Financial Disclosures – and, norms and practices of financial disclosures, SEBI and government and corporate governance

UNIT-IV

The Concept of Whistle-blowing, whistle-blowing policy, whistle-blowing legislation across countries (India),

Unit V

Corporate Social Responsibility, Meaning concept and theory, corporate sustainability reporting, CSR through triple bottom line, environmental aspect of CSR, CSR model, drivers of CSR, major codes on CSR, CSR and corporate Governance, CSR initiative in India

SUGGESTED READINGS:

1. Baxi, C V, Corporate Governance, Excel Books
2. Gopalswamy, Corporate Governance, New Age International Pvt. Ltd.
3. Swami, Parthasarthy, Corporate Governance, Biztantra, New Delhi
4. Mallin, Christine A., Corporate Governance (Indian Edition), Oxford University Press, New Delhi.
5. Sharma, J.P., Corporate Governance, Business Ethics & CSR, Ane Books Pvt Ltd, New Delhi.
6. Sharma, J.P., Corporate Governance and Social Responsibility of Business, Ane Books Pvt. Ltd, New Delhi.

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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-134A	SUPPLY CHAIN MANAGEMENT
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OBJECTIVE :The course seeks to provide the key concepts and solutions in the design, operation, control and management of supply chains as integrated systems.

1. BUILDING A STRATEGIC FRAME WORK TO ANALYSE SUPPLY CHAINS: Supply chain stages and decision phases process view of a supply chain. Supply chain flows. Examples of supply chains. Competitive and supply chain strategies. Achieving strategic fit. Expanding strategic scope. Drivers of supply chain performance. Framework for structuring drivers – Inventory, Transportation, Facilities, Information. Obstacles to achieving fit. Case discussions.

2. DESIGNING THE SUPPLY CHAIN NETWORK: Distribution Networking – Role, Design. Supply Chain Network (SCN) – Role, Factors, Framework for Design Decisions.

FACILITY LOCATION AND NETWORK DESIGN: Models for facility location and capacity allocation. Impact of uncertainty on SCN – discounted cash flow analysis, evaluating network design decisions using decision using decision trees. Analytical problems.

3. PLANNING AND MANAGING INVENTORIES IN A SUPPLY CHAIN: Review of inventory concepts. Trade promotions, Managing multi-echelon cycle inventory, safety inventory determination. Impact of supply uncertainty aggregation and replenishment policies on safety inventory. Optimum level of product availability; importance factors. Managerial levers to improve supply chain profitability.

4. SOURCING, TRANSPORTATION AND PRICING PRODUCTS: Role of sourcing, supplier – scoring & assessment, selection and contracts. Design collaboration.

SOURCING, TRANSPORTATION AND PRICING PRODUCTS: Role of transportation, Factors affecting transportation decisions. Modes of transportation and their performance characteristics. Designing transportation network. Trade-off in transportation design. Tailored transportation, Routing and scheduling in transportation. International transportation. Analytical problems. Role Revenue Management in the supply chain, Revenue management for: Multiple customer segments, perishable assets, seasonal demand, bulk and spot contracts.

5. COORDINATION AND TECHNOLOGY IN THE SUPPLY CHAIN: Co-ordination in a supply chain: Bullwhip effect. Obstacles to coordination. Managerial levers to achieve co-ordination, Building strategic partnerships.

COORDINATION AND TECHNOLOGY IN THE SUPPLY CHAIN: The role of IT supply Chain, The Supply Chain IT framework, CRM, Internal SCM, SRM. The role of E-business in a supply chain, The E-business framework, E-business in practice.

EMERGING CONCEPTS: Reverse Logistics; Reasons, Activities, Role. RFID Systems; Components, applications, implementation. Lean supply chains, Implementation of Six Sigma in Supply Chains.

SUGGESTED TEXT BOOK:

1. **Supply Chain Management** – 2001, Strategy, Planning & Operation. Sunil Chopra & Peter Meindl; Pearson Education Asia, ISBN: 81-7808-272-1.

REFERENCE BOOKS:

1. **Supply Chain Redesign** – Transforming Supply Chains into Integrated Value Systems -Robert B Handfield, Ernest L Nichols, Jr., 2002, Pearson Education Inc, ISBN: 81-297-0113-8
2. **Modelling the Supply Chain** -Jeremy F Shapiro, Duxbury;, 2002, Thomson Learning, ISBN 0-534-37363
3. **Designing & Managing the Supply Chain** -David Simchi Levi, Philip Kaminsky& Edith Simchi Levi;; McGraw Hill

Going Backwards Reverse Logistics Trends and Practices -Dr. Dale S. Rogers, Dr. Ronald S. Tibben-Lembke, University of Nevada, Reno, Center for Logistics Management.

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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA- 264A	Managerial Skills
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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 .

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-201A	STRATEGIC MANAGEMENT
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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.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-202A	OPERATIONS RESEARCH
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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.
5. Sharma, J.K., Operations Research: Theory and Applications, Macmillan India Ltd, New Delhi.
6. Kalavathy, Operations Research, Vikas Publishing House, New Delhi .

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-120A

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: Response 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.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

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 Entrepreneurshipprentice hall N. Jersey.
5. Lall, Mahurima and Shikha, Entrepreneurship, Excel Book, N.Delhi

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-212A	E-COMMERCE
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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
4. Electronic Commerce: Opportunities and Challenges by Syed MahbuburRahman, Mahesh Raisinghani, Publisher: Idea Group

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

EN-214

MANAGERIAL COMMUNICATION

OBJECTIVES: The course is aimed at equipping the students with necessary techniques and skills of communication to inform others inspire them and enlist their activity and willing cooperation in the performance of their jobs.

1. COMMUNICATION IN BUSINESS: Importance of Communication Forms of Communication, -- Communication Network of the Organization, Process of Communication: Different Stages, Difference between Oral & Written Communication.

2. ORAL COMMUNICATION: Fundamentals of Oral Communication: Introduction, Barriers and Gateways in Communication, Listening, Feedback, Telephonic Messages, Public Speaking and Presentation of Reports, PowerPoint Presentation, Body Language

BODY LANGUAGE: Facial Expressions, Non-verbal Communication, emotional Intelligence, Creativity in Oral Communication, Persuasive Communication, Communication through organizing various events like conferences, committee meetings, press meets, seminars, fests and the like

3. REPORT WRITING: Writing an Effective Report, Stages of Writing, Composing Business Messages, Style and Tone, Five Ws and one H of Report Writing, Planning and Types of Reports, Divisions, Numbering and use of Visual Aids, Creativity in Written Communication, Use of Pictures, Diagrams in Written Communication.

BUSINESS COMMUNICATION: Writing Commercial Letters, Business Letter Format, Types of Letters - Routine Business Letters, Sales Letters, Resume and Job Applications

4. BUSINESS MEMOS eMail Messages, Proposals, Technical Articles, Telegrams, Telex Messages, and Facsimiles, Electronic Mail, Handling a Mail, Maintaining a Diary, Legal Aspects of Business Communication, and Negotiation Skills.

5. ROUTINE CORRESPONDENCE:-- Circulars, Drafting Notices, Handling Complaints, Evaluating Interview Performance, Articles, Formal Invitations, -- Proforma for Performance Appraisals, Letters of Appointment, Captions for Advertising, Company Notice related Shares, dividends, MoA, AoA, Annual Reports, Minutes of Meetings, Action taken on Previous Resolution.

SUGGESTED BOOKS:

1. Scot Ober, Contemporary Business Communication, Biztantra
2. Bovee, Thill & Schatzman, Business Communication Today, Pearson
3. Nageshwar Rao and Rajendra Das, Business skills, HPH
4. Mary Ellen Guffy, Business Communication, Thomson
5. M Ashraf Rizvi, Effective Technical Communication, TMH
6. Meenakshi Raman and Sangeeta Sharma, Technical Communication, Oxford
7. Micheal Osborn and Suzanne Osborn, Public Speaking, Biztantra
8. John Seely, Oxford Writing and Speaking, Oxford
9. Parag Diwan, Business Communication, EB

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA- 264A	Managerial Skills
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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 .

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

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 operationalizing 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

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

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



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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

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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, RandD 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

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-405A	TALENT MANAGEMENT
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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 brendly 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



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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-406A	INDUSTRIAL RELATIONS AND LABOR LEGISLATIONS
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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.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

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

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

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

- Holt, David H, “International Management–Text and Cases”, Dry Den Press, Thomson Learning, Bombay
- Peter, J., Dolling, Danice, E. Welch, “International Human Resource Management”, Thomson learning – Excel books
- Cullen, “Multinational Management”, Thomson Learning Bombay
- Harzing and Van Ruysseveldt, “International Human Resource Management”, Sage Publication, New Delhi

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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. Machiraj, HR, Indian Financial System, Vikas Publishing House Pvt. Ltd. New-Delhi
5. Vasant Desai, The Indian Financial System, Himalaya Publishing House, New-Delhi

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BA-310A	PROJECT MANAGEMENT AND INFRASTRUCTURE FINANCE
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COURSE OBJECTIVE:

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

Note:

1. Instructions for External Examiner: The question paper shall be divided in two sections.

Section 'A' shall comprise of eight short answer type questions from whole of the syllabus carrying two marks each, which shall be compulsory. Answer to each question should not exceed 50 words normally.

2. Section 'B' shall comprise 8 questions (2 questions from each unit). The students will be required to attempt four questions selecting one question from each unit.

3. All questions will carry equal marks.

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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-311A	STRATEGIC COST MANAGEMENT AND CONTROL
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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



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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-312A	MULTINATIONAL FINANCIAL MANAGEMENT
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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 BUDETING:** 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



LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-409A

TAXATION LAWS AND PLANNING

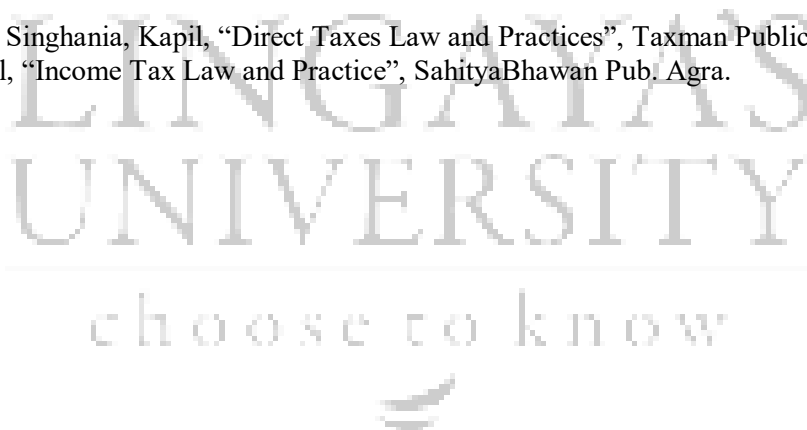
OBJECTIVE

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. Singhanian, V.K. and Singhanian, Kapil, "Direct Taxes Law and Practices", Taxman Publications
2. Mehrotara and Goyal, "Income Tax Law and Practice", SahityaBhawan Pub. Agra.



LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-410A	MANAGEMENT OF BANKING AND INSURANCE
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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



BA-411A	SECURITY ANALYSIS and PORTFOLIO MANAGEMENT
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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 listed securities & variable income security, fundamental & technical analysis.
3. **PORTFOLIO:** 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, Gordon J. and Bailey, Jeffery V., “Investment Analysis and Portfolio Management”, Dryden press, Thomson Learning, Bombay
4. Pandian, “Security Analysis and Portfolio Management”, Vikas Publishing House, New Delhi

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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-412A	FINANCIAL DERIVATIVES
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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



BA-317A	FOREIGN EXCHANGE MANAGEMENT
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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.

BA-318A	INTERNATIONAL MARKETING
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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. OnkvisitSak 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



LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

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

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MASTER OF BUSINESS ADMINISTRATION PROGRAMME

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

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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 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

4. Lasserre Philippe, Global Strategic Management, Palgrave MacMillan, Hampshire

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-419A	INTERNATIONAL LOGISTICS
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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
4. Govt of India, An Overview of Customs ,Commissionate of Customs and ICDs, New Delhi
5. Govt. of India, Ministry of Commerce and Industry – Handbook of Procedure, Govt. of India, New Delhi.

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LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-420A	INTERNATIONAL ACCOUNTING
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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. ShirinRathore: Intenational Accounts, PHI.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-321A	BRAND MANAGEMENT
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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. **LEVERGING 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

BA-322A	INTEGRATED MARKETING COMMUNICATION
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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.

1. 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.

2. 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 Foote, Cone and Belding (FCB) Model

3. 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.

4. 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

5. 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. Wells, William, Brunett, John and Moriarty, Sandra, "Advertising Principles and Practice", Pearson Education, New Delhi.

**LINGAYAS UNIVERSITY, FARIDABAD
MASTER OF BUSINESS ADMINISTRATION PROGRAMME**

BA-323A	SERVICE MARKETING
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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.

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 BOOKS

1. Lovelock, Christopher, Wirtz, Jochen and ChatterjeeJayanta, “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.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA- 324A	CONSUMER BEHAVIOUR
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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.

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-421A	CUSTOMER RELATIONSHIP MANAGEMENT
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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
- Greenberg, Paul, "CRM at The Speed of Light", Tata McGraw Hills, New Delhi

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-422A	ADVERTISING MANAGEMENT
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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

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-423A	RETAIL MANAGEMENT
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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

LINGAYAS UNIVERSITY, FARIDABAD

MASTER OF BUSINESS ADMINISTRATION PROGRAMME

BA-424A

SALES AND DISTRIBUTION MANAGEMENT

OBJECTIVE

The Objective of paper is two 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 Bachelor of Business Administration (BBA)

BBA			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-2101	Principles of Management	4	0	0	4
2	BA-2102	Business Economics-I	4	0	0	4
3	MA-103	Business Mathematics	4	0	0	4
4	CS-1101	Introduction to IT	4	0	0	4
5	BA-2105	Financial Accounting	4	0	0	4
6	EN-2106	Personality Development & Communication Skills-I	4	0	0	4
PRACTICAL						
1	CS-1151	IT Lab	0	0	4	2
2	PDI-194	Basics of Professional Skills	0	1	0	1
TOTAL			24	1	4	27

BBA			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-2107	Business Organization	4	0	0	4
2	BA-2108	Business Economics-II	4	0	0	4
3	MA-104	Quantitative Techniques and Operations Research in Management	4	0	0	4
4	CS-1201	Data Base Management System	4	0	0	4
5	BA-2111	Cost Accounting	4	0	0	4
6	EN-2112	Personality Development & Communication Skills-II	3	0	0	3
PRACTICAL						
1	CS-1251	DBMS Lab	0	0	6	3
2	PD 191	Co-Curricular Activities	0	1	0	1
3	PD-151	Fundamentals & Basics of Computer	0	1	0	1
TOTAL			23	2	6	28

BBA			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2201	Organizational Behavior	4	0	0	4
2	BA -2202	Indian Economy	4	0	0	4
3	BA -2203	Marketing Management	4	0	0	4
4	BA -2204	Management Accounting	4	0	0	4
5	BA -2281	Personality Development & Communication Skills-I (Minor Project Report)	0	0	8	4
PRACTICAL						
1	PD 291	Co-Curricular Activities	0	1	0	1
2	PDP	PDP	0	1	0	1
TOTAL			16	2	8	22

BBA			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2205	Human Resource Management	4	0	0	4
2	BA-2206	Business Environment	4	0	0	4
3	BA -2207	Marketing Research	4	0	0	4
4	CS-2201	Computer Applications – I	4	0	0	4
5	BA -2209	Business Laws	4	0	0	4
6	BA -2210	Taxation Laws	4	0	0	4
PRACTICAL						
1	CS-2251	Computer Applications Lab	0	0	4	2
2	BA-0001	Minor Project	3	0	0	3
3	PDP	PDP	0	1	0	1
Total			27	1	4	30

BBA			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2301	Values & Ethics in Business	4	0	0	4
2	BA -2302	Sales Management	4	0	0	4
3	BA -2303	Production & Operations Management	4	0	0	4
4	CS-3101	Management Information System	3	0	0	3
5	BA -2304	Financial Management	4	0	0	4
6	BA -1391	Summer Training Report & Viva Voice	2	0	0	2
PRACTICAL						
1	CS-3151	Computer Applications Project	4	0	0	4
2	PDP 492	PDP	0	1	0	1
TOTAL			25	1	0	26

BBA			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2310	Business Policy & Strategy	4	0	0	4
2	BA -2311	Project Planning & Evaluation	4	0	0	4
3	BA -2312	Entrepreneurship Development	4	0	0	4
4	BA -2313	International Business Management	4	0	0	4
5	BA -2314	Project Report and Viva-Voce	6	0	0	6
6	CE-2301	Environmental Science	4	0	0	4
7	PDP302	PDP	0	1	0	1
TOTAL			26	1	0	27

Scheme for Integrated BBA-MBA(Management and Commerce)

BBA-MBA (Integrated)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-2101	Principles of Management	4	0	0	4
2	BA-2102	Business Economics-I	4	0	0	4
3	MA-103	Business Mathematics	4	0	0	4
4	CS-1101	Introduction to IT	4	0	0	4
5	BA-2105	Financial Accounting	4	0	0	4
6	EN-2106	Personality Development & Communication Skills-I	4	0	0	4
PRACTICAL						
1	CS-1151	IT Lab	0	0	4	2
2	PD 191	Co-Curricular Activities	0	1	0	1
3	PDI-194	Basics of Professional Skills	0	1	0	2
TOTAL			24	2	4	28

BBA-MBA (Integrated)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-2107	Business Organization	4	0	0	4
2	BA-2108	Business Economics-II	4	0	0	4
3	MA-104	Quantitative Techniques and Operations Research in Management	4	0	0	4
4	CS-1201	Data Base Management System	4	0	0	4
5	BA-2111	Cost Accounting	4	0	0	4
6	EN-2112	Personality Development & Communication Skills-II	3	0	0	3
PRACTICAL						
1	CS-1251	DBMS Lab	0	0	6	3
2	PD 191	Co-Curricular Activities	0	1	0	1
3	PD-151	Fundamentals & Basics of Computer	0	1	0	1
Total			23	2	6	28

BBA-MBA (Integrated)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2201	Organizational Behavior	4	0	0	4
2	BA -2202	Indian Economy	4	0	0	4
3	BA -2203	Marketing Management	4	0	0	4
4	BA -2204	Management Accounting	4	0	0	4
5	BA -2281	Personality Development & Communication Skills-I (Minor Project Report)	0	0	8	4
PRACTICAL						
1	PD 291	Co-Curricular Activities	0	1	2	2
2	PD-292	Effective Communication	0	1	2	2
Total			16	2	12	24

BBA-MBA (Integrated)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2205	Human Resource Management	4	0	0	4
2	BA-2206	Business Environment	4	0	0	4
3	BA -2207	Marketing Research	4	0	0	4
4	CS-2201	Computer Applications – I	4	0	0	4
5	BA134A	Supply Chain Management	3	0	0	3
6	BA -2209	Business Laws	4	0	0	4
7	BA -2210	Taxation Laws	4	0	0	4
PRACTICAL						
1	CS-2251	Computer Applications Lab- I	0	0	4	2
2	PD 291	Co-Curricular Activities	0	1	0	1
3	BA-0001	Minor Project	0	1	2	2
4	PD-293A	Intra and Inter Personal Skills	0	1	0	1
Total			27	3	6	33

BBA-MBA (Integrated)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2301	Values & Ethics in Business	4	0	0	4
2	BA -2302	Sales Management	4	0	0	4
3	BA -2303	Production & Operations Management	4	0	0	4
4	CS-3101	Management Information System	3	0	0	3
5	BA-136A	Principle of Insurance	3	0	0	3
6	BA -2304	Financial Management	4	0	0	4
7	BA -1391	Summer Training Report & Viva Voice	2	0	0	2
PRACTICAL						
1	CS-3151	Computer Applications Project	4	0	0	4
2	PD-391	Co-Curricular Activities	0	1	0	1
3	DP 492	PDP	0	1	0	1
Total			28	2	0	30

BBA-MBA (Integrated)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA -2310	Business Policy & Strategy	4	0	0	4
2	BA -2311	Project Planning & Evaluation	4	0	0	4
3	BA -2312	Entrepreneurship Development	4	0	0	4
4	BA -2313	International Business Management	4	0	0	4
5	BA -2314	Project Report and Viva-Voce	6	0	0	6
6	CE-2301	Environmental Science	4	0	0	4
7	EN472A	Advanced Business Communication	3	0	0	3
8	D-392A	Problem Solving Skills	0	1	0	1
Total			29	1	0	30

BBA-MBA (Integrated)			Semester			VII
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	BA120A	International Business	3	0	0	3
4	BA103A	Accounting for Managers	3	0	0	3
5		Specialization Elective 1 (Major)	3	0	0	3
6		Specialization Elective 2 (Major)	3	0	0	3
7		Specialization Elective 3 (Major)	3	0	0	3
8		Specialization Elective 1 (Major)	3	0	0	3
9		Specialization Elective 2 (Major)	3	0	0	3
10		Specializations Elective 3 (Major)	3	0	0	3
PRACTICAL						
1	PD 294 A	Interview handling courses	0	1	0	1
2	BA-264A	Managerial Skills	0	0	4	2
3	BA-257A	Project	4	0	0	4
Total			34	1	4	37

BBA-MBA (Integrated)			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EN-214A	Managerial Communication	3	0	0	3
2	BA-212A	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
PRACTICAL						
1	BA264 A	Managerial Skills	1	0	2	2
2	BA-256A	Project	1	0	6	5
Total			26	0	8	30

BBA-MBA (Integrated)			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-1581A	MAJOR PROJECT	1	0	30	31
Total			1	0	30	31

Syllabus for BBA-BMI

BA 2102: Business Economics-I

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 Lectures:-12 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 Lectures:-18 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 Lectures:-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 Lectures:-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. (2009) Economics, 18th Edition, McGraw Hill Education.
2. Dwivedi, D.N. (2008) Managerial Economics, 7th edition, Vikas Publishing House.

Reference Books:

1. Salvatore, D. ((2006) Managerial Economics in a Global Economy, 6th edition, Oxford University Press.
2. Kreps, D. (2009). MicroEconomics for Managers, 1st edition, Viva Books Pvt. Ltd.
3. Peterson, L. and Jain (2006) Managerial Economics, 4th edition, Pearson Education.
4. Colander, D , C (2008) Economics, McGraw H i l l Education.

MA- 103 Business Mathematics

Objectives: This course aims at equipping student with a broad based knowledge of mathematics with emphasis on business applications.

Course Contents

Unit I

Lectures:-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 -A.P. & G.P.

Unit II

Lectures:-14

Matrix Algebra: The Inverse of a Matrix. Properties of the Inverse Solution to a System of Equations by (I) The Adjoint Matrix Methods.

(I) The Gaussian Elimination method, Rank of a Matrix, Rank of a System of Equations. The Echelon Matrix; Vectors: Types Optimization Vector- Additions, Suggestions & Multiplication, scalar Product, Vector Product; Linear Dependence of Vectors, Application of Matrices to Business Problems Input Output Analysis, Preparation of Depreciation Lapse schedule, Variance Analysis, Inventory Flow Analysis.

Unit III

Lectures:-14

Differential Calculus: 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

Lectures:-12

Integral Calculus & Differential Equations: Business application, Consumer's or Producer's surplus, Learning Curve; Differential Equations – Variable, Separable and Homogeneous Type- Business applications.

Text Books

1. Trivedi, ((2010), Business Mathematics, 1st edition, Pearson Education.
2. Bhardwaj, R.S. (2000). Mathematics for Economics and Business, Excel Books.

References

1. Raghavachari, M , ((2004), Mathematics for Management, McGraw H i l l Education.
2. Cleaves, Cheryl, and Hobbs, Margie, (2008) Business Math, 7th Edition, PrenticeH a l .
3. Tuttle, Michael,D ., (2008) Practical Business Math: An Applications Approach, 8th Edition,

Prentice Hall.

4. Khan, Shadab, (2008) A Text Book of Business Mathematics, Anmol Publications.

CS-1101 : Introduction to IT

Objectives: This is a basic paper for Business Administration students to familiarize with computer and its applications in the relevant fields and expose them to other related papers of IT.

Course Contents

Unit I Lectures:-18 Basics of
Computer and its Evolution

Evolution of Computer, Data, Instruction and Information, Characteristics of Computers, Various fields of application of Computers, Various Fields of Computer, Input-output Devices (Hardware, Software, Human ware and Firmware), Advantages and Limitations of Computer, Block Diagram of Computer, Function of Different Units of Computer, Classification of Computers.

Data Representation

Different Number System (Decimal, Binary, Octal and hexadecimal) and their Inter Conversion (Fixed Point Only), Binary Arithmetic (Addition, Subtraction, Multiplication and Division)

Unit II Lectures:-10

Computer Software: Types of Software, Compiler and Interpreter, Generations of languages, Computer Memory: Primary Memory (ROM and its type – PROM, EPROM, EEPROM, RAM) Secondary memory- SASD, DASD Concept, Magnetic Disks – Floppy Disks, Hard Disks, Magnetic Tape, Optical Disks – CD ROM and its type (CD ROM, CD ROM-R, CD ROM-EO, DVD ROM, Flash Memory.

Unit III Lectures:-12 Operating System

Concept: 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: AI Directory Manipulation: Creating Directory, Sub Directory, Renaming, Coping and Deleting the Directory

File Manipulation: Creating a File, Deleting, Coping, Renaming a File

Unit IV Lectures:-12 Concept of Data
Communication and Networking:

Networking Concepts, Types of networking (LAN, MAN AND WAN), Communication Media, Mode of Transmission (Simplex, Half Duplex, Full Duplex), Analog and Digital Transmission. Synchronous and

Asynchronous Transmission, Different Topologies Introduction to MS-Word, Spread Sheets and Graphical Solutions.

Text Books

1. ITL, ESL,(2005) Introduction to Infotech, 1ST edition, Pearson Education.
2. Goyal, Anita, ((2010) Computer Fundamentals, 1ST Edition, Pearson Education.

Reference Books

1. Leon and Leon, (1999) Introduction to Information Technology, Vikas Publishing House.
2. Joseph A. Brady and Elen F Monk, (2007) Problem Solving Cases in Microsoft and Excel, Fourth Annual Edition, Thomson Learning.
3. Rajaraman, V., (2009) Introduction to Information Technology, Prentice H a l of India.
4. Deepak Bharihoke, (2009), Fundamentals of Information Technology, 3rd Edition, Excel Books.

BA 2105 : Financial Accounting

Objectives: The primary objective of the course is to familiarize the students with the basic accounting principles and techniques of preparing and presenting the accounts for user of accounting information.

Course Contents

Unit I

Lectures:-16

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 Equation.

Accounting Principles and Standards: Accounting Principles, Accounting Concepts and Conventions, Accounting cycle system of accounting Introduction to Accounting Standards Issued by ICAI.

Journalizing Transactions: Journal, Rules of Debit and Credit, Sub Division of Journal: Cash Journal, Petty Cash Book, Purchase Journal, Purchase Return, Sales Journal, Sales Return Journal, Voucher System.

Unit II

Lectures:-8 Ledger Posting and Trial

Balance: Ledger, Posting, Rules Regarding Posting, Trial Balance.

Capital and Revenue: Classification of Income, Classification of Expenditure, Classification of Receipts, Difference between Capital Expenditure & Capitalized, Expenditure, Revenue Recognition.

Unit III

Lectures:-10 Inventory

Valuation: Meaning of Inventory, Objectives of Inventory Valuation, Inventory Systems, Methods of Valuation of Inventories, Accounting Standard 2 (Revised). 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).

Unit IV

Lectures:-18 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, Issue of two classes of Shares, Right Shares, Re-issue of Shares.

Debentures: Classification of Debentures, Issue of Debentures, Different Terms of Issue of Debentures, Writing off Loss on Issue of Debentures, Accounting Entries, Redemption of Debentures.

Company Final Accounts: Books of Account, Preparation of Final Accounts, Profit & Loss Account, Balance Sheet, Requirements of Schedule VI

Text Books

1. Tulsian, P.C., (2009) Financial Accountancy, 2nd edition, Pearson Education.
2. Maheshwari, S.N. and Maheshwari, S. K., (2009) An Introduction to Accountancy, Eighth Edition, Vikas Publishing House.

Reference Books

1. Bhattacharyya, Asish K., ((2010) Essentials of Financial Accounting, Prentice Hall of India.
2. Rajasekran, ((2010), Financial Accounting, 1st edition, Pearson Education.
3. Bhattacharya, S.K. and Dearden, J., ((2003) Accounting for Manager – Text and Cases, 3rd Edition, Vikas Publishing House.
4. Glautier, M.W.E. and Underdown, B. ((2010). Accounting Theory and Practice, Pearson Education.

EN -2106 : Personality Development &

Communication Skills - I

Objectives

1. To develop the skills of the professional undergraduate students for proper self expression, social communication, spoken English, correct pronunciation, voice modulation and business etiquettes.
2. The students should improve their personality, communication skills and enhance their self-confidence.

Course Contents

Unit-I

Lectures:-12 Fundamental of Grammar

and their Usage: How To Improve Command Over Spoken and Written English with Stress on Noun, Verb, Tense and Adjective. Sentence Errors, Punctuation, Vocabulary Building to Encourage the Individual to Communicate Effectively, Common Errors in Business Writing.

Unit-II

Lectures:-14 Introduction to

Business Communication: Basic Forms of Communication, Process of Communication, Principles of Effective Business Communication, 7Cs; Media of Communication: Types of Communication: Barriers of Communication (Practical exercise in communication)

Unit-III

Lectures:-14 Business letter

writing: Need, Functions and Kinds, Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters, Complaints and Adjustments; Departmental Communication: Meaning, Need and Types: Interview Letters, Promotion. Letters, Resignation Letters, News Letters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, Press Release.

Unit-IV

Lectures:-12 Business

Etiquettes and Public Speaking:

Business Manners. Body Language Gestures, Email and Net Etiquettes, Etiquette of the Written Word, Etiquettes on the Telephone, Handling Business Meetings; Introducing Characteristic, Model Speeches, Role Play on Selected Topics with Case Analysis and Real Life Experiences.

Text Books:

1. Boove, C.L., Thill, J.V., and Chaturvedi, M., (2009) Business Communication Today, Pearson Education.
2. Murphy and Hildebrandt, (2008) Effective Business Communication, McGrawHill Education.

Reference Books:

1. Krizan, A. C. Buddy, and Merrier, Patricia (2008) Effective Business Communication, 7th Edition, Cengage Learning.
2. Lesikar, (2009), Business Communication: Making Connections in a Digital World, McGrawHill Education.
3. McGraw, S. J., (2008) Basic Managerial Skills for All, 8th edition, Prentice Hall of India.
4. Wren & Martin, (2008), English Grammar and Composition, Sultan chand & Sons.

CS-1151 : IT Lab

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, its 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, Feature of MS-Excel, Entering Data, Entering Series, Editing Data, Cell Referencing, ranges, Formulae, Functions, Auto Sum, Copying Formula, Formatting Data, Creating Charts, Creating Database, Sorting Data, Filtering etc.

4. Introduction to MS PowerPoint

PowerPoint, Features of MS PowerPoint Clipping, Slide Animation, Slide Shows, Formatting etc.

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

6. Singhal, A.K. and Ghosh, Roy H.J., "Accounting for Managers", JBC Publishers and Distributors, New Delhi
7. Pandey, I.M., "Management Accounting", Vikas Publishing House, New Delhi
8. Homgren, Sundem and Stratton, "Introduction to Management", Accounting, Pearson Education, New Delhi
9. Anthony R N and Reece J.S. Management Accounting Principle, Homeword, Illinois Richard, D Irwin.
10. Khan, my and Jain P K, Management Accounting, TMH, New-Delhi

BBA 2107: Business Organization

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

Lectures:-12

Introduction: Concept, Nature and Scope of Business; Concept of Business as a System; Business and Environment Interface; Business Objectives; Profit Maximization vs Social Responsibility of Business; Introduction to Business Ethics and Values.

Unit II Lectures:-14 Business Enterprises:
Entrepreneurship – Concept & Nature; Locations of Business Enterprise (Weber's Theory); Government Policy on Industrial Location.

Forms of Business Organization: Sole Proprietorship, Joint Hindu Family Firm, Partnership firm, Joint Stock Company, Cooperative Organization; Types of Companies, Choice of form of organization; Promotion of a company – Stages in formation; documentation (MOA, AOA).

Unit III Lectures:-12 Small Business:
Scope and role; Government Policies.

Government & Business Interface: Rationale; Forms of Government and Business Interface.

Unit IV Lectures:-14 Multinationals: Concept and
role of MNCs; Transactional Corporations (TNCs); International Business Risks.

Business Combinations: Concept and causes of business combinations; Chambers of Commerce and Industry in India; FICCI, C I , ASSOCHAM, AIMO, etc.

Text Books

1. Robert; Lawrence, (2009) Modern Business Organization, McMillan India.
2. Tulsian, P. C., (2009) Business Organization & Management, 2nd edition, Pearson Education.

Reference Books

1. Basu, C. R. (2008) Business Organization and Management, McGraw Hill Education.
2. Basu, C, (2010) Business Organization 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 Organization And Management, Dhanpat Rai & Sons

BBA 2108: Business Economics - I I

Objectives: The objective of this paper is to develop the concepts on Macroeconomic variables, working of an economy, and how business decisions are affected with the influence of macro variables in business.

Course Contents

Unit I Lectures:-12 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 Lectures:-16
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 Lectures:-12 Analysis of Money Supply and Inflation: Functions and Forms of Money, Demand for Money-Classical, Keynesian and Friedmanian Approach, Measures of Money Supply, Quantity Theory of Money, Inflation- Types, Causes, Impact and Remedies.

Unit IV Lectures:-12 Equilibrium of Product and Money Market: Introduction to IS-LM Model, Equilibrium- Product Market and Money Market, Monetary Policy, Fiscal Policy.

Text Books

1. Soga, Erol, (2008) Macro Economics, 1st edition, Pearson Education.
2. Agarwal, ((2010) Macroeconomics Theory and Policy, 1st edition, Pearson Education.

Reference Books:

1. Dwivedi, D . N . , ((2005) Macro Economics, McGraw Hill Education.
2. Mishra, S. K. and Puri, V. K., ((2003), Modern Macro-Economic Theory, Himalaya Publishing House.
3. Shapiro, E . , ((2003) Macro-Economic Analysis, McGraw Hill Education.
4. HirCShey, Mark, (2009) Fundamentals of Managerial Economics, 9th edition, Cengage Learning.

MA -104 Quantitative Techniques and Operations Research in Management

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 Lectures:-14
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; Measures of variation – Range, IQR, quartile, deciles and percentiles, quartile deviation and standard deviation and Lorenz Curve.

Unit II Lectures:-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; Real world
Application using IT Tools.

Unit III Lectures:-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,
Usage & Application in Business Decision Making.

Unit IV Lectures:-14 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, Gant Charts, Principles of Work Center Scheduling, Principles of Job Shop Scheduling, Personnel
Scheduling.

Text Books:

1. Vohra, N.D., (2009) Quantitative Techniques in Management, 4th edition, McGraw Hill Education.
- Vishwanathan, P.K., (2008) Business Statistics and Applied Orientation, 1st edition,

Reference Books

1. Rajagopalan, S. and Satanathan, R., (2009) Business Statistics & Operations Research, 2nd Edition, McGraw Hill Education.
2. Sharma, J.K., (2009) Operations Research: Problems & Solutions, 2nd edition, Macmillan India Ltd.
3. Taha, Hamdy, (2008) Operations Research: An Introduction, 8th edition, Pearson Education.
4. Render, Barry, Stair, R.M., Hanna, M.E., and Badri, (2009) Quantitative Analysis for Management, 10th edition, Pearson Education.

CS-1201 : Data Base Management System

Objectives: To develop understanding of database management system and abilities to use DBMS packages.

Course Contents

Unit I Lectures:-12 Introduction to
Database Systems: File System versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS,
Queries in a DBMS, Structure of a DBMS, People who deal with Database, Introduction to Data Models,
Architecture of DBMS.

Unit II Lectures:-16 Entity Relationship Model:
Overview of Database Design, Entities, attributes, and Entity Sets, Relationships and Relationship Sets, Additional
Features of the ER Model, Conceptual Database Design with the ER Model – Entity versus Attribute, Entity versus
Relationship; Relational Model: Introduction to Relational Model, Foreign Key Constraints, Enforcing

Integrity Constraints, Querying Relational Data, Logical Database Design : ER to Relation, Introduction to Views, Destroying/Altering Tables and Views, Codd Rules.

Unit III Lectures:-12 Schema Refinement & Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Examples Motivation Schema Refinement, Reasoning about Functional Dependencies, Normal Forms, Decompositions, Normalization (Up to 3rd Normal Form)

Unit IV Lectures:-12 Concept of Objects: Objects, Tables, Queries, Forms, Reports, Modules; Database Creation and Manipulation; SQL Queries: the Form of a Basic SQL Query, Union, Intersect, and Except, Introduction to Nested Queries, Aggregate Operators, Null Values.

Text Books

1. Elmasri and Navathe, (2009), Fundamentals of Database Systems, 5th edition, Pearson Education.
2. IITL Education Ltd., (2010), Introduction to Database System, Pearson Education.

Reference Books:

1. Ramakrishnan, R. and Gehrke, J. (2007), Database Management Systems, 3rd edition, McGrawHill Education.
2. Korth, A. and Abraham, C. J., (2006), An Introduction to Database System, Vol. I & Vol. II, 8th edition, Addison Wesley Publishing Company.
3. Singh. S. L., (2008), Database System Concept and Application, 2nd edition, Pearson Education.
4. Atul, Kahate, (2006), Introduction to Database Management System, 1st edition Pearson Education.

BA 2111: Cost Accounting

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

Lectures:-14 Meaning and Scope of

Cost Accounting:

Basic Cost Concepts – Elements of Costs, Classification of Costs, Total Cost Build up and Cost Sheet, Emerging Terms viz. Life Cycle Costing, Activity Based Costing, Back Flush Costing.

Materials Control:

Meaning – Steps Involved – Materials and Inventory – Techniques of Material/Inventory Control – Valuation of Inventory – Material Losses.

Unit II

Lectures:-14

Labour Cost Control: Direct and Indirect Labour, Steps Involved – Treatment of Idle Time, Holiday Pay, Overtime etc. in Cost Accounts, Casual Workers & Out Workers, Labour Turnover, Methods of Wage Payment. Incentive Plans.

Overheads: Meaning and Classification of Overheads – Treatment of Specific Items of Overheads in Cost Accounts – Stages Involved in Distribution of Overheads – Methods of Absorption of Overheads – Treatment of Under and Over Absorption of Overheads.

Unit III Lectures:-12 Methods of Costing: Single Output Costing, Job Costing, Contract & Batch Costing.

Unit IV Lectures:-12 Process Costing (including Joint Products and By-products and Inter-process Profits), Operating/Service Costing. (Transport & Power House only); Reconciliation of Cost and Financial Accounts.

Text Books

1. Maheshwari, S.N. and Mittal, S.N. (2009), Cost Accounting – Theory and Problems, 22nd Revised Edition, Shri Mahavir Book Depot.
2. Rajasekaran, (2010), Cost Accounting, 1st edition, Pearson Education.

Reference Books:

1. Duta, Mahesh, (2006), Cost Accounting - Principle Practices, 1st edition, Pearson Education.
2. Arora, M.N., (2009), Cost Accounting, Vikas Publishing House.
3. Lal, Jawahar and Srivastava, Seema, (2008), Cost Accounting, 4th Edition, McGraw Hill Education.
4. Jain and Narang, (2008), Cost Accounting, Kalyani Publishers.

EN 2112 : Personality Development and

Communication Skill-II

Objectives

1. To develop the project writing and presentation skills of the undergraduate students.
2. The students should be able to act with confidence, should be clear about their own personality, character and future goals.

Course Contents

Unit I Lectures:-9 Project and Report writing and Proposals: – How to write an Effective Report, Basics of Project writing, Paragraph writing, Paper reading and Voice modulation, Basics of Project presentation.

Unit II Lectures:-10 How to Make a Presentation, the Various Presentation Tools, along with Guidelines of Effective Presentation, Boredom Factors in Presentation and How to Overcome them, Interactive Presentation & Presentation as Part of a Job Interview, Art of Effective Listening.

Unit III Lectures:-10 Resume Writing Skills, Guidelines for a Good Resume, How to Face an Interview Board, Proper Body Posture, Importance of Gestures and Steps to Succeed in Interviews. Practice Mock Interview in Classrooms with Presentations on Self; Self Introduction – Highlighting Positive and Negative Traits and Dealing with People with Face to Face.

Unit IV

Lectures:-10 Leadership – Qualities

of a Leader, Leadership Quiz with Case Study, Knowing Your Skills and Abilities; Introduction to Group Discussion Techniques with Debate and Extempore, Increase Your Professionalism.

Audio Video Recording and Dialogue Sessions on Current Topics, Economy, Education System, Environment, Politics.

Text Books

1. Bovee, Thill and Chaturvedi, (2010), Business Communication, 2nd edition, Pearson Education.
2. Lilian, Chaney, (2008), Intercultural Business Communication, 4th edition, Pearson Education.

Reference Books:

Chaturvedi, Mukesh, (2009), Business Communication: Concepts, Cases & Applications, 1st edition, Pearson Education.

1. McGraw, S. J., (2008), Basic Managerial Skills for AI, 8th edition, Prentice Hall of India.
2. Michaul, V. K., (2007), Communication & Research for Management, Himalaya Publication House.

CS-1251 : Data Base Management System (Practical)

USING MS-ACCESS

Course Contents

1. Getting Familiar with Access Objects: Tables, Queries, Forms, Reports, and Modules.
2. Creating Database: Creating database using wizards, documenting the database, creating own databases.
3. Creating Tables: Working with tables in design view, setting field properties, naming fields, setting data types, setting primary key, multiple field primary keys, creating indexes, using table wizard.
4. Creating Queries: Working with query design grid, adding tables, adding fields, sorting records, setting field criteria, planning for null values, using simple query wizard – summarizing your records.
5. Creating forms: Working in design view, components of a form in design view, sections of a form, assigning form properties, modifying form properties to create a dialog box, using form templates, creating forms with a wizard, auto forms.
6. Creating Reports: Using Report Wizards, Working with auto report, creating a report template, inserting a chart into a report with the chart wizard, printing report.
7. Creating Labels and Mail-Merge Documents: Using the Label Wizard, using Custom Labels, Printing Multiple Labels, Merging Access Data with Word Documents.

BA 2201: Organizational Behaviour

Objectives: The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behaviour at the individual, group and organizational levels in the changing global Scenario. The course must be taught using case study method.

Course Contents

Unit –I Lectures:-10 Introduction: Concept and nature of Organizational behaviour; Contributing disciplines to the field of O.B.; O.B. Models; Need to understand human behaviour; Challenges and Opportunities.

Unit II Lectures:-16 Individual & Interpersonal Behaviour: Biographical Characteristics; Ability; Values; Attitudes-Formation, Theories, Organisation Related Attitude, Relationship between Attitude and Behavior; Personality – Determinants and Traits; Emotions; Learning-Theories and Reinforcement Schedules, Perception –Process and Errors. Interpersonal Behaviour: Johor Window; Transactional Analysis – Ego States, Types of Transactions, Life Positions, Applications of T.A.

Unit III Lectures:-14 Group Behaviour & Team Development: Concept of Group and Group Dynamics; Types of Groups; Formal and Informal Groups; Stages of Group Development, Theories of Group Formation; Group Norms, Group Cohesiveness; Group Think and Group Shift. Group Decision Making; Inter Group Behaviour; Concept of Team Vs. Group; Types of Teams; Building and Managing Effective Teams.

Unit IV Lectures:-12 Organization Culture and Conflict Management: Organizational Culture- Concept, Functions, Socialization; Creating and sustaining culture; Managing Conflict – Sources, Types, Process and Resolution of Conflict; Managing Change; Resistance to Change, Planned Change. Managing Across Cultures; Empowerment and Participation.

Text Books

1. Robbins, S.P. and Sanghi, S., (2009), Organizational Behaviour; 13th edition, Pearson Education.
2. Singh, Kavita, (2010), Organizational Behaviour: Text and Cases, 1st edition, Pearson Education.

Reference Books

1. Luthans, Fred, (2008), Organizational Behavior, 11th Edition, McGraw Hill Education.
2. Mirza, S., ((2003), Organizational Behavior, 1st Edition, McGraw Hill Education.
3. Mcshane, Steven, Von, Glinow and Sharma, Radha, (2008), Organisational Behaviour, 4th Edition, McGraw Hill Education.

4. BBA 2202: Indian Economy

5.

6. Objective: Objective of this course is to acquaint students of the Indian Economy, present and future of Indian Economics, and how the Indian Economy is influencing the business environment in India context.

7. Course Contents

8. Unit I Lectures:-12 Structure of Indian Economy: Concept of Economic Growth and Economic Development, Growth and Development. Basic Characteristics of Indian Economy Changes in structure of Indian Economy (Primary Sector, Secondary Sector & Tertiary Sector). Trends in National Income in India, Work Force Participation and Changes in Occupational Structure in India.

9. Unit II

Lectures:-16

Planning and Economic Development and Problems in Indian Economy: Objective of Economic Planning in India, Current Five Year Plan. Industrial Policy-1991, Disinvestments of Public Enterprises; Economic Problems: Poverty, Inequality, Parallel Economy, Unemployment, Concentration of Economic Power, Balanced Regional Development, Low Capital Formation and Industrial Sickness.

10. Unit III

Lectures:-12 Indian

Economy & Foreign Trade: Concept, Significance, Foreign Exchange Reserve, Balance of Payment, Balance of Trade, Current Foreign Policy, Foreign Exchange Management Act (FEMA), Export Promotion.

11. Unit IV

Lectures:-12 Indian

Economy – Emerging Issues: WTO and various agreement & Indian Economy (Emerging Areas), GATT, TRIMS, TRIPS, Foreign Direct Investment, Foreign Institutional Investment.

Text Books

1. Dat, and Sundhram, R., (2009), Indian Economy, 61 st edition, Sultan Chand & Sons.
2. Prakash, B. A., (2009), The Indian Economy since 1991 – Economic Reforms & Performances, 1st edition, Pearson Education.

Reference Books

1. Dhingra, I C., (2009), Indian Economy, Sultan Chand & Sons.
2. Jaiganta, Sarkar, (2007), Indian Economy: Policies and Practices, 1st edition, Pearson Education.
3. Mishra, S.K., and Puri, V.K., (2007), Problems of Indian Economy, Himalya Publishing House.

BBA-2203: Marketing Management

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

Lectures:-12 Introduction to

Marketing: Nature, Scope and Importance of Marketing, Basic concepts, Marketing Environment, Market Segmentation, Targeting and Positioning.

Unit II

Lectures:-12 Product: Product Levels,

Product Mix, Product Strategy, Product innovation and Diffusion, Product Development, Product Lifecycle and Product Mix.

Pricing Decisions: Designing Pricing Strategies and Programmes, Pricing Techniques.

Unit III

Lectures:-14 Place: Meaning & importance, Types of Channels, Channels Strategies, Designing and Managing Marketing Channel, Managing Retailing, Physical Distribution, Marketing Logistics and Supply Chain Management.

Unit IV

Lectures:-14 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.

Text Books:

1. Kotler, Armstrong, Agnihotri and Haque, (2010), Principles of Marketing- A South Asian Perspective, 13th edition, Pearson Education.
2. Ramaswamy and Namkumar, S., (2009), Marketing Management Global Perspective: Indian Context, McMilan, Delhi.

References:

1. Saxena, Rajan, (2008), Marketing Management, 3rd edition, McGrawHill Education.
2. Kumar, Arun and Meenakshi, N., (2009), Marketing Management, Vikas Publishing House.
3. Russell, Winer, (2007), Marketing Management, 3rd edition, Pearson Education.
4. Kotler, Koshi Jha, (2009), Marketing Management, 13 edition, Pearson Education.

BA-2204: Management Accounting

3 hours Marks: 100

Lectures: 65

Objective: To impart the students, knowledge about the use of financial, cost and other data for the purpose of managerial planning, control and decision making.

COURSE CONTENTS:

Unit 1: Introduction (6 Lectures)

Meaning, Objectives, Nature and Scope of management accounting, Difference between cost accounting and management accounting, Cost control and Cost reduction, Cost management

Unit 2: Budgetary Control (10 Lectures)

Budgeting and Budgetary Control: Concept of budget, budgeting and budgetary control,

objectives, merits, and limitations. Budget administration. Functional budgets. Fixed and flexible budgets. Zero base budgeting. Programme and performance budgeting.

Unit 3: Standard Costing (12 Lectures)

Standard Costing and Variance Analysis: Meaning of standard cost and standard costing, advantages, limitations and applications. Variance Analysis – material, labour, overheads and sales variances. Disposition of Variances, Control Ratios.

Unit 4: Marginal Costing (12 Lectures)

Absorption versus Variable Costing: Distinctive features and income determination. Cost-Volume-Profit Analysis, Profit / Volume ratio. Break-even analysis-algebraic and graphic methods. Angle of incidence, margin of safety, Key factor, determination of cost indifference point.

Unit 5: Decision Making (20 Lectures)

Steps in Decision Making Process, Concept of Relevant Costs and Benefits, Various short term decision making situations – profitable product mix, Acceptance or Rejection of special/ export offers, Make or buy, Addition or Elimination of a product line, sell or process further, operate or shut down. Pricing Decisions: Major factors influencing pricing decisions, various methods of pricing.

Unit 6: Contemporary Issues (5 Lectures)

Responsibility Accounting: Concept, Significance, Different Responsibility Centres, Divisional Performance Measurement: Financial and Non-Financial measures. Transfer Pricing

Suggested Reading:

1. Charles T. Horngren, Gary L. Sundem, Dave Burgstahler, Jeff O. Schatzberg.

Introduction to Management Accounting, Pearson Education.

2. Anthony A. Atkinson, Robert S. Kaplan, Ella Mae Matsumura, S. Mark Young.

Management Accounting. Dorling Kindersley(India) Pvt. Ltd.

3. Ronald W. Hilton and David E. Platt. Managerial Accounting: Creating Value in a Global Business Environment, Mc Graw Hill Education.

4. Singh, Surender. Management Accounting, Scholar Tech Press, New Delhi.
5. Goel, Rajiv, Management Accounting. International Book House,
6. Arora, M.N. Management Accounting . Vikas Publishing House, New Delhi.
7. Maheshwari, S.N. and S.N. Mittal. Management Accounting. Shree Mahavir Book Depot, New Delhi.
8. Singh, S. K. and Gupta Lovleen. Management Accounting – Theory and Practice. Pinnacle Publishing House.
9. Khan, M.Y. and Jain , P.K. Management Accounting. McGraw Hill Education
10. H.V. Jhamb, Fundamentals of Management Accounting, Ane Books Pvt. Ltd.

BA-2281 : Personality Development and Communication Skill – III (Minor Project Report)

Objectives: The student will have the opportunity to explore the current management literature so as to develop an individual style and sharpen his skills in the area of leadership communication, decision making, motivation and conflict management.

Minor Project and Presentation

Minor projects are tasks that add to the knowledge of the students. A topic shall be given to each student in the beginning of the semester in various areas of management. The Presentation Project comprises of either of the following:

Project Presentation

OR

*Case Study Presentation

Suggested Topics for Minor Projects

Goals of an organization. Work Values

Character Ethics

Working Conditions Decision making Strategies Goal Setting

Customer Satisfaction * Case study can be chosen by the students in their respective areas of interest.

Text Books

1. Lather, A.S. & Handa, M (2009). Cases in Management. Wisdom Publications.
2. McGrath. (2009). Basic Managerial Skills for A I , 8th ed. Prentice H a I I India

Reference Book

1. Elis. (2009). Management Skills for New Managers. Prentice H a I I India

BA-134A SUPPLY CHAIN MANAGEMENT

OBJECTIVE : The course seeks to provide the key concepts and solutions in the design, operation, control and management of supply chains as integrated systems.

1. BUILDING A STRATEGIC FRAME WORK TO ANALYSE SUPPLY CHAINS: Supply chain stages and decision phases process view of a supply chain. Supply chain flows. Examples of supply chains. Competitive and supply chain strategies. Achieving strategic fit. Expanding strategic scope. Drivers of supply chain performance. Framework for structuring drivers – Inventory, Transportation, Facilities, Information. Obstacles to achieving fit. Case discussions.

2. DESIGNING THE SUPPLY CHAIN NETWORK: Distribution Networking – Role, Design. Supply Chain Network (SCN) – Role, Factors, Framework for Design Decisions.

FACILITY LOCATION AND NETWORK DESIGN: Models for facility location and capacity allocation. Impact of uncertainty on SCN – discounted cash flow analysis, evaluating network design decisions using decision using decision trees. Analytical problems.

3. PLANNING AND MANAGING INVENTORIES IN A SUPPLY CHAIN: Review of inventory concepts. Trade promotions, Managing multi-echelon cycle inventory, safety inventory determination. Impact of supply uncertainty aggregation and replenishment policies on safety inventory. Optimum level of product availability; importance factors. Managerial levers to improve supply chain profitability.

4. SOURCING, TRANSPORTATION AND PRICING PRODUCTS: Role of sourcing, supplier – scoring & assessment, selection and contracts. Design collaboration.

SOURCING, TRANSPORTATION AND PRICING PRODUCTS: Role of transportation, Factors affecting transportation decisions. Modes of transportation and their performance characteristics. Designing transportation network. Trade-off in transportation design. Tailored transportation, Routing and scheduling in transportation. International transportation. Analytical problems. Role Revenue Management in the supply chain, Revenue management for: Multiple customer segments, perishable assets, seasonal demand, bulk and spot contracts.

5. COORDINATION AND TECHNOLOGY IN THE SUPPLY CHAIN: Co-ordination in a supply chain: Bullwhip effect. Obstacles to coordination. Managerial levers to achieve co-ordination, Building strategic partnerships.

COORDINATION AND TECHNOLOGY IN THE SUPPLY CHAIN: The role of IT supply Chain, The Supply Chain IT framework, CRM, Internal SCM, SRM. The role of E-business in a supply chain, The E-business framework, E-business in practice.

EMERGING CONCEPTS: Reverse Logistics; Reasons, Activities, Role. RFID Systems; Components, applications, implementation. Lean supply chains, Implementation of Six Sigma in Supply Chains.

SUGGESTED TEXT BOOK:

1. **Supply Chain Management** – 2001, Strategy, Planning & Operation. Sunil Chopra & Peter Meindl; Pearson Education Asia, ISBN: 81-7808-272-1.

REFERENCE BOOKS:

4. **Supply Chain Redesign** – Transforming Supply Chains into Integrated Value Systems -Robert B Handfield, Ernest L Nichols, Jr., 2002, Pearson Education Inc, ISBN: 81-297-0113-8
5. **Modelling the Supply Chain** -Jeremy F Shapiro, Duxbury,, 2002, Thomson Learning, ISBN 0-534-37363
6. **Designing & Managing the Supply Chain** -David Simchi Levi, Philip Kaminsky & Edith Simchi Levi;; Mc Graw Hill
Going Backwards Reverse Logistics Trends and Practices -Dr. Dale S. Rogers,Dr. Ronald S. Tibben-Lembke,University of Nevada, Reno, Center for Logistics Management.

BBA 2205: Human Resource Management

Objectives: The objective of the course is to familiarize students with the different aspects of managing Human Resources in the organization through the phases of acquisition, development and retention.

Course Contents

Unit I Lectures:-12 Introduction: Concept , Nature, Scope, Objectives and Importance of HRM; Evolution of HRM; Challenges of HRM; Personnel Management vs HRM; Strategies for the New Millennium: Role ofHRM in Strategic Management; Human Capital; Emotional Quotient; Mentoring; ESOP; Flexi-time; Quality Circles; Kaizen; TQM and Six Sigma.

Unit II Lectures:-14 Acquisition of Human Resources: HR Planning; Job Analysis – Job Description and Job Specification; Recruitment – Sources and Process; Selection Process – Tests and Interviews; Placement and Induction; Job Changes – Transfers, Promotions/Demotions, Separations.

Unit III Lectures:-12 Training and Development: Concept and Importance of Training; Types of Training; Methods of Training; Design of Training Programme; Evaluation of Training Effectiveness; Executive Development – Process and Techniques; Career Planning and Development.

Unit IV Lectures:-14 Compensation and Maintenance: Compensation: Job Evaluation – Concept, Process and Significance; Components of Employee Remuneration – Base and Supplementary; Performance and Potential Appraisal – Concept and Objectives; Traditional and Modern Methods, Limitations of Performance Appraisal Methods, 360 Degree Appraisal Technique; Maintenance: Overview of Employee Welfare, Health and Safety, Social Security.

Text Books

1. Aswathappa, K. , (2010), Human Resource Management, McGraw Hill Education.
2. DeCenzo, D. A. and Robbins, S.P. (2007), Fundamentals of Human Resource Management, 9th edition, John Wiley.

Reference Books

1. Durai, Praveen, (2010), Human Resource Management, Pearson Education.
2. Monappa, A. and Saiyadain, M. , ((2001), Personnel Management, McGraw-Hill Education.
3. Dessler, Gary, ((2004) Human Resource Management, Pearson Education.

4. Jyothi, P. and Venkatesh, D.N, (2006), Human Resource Management, Oxford Higher Education.

BA 2206: Business Environment

Objectives: The basic objective of this course is to familiarize the students with the nature and dimensions of evolving business environment in India to influence managerial decisions.

Course Contents

Unit-I

Lectures:-13

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, Objectives and the Uses of Study, Process and Limitations of Environmental Analysis.

Unit II

Lectures:-12 Economic Environment:

Nature of Economic Environment, Economic, Nature and Structure of the Economy, Monetary and Fiscal Policies, Competition Act, 2000.

Unit III

Lectures:-14 Socio-Cultural

Environment: Nature and Impact of Culture on Business, Culture and Globalization, Social Responsibilities of Business, Business and Society, Social Audit, Business Ethics and Corporate Governance.

Political Environment: Functions of State, Economic Roles of Government, Government and Legal Environment, The Constitutional Environment, Rationale and Extent of State Intervention.

Unit IV

Lectures:-13 Natural and Technological

Environment: Innovation, Technological Leadership and Followership, Sources of Technological Dynamics, Technology Transfer, Time Lags in Technology Introduction, and Status of Technology in India. Management of Technology, Features and Impact of Technology.

Text Books:

1. Shaikh, Saleem, (2010), Business Environment, 2nd edition, Pearson Education.
2. Cherunilam, Francis, (2007), Business Environment - Text and Cases, Himalaya Publishing House.

Reference Books:

1. Aswathappa, K., (2000), Essentials of Business Environment, 7th edition, Himalaya Publishing House.
2. Gupta C. B., (2008), Business Environment, 4th edition, Sultan Chand.
3. Bedi, Suresh, ((2004), Business Environment Excel Book.
4. Ian Worthington, Chris Briton, (2009), Business Environment, Pearson Education.

BBA-2207 Marketing Research

Objectives: The objective of this paper is to understand the various aspects of marketing research, identify the various tools available to a marketing researcher. Marketing research can help the marketing manager in decision making.

Course Contents

Unit I Lectures:-14 Introduction of Marketing Research: Define Marketing Research, Aims and Objectives of Marketing Research. Applications of Marketing Research, Marketing Information System, Evaluation and Control of Marketing Research, Value of Information in Decision Making, Steps in Marketing Research.

Research Design: Formulating the Research Problem, Choice of Research Design, Types of Research Design, Sources of Experimental Errors.

Unit II Lectures:-12 Sample and Sampling Design: Some basic terms, Advantages and Limitation of Sampling, Sampling process, Types of Sampling, Types of Sample Designs, Determining the Sample Size, Sampling Distribution of the Mean.

Scaling Techniques: The concept of Attitude, Difficulty of Attitude Measurement, Types of Scales, and Applications of Scaling in Marketing Research.

Unit III Lectures:-14 Data Collection:: Secondary Data, Sources of Secondary Data, Primary Data, Collection of Primary Data, Methods of Data Collection- Observation, Questionnaire, Designing of Questionnaire.

Data Processing and Tabulation: Editing, Coding and Tabulation.

Unit IV Lectures:-12 Data Analysis: Testing of Hypothesis, Measurement of Central Tendency, Dispersion, Univariate Analysis, Multiple Regression, Factor Analysis, Cluster Analysis, Multidimensional Scaling, Conjoint Analysis; Interpretation and Report Writing, Types of Research Reports, Guidelines for Writing a Report, Writing a Report Format, Evaluation of Research Report.

Text Books

1. Beri, G.C., (2007), Marketing Research: Research Design, 4th Edition, McGraw Hill Education.
2. Malhotra, Naresh, (2008), Marketing Research, 5th edition, Pearson education.

Reference Books

1. Nargundkar, Rajendra, (2008), Marketing Research: Text and Cases, 3rd Edition, McGraw Hill Education.
2. Sekaran, Uma, (2003), Research Methods for Business, 4th edition, Wiley.
3. Kumar, Ranjit, (2005), Research Methodology: A step by step guide for Beginners. Pearson Education.
- Levin, Richard and Rubin, DS, (2009), Statistics for Management, 7th edition, Pearson Education

CS-2201 : Computer Applications - I

(Web Technology, HTTP and HTML concepts)

Objectives: To familiarize the students with various Web based packages to develop customize web site.

Course Contents

UNIT-I Lectures:-12 An Introduction to the World Wide Web: Concepts of Web Technology, Web Browsers, Internet Explorer, NetCSape Navigator, Internet and Intranet, Windows NT Server (I S) Versus Linux (Apache) as a Web Server

Planning your Web Site: Doing Business on the Web, An Overview of Internet Service Providers (ISP), A Search Engine, Types of search engine, working of a Basic Search Engine, Searching Techniques, Making a Web Site Plan, Forming a Project Team, Setting Goals and Objectives, Developing the R i g h t Business Strategy

UNIT-II Lectures:-12 Designing and constructing your Web site: Developing Content, Designing Individual Pages, Designing & Constructing your Web Site, Implementing your Web Site, NetCSape Extensions and HTML, HTML Tools, CGI Concepts

Creating your Web Site with FrontPage: Introducing FrontPage, Editing Documents in the FrontPage Editor, Formatting Pages, Linking Pages to the World, Displaying Images in Pages

UNIT-III Lectures:- 14 HTML: What is HTML?, HTML Basics, Document Tags, Container and Empty Tags, Entering Paragraph Text on your Web page, The
 Tag, The Comment Tag

Working with HTML Text: Working with HTML Text, Emphasizing Text Implicitly and Explicitly, The <BLOCKQUOTE> Element, Pre-formatting Text, The <DIV> Tag, The Tag, The <BASEFONT> Tag, Using Lists in Web Document, Nested Ordered, Unordered Lists, Menu List, Directory Lists, Definition Lists

UNIT-IV Lectures:-14 Graphics for web pages: Choosing the correct Graphics File Format, Color in images, Loss of image quality due to compression, Adding inline image to web page, Scaling down an image, Alternative Text for the tag, Understanding Image maps

Working with Links: Working with links, Relative and absolute links, providing links for internet services, Link tag

Tables, Frames and Forms: Creating Borderless Tables, Frames, Forms

Cascading Style sheets: What is Style Sheet, Types of Style Sheets, Using Style Sheet with HTML

Text Books:

1. C. Xavier, World Wide Web Design with HTML, McGraw H i l l Education.
2. HTML-4.0 Complete Reference-BPB Publication

Reference Books:

1. Internet Complete Reference- Tata McgrawHil
2. HTML-4.0 unleashed – Techmedia Publication
3. HTML,DHTML –Ivan Bayross

BA-2209: Business Laws

Note: Students are expected to have only elementary knowledge of the topics specified in the syllabus.

Objectives: To acquaint the student with a basic and elementary knowledge of the subject.

Course Contents

Unit I Lectures:-18 Indian Contract Act, 1872 (Fundamental Knowledge): Essentials of Valid Contract, Discharge of Contract, Remedies for Breach of Contract; Contracts of Indemnity, Guarantee, Bailment, Pledge and Agency.

Unit II Lectures:-8 Sale of Goods Act 1930: Meaning of Sale and Goods, Conditions and Warranties, Transfer of Property, Rights of an unpaid seller.

Unit III Lectures:-8 The Negotiable Instruments Act 1881 – Essentials of a Negotiable Instruments, Kinds of Negotiable Instrument, Holder and Holder in Due Course, Negotiation by Endorsements, Crossing of a Cheque and Dishonour of a Cheque.

Unit IV Lectures:-18 The Companies Act 1956 (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.

Text Books

- 1.Pathak, Akhileshwar, (2009), Legal Aspects of Business, 4th Edition, McGrawHill Education.
- 2.Kuchhal, M. C., (2006), Business Law, Vikas Publishing House, New Delhi.

Reference Books:

- 1.Singh, Avtar, (2006), Company Law, Eastern Book Co. Lucknow, Bharat Law House, Delhi.
- 2.Bagriyal, Ashok, (2008), Company Law, Vikas Publishing House.
- 3.Kapoor, N. D., (2006), Elements of Mercantile Law, Sultan Chand & Sons, New Delhi.
- 4.A.Ramaiyya, Guide to the Companies Act, 16th edition, Lexis Nexis Butterworths

BA 2210: Taxation Laws

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 Lectures:-12 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 Lectures:-24
Heads of Income – Salary, House Property, Business or Profession, Capital Gains, Other Sources, Clubbing of Income, Deductions Under Chapter VI (related to individuals and firms) Assessment of Individuals and Firms (simple problems).

Unit III Lectures:-6 Relief's, Set off and Carry Forward of Losses, Deduction of Tax at Sources. Payment of Advance Tax.

Unit IV Lectures:-10 Central Sales Tax Act 1956 – Introduction; VAT, Registration of Dealers, Levy and Collection of Tax and Penalties.

Service Tax (Finance Act 1994) –

Note: Assessment Year (Current) Introduction to procedure for Service Tax Return

Text Books

1. Lal, B.B., (2009), Income Tax and Central Sales tax Law and Practice, 30th edition, Pearson Education.
2. Singhanian, V. K and Singhanian, Monica, Students Guide to Income Tax, latest edition, Taxman Publications.

Reference Books

1. Ahuja, Girish and Gupta, Ravi, Systematic Approach to Income Tax, Latest Edition, Bharat Law House.
 2. Datey, V.S., Indirect Taxes-Law and Practice, latest edition, Taxmann Publications.
 3. Government of India, Bare Acts (Income Tax, Service Tax, Excise and Customs)
- Vashisht, Nitin and Lal, B.B., (2009), Direct Taxes: Income Tax, Wealth Tax and Tax Planning, 30th edition, Pearson Education.

CS-2251 : Computer Applications Lab – I

FRONT PAGE

Orientation to the Front Page environment and building web sites

1. Create a new site. Start with a web page using Your Name to name the page. Make it the home page and view the web in navigation and folder. View record your observation.
2. On the home page, give a brief description about yourself & type the following sub heading “qualification”, “Hobbies”, & “Interest”, “Future Plans”, & “Address for communication”
3. Apply the most appropriate theme at the web page and the web site.
4. Apply font and color styles on to your web page and preview.
5. Create a new web page using the Front Page explorer and write your academic and professional qualification. Place a bookmark at an appropriate place and save the page as “qualification”.
6. Link the page, qualification.htm, with the sub-heading “qualification” in the home page.
7. Create a new page using the front page editor and write your hobbies and interest on it. Save the page as

“Hobbies.htm”.

8. Link the page, Hobbies.htm, with the sub-heading “hobbies” & “interest” in the home page.
9. Create a new page and write a few lines on your future plans and save the page as “future plan”.
10. Link the page. Future-plan.htm, with the sub heading “future plan” in the home page.
11. Create a new page, write your address for communication & save the page as “address”
12. Link the page, “address.htm” to the sub-heading “address” for communication page in the page.
13. Interest a navigation bar in the page.
14. Test a I hyperlink in the front page editor and record your observation.

Adding Images and special _____ feature to web

15. Import an image, if it is not available on the local drive. Use cli part on each page and use image to link to the home page.

Make the image brighter and lower the contrast

16. Make the color transparent and assign alternate text with a suitable caption to the image.
17. Open the web page “future.htm” and insert a background sound file into the page.
18. Open the web page “hobbies.htm” and apply animation (as animated GIF) to the image or cli part (if inserted)

Working with tables and frame

19. Open the page, “hobbies.htm” and insert a table of at least column and fire rows, with column and fire rows, with column heading as Name, Address, Phone no and date of Birth. Align the table to the center of the webpage and text flow at center.
20. Enter data into the table and adjust the font as book antiqua and font size as “12”.
21. Insert “Address Book” as caption for the table.
22. Split the column named c e l l phone no into two and name them as “off” and “Resi”

Creating Forms and connecting to the database

23. Open the page, bearing your name and insert a form. Assign the base name as “personal details” and save the file as “personal.txt” format.
24. The form should contain the following fields as mentioned below

Personal Profile

Name:

Address:

Phone_Off:

Phone_Resi:

Mobile:

E-mail:

Fax:

Passport n o.:

Driving License No.: Insurance Policy No: Blood Group:

Credit Cards:

25. Assign a drop down menu for the credit cards fields.
26. Assign a one line text driving license No .

Advanced Topics

27. Open the page, bearing your name and insert marquee to display the message "Welcome to my site".
Open each and every page "apply suitable

BA 2301: Values & Ethics in Business

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 Lectures:-12 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 Lectures:-16 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 Karma Yoga, Nishkam Karma, and Sakam Karma; Total Quality Management, Quality of life and Quality of Work Life.

Unit-III Lectures:-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

Lectures:-12 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., (2009), Business Ethics, 1st edition, Pearson education.
2. Hartman, Laura and Chatterjee, Abha, (2006), Perspectives in Business Ethics, 3rd Edition, McGraw Hill Education.

Reference Books:

1. Chakraborty, S.K., (2004), Ethics in Management: A Vedantic Perspective, Oxford University Press.
2. Kaur, Tripat, (2008), Values & Ethics in Management, Galgotia Publishers.
3. Rao, A.B., (2006), Business Ethics and Professional Values, Excel Book.
4. Manuel G. Velasquez, (2007), Business Ethics Concepts, Prentice Hall of India.

BBA-2302 Sales Management

Objectives: To acquaint the students with the process of personal selling and the strategies and methods for effective sales management.

Course Contents

Unit I

Introduction to Sales Management Nature, Scope and Importance

Lectures :- 14 of
Sales Management, Sales
Objectives, Sales

Unit II

Theories of Selling, SPIN Model, Types of Selling, Transactional and Relationship Selling, Sales Forecasting Methods.

Lectures: - 12 Personal Selling Process,

Unit III

Recruitment and Selection Process, Design, Execution and Evaluation of Sales Force Training, Motivation and Compensation of Sales Personnel, Design and Management of Sales Territories and Quotas.

Lectures: - 16 Sales Force

Unit IV

Sales Budgets, Sales Audits, Legal and Ethical Issues in Sales Management, Role of Information Technology in Sales Management

Lectures: - 10 Evaluation of Sales Personnel,

Text Books

1. Still, K.R., Cundiff, E.W & Govoni, N.A.P "Sales Management – Decision Strategies and Cases., 5th Ed ((2009) Impression), Pearson Education
2. Tanner Jr., J.F., Honeycutt Jr., E. D. and Erffmeyer, R.C. (2009) Sales Management, Pearson Education, New Delhi

Reference Books

1. Donaldson Bill (2007) Sales Management, Principles, Process and Practice Palgrave Macmillan.
2. Havaldar.K.K. & Cavale V.M (2007) Sales and Distribution Management. Text & Cases Tata McGraw Hill Publishing company Ltd. New Delhi.

3. Jobber, David and Lancaster, Geoffery, (2006), Selling and Sales Management, 7th Edition, Pearson Education, New Delhi
- Ingram, LaForge, Avila., CShwepker Jr, Wiliams (2007), Sales Management-Analysis and Decision Making. Thomson South – Western

BBA 2303: Production & Operations Management

Objectives: To develop basic understanding of concepts, theories and techniques of production process and operation management.

Unit I Lectures:-10 Introduction to Operation Management: Basic Concept of Production / Transformation, Types of Transformation

Unit II Lectures:-16 Quality Management & Statistical Quality Control: TQM, Quality Specification, Design Quality, Quality at Source, Zero Defects, Cost of Quality, Continuous Improvement, Benchmarking, Poka –Yokes, Quality Awards; Statistical Quality Control:

Acceptance Sampling, AQL & LTPD, P—Chart, X & R Chart.

Unit III Lectures:-14 Facility Location and Layout: Issue in Facility Location, Plant Location Methods, Factor Rating, Centre of Gravity Methods, Analytic D e l p h i Method, Four Basic Lay Out Formats, Assembly Line Balancing, spl i t t i n g Tasks, Problems in Facility Layout.

Unit IV Lectures:-12 Waiting Line & Inventory Management: Economics of Waiting Line, Queuing System, Four Waiting Line Models along with application: Inventory management and Waiting Line Management, Inventory Models.

Text Books

1. Muhleman, (2008), Production and Operations Management, 6th edition, Pearson Education.
2. B.Mahadevan, (2010), Operations Management, Theory and Practical, Pearson Education.

References Books

1. Kachru, Upender, (2006), Production and Operation Management, Excel Books.
2. Chary, S.N and Paneerselvam R., (2009), Production and Operations Management, McGraw H i l l Education.
3. Stevenson, W. J, (2007), Operations Management, 9th Edition, McGrawH i l l Education.
4. Gaither, Norman and Frazier, G., (2004), Operations Management, 9th Edition, Cengage Learning.
5. CS-3101 : Management Information System
- 6.
7. 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.

8. Course Contents

9. Unit I

Lectures:-12

Introduction: Definition, Purpose, Objectives and Role of MIS in Business Organization with particular reference to Management Levels. MIS Growth and Development, Location of MIS in the Organization – Concept and Design. Transaction Processing System, Decision Support System, Executive Information System, Expert System, and the recent developments in the Field of MIS.

Unit II Lectures:-14 System
Development: Concept of System, Types of Systems – Open, Closed, Deterministic, Probabilistic, etc. Relevance of Choice of System in MIS, Integration of Organization Systems and Information Systems, System Development Life Cycle, System Analysis, Design and Implementation, MIS Applications in Business.

Unit III Lectures:-14 Information
Concepts: Data and Information – Meaning and importance, Relevance of Information in Decision Making, Sources and Types of Information, Cost Benefit Analysis – Quantitative and Qualitative Aspects, Assessing Information Needs of the Organization.

Unit IV Lectures:-12 Information
Technology: Recent Developments in the Field of Information Technology: Multimedia Approach to Information Processing. Decision of Appropriate Information Technology for proper MIS. Choice of Appropriate IT Systems – Database, Data warehousing & Data mining Concepts, Centralized and Distributed Processing.

Text Book

- 1.Laudon and Laudon, (2010), Management Information System, 11 th edition, Pearson Education.
- 2.Sadagopan, S., (2009), Management Information Systems, Prentice Hall of India.

Reference Books

- 1.LM Prasad, (2008), Management Information System, Sultan Chand.
- 2.Arora, Ashok and Akshaya Bhatia, (2009), Information Systems for Managers, Excel Books, New Delhi.
- 3.McLeod, Raymond, (2008), Management Information System, Pearson Education.
- 4.Goyal, D.P., (2008), Management Information Systems-Managerial Perspectives, 2nd Edition, Macmillan, New Delhi.

BA-136 A- Principles of Insurance

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

Lectures:15

Insurance Fundamentals: Origin of Insurance, concepts, meaning of insurance, definition, nature, functions, history of insurance and different classifications; comparison of life insurance with other insurances.

UNIT-II

Lectures: 20

Basic Principles of Insurance: Key concepts, economic principles, principles of insurance viz. Utmost good faith, insurable interest, indemnity, subrogation, contribution and proximity cause.

UNIT-III

Lectures: 20

Insurance Market and organizational structure, functional processes, distribution channels

(traditional and alternate), types of insurances, various forms in use, policy forms and their construction, parts, terms/conditions, exclusions, clauses, memos, riders and warranties.

UNIT-IV

Lectures: 15

Rating practices, premium payment regulations, claim procedure & management, survey & assessment (types, methods and functions involved).

Text Books:

1. Gupta, P.K, (2010) Insurance & Risk Management, Himalaya Publishing House, Delhi.
2. Principles of Insurance (I.C.01) (Insurance Institute of India, Mumbai)

Reference Books:

1. PravaNalini, (2009), Insurance : Theory & Practice, Prentice Hall of India Pvt Ltd, New Delhi
2. Practice of General Insurance (I.C.11) (Insurance Institute of India, Mumbai)
3. Practice of Life Insurance (I.C.02) (Insurance Institute of India, Mumbai)
4. Mittal, Alka, (2009) Principles of Insurance & Risk Management, Sultan Chand & Sons, New Delhi

BA-2304: Financial Management

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

Lectures:-16

Financial

Management: Meaning, Scope, Objectives of Financial Management, And Profit Vs. Wealth Maximization. Financial

Management and other Areas of Management, Liquidity Vs Profitability, Methods of Financial Management, Organization of Finance Function.

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. Concept in Valuation: Time Value of Money, Valuation Concepts, Valuation of Securities viz., Debentures, Preference shares and Equity Shares.

Unit II Lectures:-12 Capital Structure: Meaning, Capital Structure and Financial Structure, Patterns of Capital Structure, Optimum Capital Structure, Capital Structure Theories, Factors Determining Capital Structure, Capital Structure Practices in India.

Cost of Capital: Concept, Importance, Classification and Determination of Cost of Capital. Leverages: Concept, Types of leverages and their significance.

Unit III Lectures:-12 Capital Budgeting: Concept, Importance and Appraisal Methods: Pay Back Period, DCF Techniques, Accounting Rate of Return, Capital Rationing, Concept of Risk, Incorporation of Risk Factor, General Techniques: Risk Adjusted Discount Return, Certainty Equivalent Coefficient and Quantitative Techniques: Sensitivity Analysis, Probability assignment, Standard Deviation, Coefficient of Variation, Decision Tree.

Unit IV Lectures:-12 Working Capital Management: Operating cycle, Working Capital Estimation, Concept, Management of Cash, Inventory Management, Management of Accounts Receivable and Accounts Payable, Over and Under Trading.

Dividend, Bonus and Rights: Dividend Policy, Relevance and Irrelevance Concepts of Dividend, Corporate Dividend Practices in India.

Text Books: -

.Khan M.Y, Jain P.K., (2010), Financial Management, 3rd edition, McGrawHill Education.2.Maheshwari S.N., (2009), Financial Management- Principles and Practice, 9th Edition Sultan Chand & Sons.

Reference Books: -

- 1.Kapil, Sheeba, (2010), Financial Management, 1st edition, Pearson Education. 2.Burk Demazo, (2010), Financial Management, Pearson Education.
- 3.Ross, Stephen,Westerfield, R., and Jaffe, J.,(2004), Corporate Finance, 7th Edition, McGraw Hill Education.
- 4.Pandey I. M., (2007), Financial Management, Vikas Publishing House

BA 1391: Summer Training Report & Viva Voce

Each student shall undergo practical training of eight weeks during the vacations after fourthsemester in an approved business / industrial / service organization and submit at least twocopies of the Summer Training

Report to the Director / Principal of the Institution within two weeks of the commencement of the Fifth Semester. 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 Board of Examiners to be appointed by the Director / Principal of the Institution. This internal Board of Examiners shall comprise of a minimum of two Internal Faculty Members. The project is given to the student, so that they can experience the practical knowledge and being trained & ready to face the market risk.

2. Maheshwari, S.N., (2009), Management Accounting & Financial Control, 14th edition, Sultan Chand & Sons.

Reference Books

1. Chandra, Prasanna, (2009), Projects: Planning, Analysis, Financing, Implementation and Review, 7th edition, McGraw Hill Education.
2. Choudhury, S, (2007). Project Management, 1st Edition, Tata McGraw Hill Publishing Company.
3. Bhavesh, M. Patel (2009). Project Management: Strategic Financial Planning Evaluation and Control, Vikas Publishing House Pvt. Ltd.
4. Panneerselvam, R., and Senthilkumar, P., (2007), Project Management, Prentice Hall of India.

CS-3151 : Computer Applications Project

A group of 4 students would be allotted with any IT Application Database Project. The Project would be based on any Front-end and Backend Concept. The project is given to the student, so that they can experience the practical knowledge and being trained & ready to face the market risk.

LINGAYA'S UNIVERSITY, FARIDABAD

BBA-MBA(I)

BA-2313 INTERNATIONAL BUSINESS MANAGEMENT

Objectives: The basis objective of this course is to provide understanding to the students with the global dimensions of management.

Course Contents

UNIT I

Lectures:-14

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, Impact of Globalization

UNIT II Lectures:-12

Globalization: Technology and its Impact, Enhancing Technological Capabilities, Technology Generation, Technology Transfer, Diffusion, Dissemination and Spillover, Rationale for Globalization, Liberalization and Unification of World Economics, International Business Theories, Trade Barriers - Tariff and Non Tariff Barriers.

UNIT III Lectures:-12

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 Lectures:-14

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. Sharan, (2010), International Business, 2nd edition, Pearson Education.
2. Tamer, Cavusgil, Gary, Knight, (2010), International Business: Strategy, Management and the New Realities, 1st Edition, Pearson Education.

Reference Books

1. Sinha P.K, (2008), International Business Management, Excel Book
2. K. Aswathappa, (2008), International Business, McGraw Hill Education.
3. Hodgetts, R., Luthans, F., Doh, Jonathan., (2008), International Management: Culture, Strategy and Behaviour, Pearson Education.
4. Deresky, (2010), International Management: Managing Across Borders and Culture, Pearson Education.

BA-2314 PROJECT REPORT AND VIVA VOCE

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. 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 will be submitted at least four weeks prior to the commencement of the End Term

Examination of the Sixth Semester. Project Report shall carry 100 marks. These shall be evaluated by an External Examiner appointed by the University for 50 marks and for the rest of the 50 marks by an Internal Board of Examiners to be appointed by the Director / Principal of the Institution. This internal Board of Examiners shall comprise of a minimum of two Internal Faculty Members.

Sixth Semester Examination

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBA)

EN-427A

ADVANCED BUSINESS COMMUNICATION

Objective : The subject aims to strengthen and transform the communication ability of the students to nurture their business communication skills like verbal, written, presentation skills thus developing their holistic personality which will aid in better performance, developing managerial capacity.

UNIT 1: Comprehensive Communication & Presentation Skills

Principles of communication, Barriers of Communication. Removing the barriers. Difference between Verbal & Non-Verbal communication. Reading, Writing, Speaking and Listening Skills. Presentation Skills, effective Presentation, tools of presentation, oral presentation skill, removal of stage fear. Activities based on PowerPoint Presentation. Self introduction in front of the Interview board; Public speaking tips; Humorous speech

UNIT 2: Developing Communication Effectiveness & Personality Projection

Fluency Enhancement Game/Activities. Team Building skill, Leadership skill development. Body language in GD; Types of GD. Mock Group Discussion. Expressing opinions & disagreements; GD in the selection process; Creative Brainstorming.

UNIT3: Current Affairs & Internal Communication:- Meeting- Need and importance of Meeting. Role of the chairperson.; Agenda; Minutes; Notice; Memo; Memorandum; Circular, Role of the chairperson, Role of the Participants.

Fusion of Management, Technology and ICT, Case studies & Analysis, Case discussion & Presentation.

UNIT 4: Professional Writing -

CV & Job application; Covering letter; Inquiry, Order, Credit and Status enquiry; Complaints, Claims, Adjustment and Collection.

UNIT 5: Corporate communication & Aptitude Development:- Improving Mathematical Acumen, Logical & Analytical Reasoning, Voice Modulation, Public Relations(PR); Tools of PR; External and Internal Measures of PR

TEXT BOOKS:

Pal Rajender, Korlahalli, "Essentials of Business Communications" S.Chand and Sons

2. Lesikar, Pedit, "Business Communication and Managerial skills, All India Book Travellers

REFERENCE BOOKS:

1. Flatley, Lesikar " Basic Business Communication skills for empowering the internet generation", All India Traveller booksellers

2. Hewing Martin, "Advanced Business Communication ", Cambridge University Press

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBA)

BA 2310: Business Policy & Strategy

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 Lectures:-14 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 Lectures:-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.

Unit III Lectures:-12 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.

Unit IV Lectures:-14 Formulation of
Strategy: Approaches to Strategy formation; Major Strategy options – Stability, Growth and Expansion, Diversification, Retrenchment, Mixed Strategy; Choice of Strategy – 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: Organization Structure; Leadership and Resource Allocation.

Pal Rajender, Korlahalli, "Essentials of Business Communications" S.Chand and Sons

2. Lesikar, Pedit, "Business Communication and Managerial skills, All India Book Travellers

REFERENCE BOOKS:

1. Flatley, Lesikar "Basic Business Communication skills for empowering the internet generation", All India Traveller booksellers

2. Hewing Martin, "Advanced Business Communication", Cambridge University Press

BA 2310: Business Policy & Strategy

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 Lectures:-14 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 Lectures:-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.

Unit III Lectures:-12 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.

Unit IV Lectures:-14 Formulation of
Strategy: Approaches to Strategy formation; Major Strategy options – Stability, Growth and Expansion, Diversification, Retrenchment, Mixed Strategy; Choice of Strategy – 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: Organization Structure; Leadership and Resource Allocation.

Text Books

- 1.Kazmi, Azhar, (2008), Strategic Management and Business Policy, 3rd Edition, McGrawHill Education.
- 2.Ghosh, P. K., (2006), Strategic Planning and Management, 8th Edition, Sultan Chand & Sons, New Delhi.

Reference Books

Walker, Gordon, (2005), Modern Competitive Strategy, 1st Edition, McGraw Hill Education

1. Weelen, (2009), Concepts in Strategic Management and Business Policy, 12th edition, Pearson Education.
2. Fred, David, (2008), Strategic Management: Concepts and Cases, 12th Edition, Prentice Hall of India

Appar Rao C, (2008), Strategy Management and Business Policy, Excel Book

BA-2311 PROJECT PLANNING AND EVALUATION

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

Lectures:-18

Project Planning Overview: Capital Investments: Importance and Difficulties, Types of Capital Investments, Phases of Capital Budgeting, Levels of Decision Making, Facets of Project Analysis, feasibility Study, Objectives of Capital Budgeting, Techniques of Capital Budgeting.

Capital Allocation Framework: Financing of Projects: Capital Structure, Mean of Financing, Equity Capital, Preference Capital, Internal Accruals, Term Loans, Debentures, Working Capital Requirement and its Financing, Miscellaneous Sources, Raising Venture Capital, Raising Capital In International Markets.

Cost of Project, Estimates of Sales and Production, Cost of Production, Profitability Projections, Projected Cash Flow Statement, Projected Balance Sheet

UNIT-II

Lectures:-12 Market and Demand

Analysis: Conduct of Market Survey, Characterization of Market, Demand Forecasting, Uncertainties in Demand Forecasting, Market Planning Technical Analysis: Manufacturing Process/ Technology, Technical Arrangements, Product Mix, Plant Capacity, Location and Site,

UNIT-III

Lectures:-16 Project Management:

Forms of Project Organization, Project Planning, Project Control, Human Aspects of Project Management, Network Techniques: Development of Project Network, Time Estimation (Simple Practical Problem with EST, EFT, LST, LFT, Total Float), Determination of the Critical Path, Scheduling when Resources are limited, PERT Model, CPM Model (Simple Practical Problem of Crashing), Network Cost System. Project Review and Administrative Aspects: Control of In- Progress Projects, Post Completion Audits,

Unit IV

Lectures:-6 Risk and Analysis

Uncertainty: Using Sensitivity, Simulation, Decision and Other Techniques

Text Books

1. Pinto, (2009), Project Management, 1st edition, Pearson
2. Maheshwari, S.N., (2009), Management Accounting & Financial Control, 14th edition, Sultan Chand & Sons.

Reference Books

1. Chandra, Prasanna, (2009), Projects: Planning, Analysis, Financing, Implementation and Review, 7th edition, McGraw Hill Education.
2. Choudhury, S, (2007). Project Management, 1st Edition, Tata Mc Graw Hill Publishing Company.
3. Bhavesh, M . Patel (2009). Project Management: Strategic Financial Planning Evaluation and Control, Vikas Publishing House Pvt. Ltd.

4. Panneerselvam, R., and Senthilkumar, P., (2007), Project Management, Prentice Hall of India.
BA-2312 Entrepreneurship Development

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 Lectures:-12 Introduction: The Entrepreneur: Definition, Emergence of Entrepreneurial Class; Theories of Entrepreneurship.

Unit II Lectures:-12 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 III Lectures:-14 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 Lectures :-14

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.

BA-2313 INTERNATIONAL BUSINESS MANAGEMENT

Objectives: The basis objective of this course is to provide understanding to the students with the global dimensions of management.

Course Contents

UNIT I Lectures:-14 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, Impact of Globalization.

UNIT II Lectures:-12
Globalization: Technology and its Impact, Enhancing Technological Capabilities, Technology Generation, Technology Transfer, Diffusion, Dissemination and Spillover, Rationale for Globalization, Liberalization and Unification of World Economics, International Business Theories, Trade Barriers- Tariff and Non Tariff Barriers.

UNIT III Lectures:-12
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 Lectures:-14
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. Sharan, (2010), International Business, 2nd edition, Pearson Education.
2. Tamer, Cavusgil, Gary, Knight, (2010), International Business: Strategy, Management and the New Realities, 1st Edition, Pearson Education.

Reference Books

1. Sinha P.K, (2008), International Business Management, Excel Books.
2. K. Aswathappa, (2008), International Business, McGraw Hill Education.
3. Hodge ts, R., Luthans, F., Doh, Jonathan., (2008), International Management: Culture, Strategy and Behaviour, Pearson Education.
4. Deresky, (2010), International Management: Managing Across Borders and Culture, Pearson Education.

BA-2314 PROJECT REPORT AND VIVA VOCE

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. 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 floppy will be submitted at least four weeks prior to the commencement of the End Term

Examination of the Sixth Semester. Project Report shall carry 100 marks. These shall be evaluated by an External Examiner appointed by the University for 50 marks and for the rest of the 50 marks by an Internal Board of Examiners to be appointed by the Director / Principal of the Institution. This internal Board of Examiners shall comprise of a minimum of two Internal Faculty Members.

Project report help the student to explore themselves and practically experience the things in the market. It makes them more competent and strong to handle the situation.

CE- 2301 ENVIRONMENTAL SCIENCE

Objectives

1. To gain an understanding of the concepts fundamental to environmental science
2. To understand the complexity of ecosystems and possibly how to sustain them
3. To understand the relationships between humans and the environment.
4. To understand major environmental problems including their causes and consequences.
5. To understand current and controversial environmental issues and possible solutions to environmental problems and their pros and cons.
6. To understand how social issues and politics impact the environment.

COURSE CONTENTS

Unit I Lectures-14 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, Stockholm Conference on Environment, 1972 and Agenda 21. International Protocols, WTO, Kyoto Protocol, International Agreement on Environmental Management.

Unit II Lectures-16 Pollution and Public Policy

Water Pollution: Water Resources of India, Hydrological Cycle, Methods of Water Conservation and Management, 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.

Solid Waste: Management – and Various Method Used, Composting, LandFill Sites etc. Hazardous Waste Management, Biomedical Waste Management.

Unit III Lectures-16 Environmental
Impact Assessment (EIA) and Environmental Management System (EMS): Introduction to EIA, its Impact, Notification of MOEF, Introduction to ISO 9000 and 14000 Standards,

Introduction to Indian Environmental laws: Legal framework: , the Indian Penal Code, Role of Judiciary in Environmental Protection, Wild Life (Protection) Act, 1972, Water (Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution) Act, 1981, Delhi Environment Law.

UNIT IV Hours 6 Field work / Case
Studies:

Visit to a related site – river / urban / rural or industrial and demonstration project including water bodies.

Text Books

1. Basat, A., (2008), Environment Studies, Pearson Education.
2. Nath, Manju, (2008), Environment Studies, Pearson Education.

Reference Books

1. Sayre, Don., Inside ISO 14000- The Competitive Advantage of Environmental Management, St Lucie Press Delray Beach, Florida
2. Gupta N.C., (2006), Social Auditing of Environmental Law in India, edited book, New Century Publications.
3. Divan, Shyam and Rosen Ceranz, Armin, (2007), Environmental Law and Policy in India, Cases, materials and statutes, Oxford University Press.
4. Bowles, Ian A. and Glenn T. Prickett, (2001), Footprints in the Jungle: Natural Resource Industries, Infrastructure and Biodiversity Conservation, Oxford University Press.

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, Ansoff'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.
5. **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

3. Kazmi, Azhar, Business Policy and Strategic Management, Tata McGraw Hill Publishing Company Ltd. New Delhi
4. 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.

BA-202A	OPERATIONS RESEARCH
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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. Panerselvam, 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.
5. Sharma, J.K., Operations Research: Theory and Applications, Macmillan India Ltd, New Delhi.
6. Kalavathy, Operations Research, Vikas Publishing House, New Delhi .

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.

BA- 264A	Managerial Skills
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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 .

BA-305A	PERFORMANCE MANAGEMENT
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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 operationalizing 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

5. Aguinis, Herman, “Performance Management”, Pearson Education
6. Sahu, R.K., “Performance Management System”, Excel Books, New Delhi
7. Cardy, Robert L, “Performance Management: Concepts, Skills and Exercises”, Prentice Hall of India, New Delhi.

Kandula, Srinivas R, "Performance Management", Prentice Hall of India, New Delhi

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

BA-306A	TRAINING AND DEVELOPMENT
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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 conselere 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 PERSECTIVE:** Emerging trends in training and development; new perspectives on training – cross cultural training, and knowledge management.

REFERENCE BOOK

2. 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

BA-307A	ORGANIZATIONAL CHANGE AND DEVELOPMENT
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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

4. Cummings, Christopher, "Organization Development and Change", Thomson Learning
5. Chowdhury, Subir, "Organization 21C", Pearson Education
6. French, Wendell, Bell, "Organization Development", New Delhi

BA-308A	COMPENSATION MANAGEMENT
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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, RandD 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

4. Milkovich, George T and Newman J.M., "Compensation", Tata McGraw Hill
5. Martocchio, J.J., "Strategic Compensation", Pearson Education
6. Armstrong, M and Murlis, H, "Reward Management", Kogan Page, UK
Henderson, R.O., "Compensation Management", Pearson Education

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

3. Khan, M.Y., "Indian Financial System", Tata McGraw Hill, New Delhi
4. Bhole, L.M., "Financial institutions and Markets", Tata McGraw Hill, New Delhi
3. Khan, M.Y., "Financial Services", Tata McGraw Hill, New Delhi
4. Machiraj, HR, Indian Financial System, Vikas Publishing House Pvt. Ltd. New-Delhi
5. Vasant Desai, The Indian Financial System, Himalaya Publishing House, New-Delhi

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBA)

BA-310A	PROJECT MANAGEMENT AND INFRASTRUCTURE FINANCE
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COURSE OBJECTIVE:

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

Note:

1. Instructions for External Examiner: The question paper shall be divided in two sections. Section 'A' shall comprise of eight short answer type questions from whole of the syllabus carrying two marks each, which shall be compulsory. Answer to each question should not exceed 50 words normally.
2. Section 'B' shall comprise 8 questions (2 questions from each unit). The students will be required to attempt four questions selecting one question from each unit.
3. All questions will carry equal marks.

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

4. Drury, Colin, "Management Accounting and Control", Thomson Learning
5. Hansen and Mowen, "Cost Management", Thomson learning
6. Kaplan, Atkinson, "Advanced Management Accounting", Pearson Learning
Horngren, Datar Foster, "Cost Accounting", Pearson Education

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

3. Madura, Jeff, "International Financial Management", Thomson learning
 4. 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

LINGAYA'S
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UNIVERSITY

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

4. Chance, Don M., “An Introduction to Derivatives and Risk Management”, Harcourt College Publishing
 5. Hull, John C., “Futures and other Derivatives Securities”, Prentice Hall India, New Delhi
 6. 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

LINGAYA’S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

BA-317A	FOREIGN EXCHANGE MANAGEMENT
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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, TransportDocuments,

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

BA-318A	INTERNATIONAL MARKETING
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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

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

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

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

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; exportsubsidies, countervailing duties and dumping; effects of a quota,International economic integration – formsand levels; trade creating and trade diverting effects of a custom union; repercussions of regional economicgroupings on the strategy of international marketers

Unit-III

Components of international trade policy; export promotion strategies; import substitution; rationale andworking of free trade zones; assessing export potential for specific products in specific markets.

Unit-IV

Logic ofstate 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 incentivesfor exporters.

Unit-V

Import control regime; impact of WTO provisions on trade policy; overall assessment ofIndia's trade policy.

Suggested Readings:

1. Krugman, Paul R. and Maurice Obstfeld, International Economics: Theory and Policy, Pearson Education, Delhi
- . 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

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBI)

BA-321A

BRAND MANAGEMENT

OBJECTIVE

To introduce the concept of branding and brand management with special emphasis on developing brand Equity

6. **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.
7. **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.
8. **LEVERGING 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.
9. **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.
10. **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

4. Kapferer, Jean Noel, "Strategic Brand Management", Kogan Page, New Delhi
5. Kapoor, Jagdeep, "24 Brand Mantras", Sage Publication, New Delhi
6. 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

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBA)

BA-322A	INTEGRATED MARKETING COMMUNICATION
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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.

2. 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.

2. 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 Foote, Cone and Belding (FCB) Model

3. 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.

4. 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

5. 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

5. Belch, George and Belch, Michael, "Advertising and Promotion", Tata McGraw Hill, New Delhi
6. Duncan, Tom, "Principles of Advertising and IMC", Tata McGraw Hill, New Delhi
7. Jethwaney, Jaishree and Jain, Shruti, "Advertising Management", Oxford University Press, New Delhi
8. Wells, William, Brunett, John and Moriarty, Sandra, "Advertising Principles and Practice", Pearson Education, New Delhi.

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. **SERVICEPRODUCT 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 BOOKS

6. Lovelock, Christopher, Wirtz, Jocken and ChatterjeeJayanta, "Services Marketing – People Technology, Strategy"" Pearson Education, New Delhi
 7. Zeithaml, Valarie A. and Bitner, Mary Jo, "Services Marketing–Integrating Customer Focus Across The Firm", Tata McGraw Hill, New Delhi
 8. Rao, K. Rama Mohana, "Services Marketing", Pearson Education, New Delhi
 9. Hoffman and Bateson, "Essentials of Service Marketing", Thomson Asia Ptc. Ltd., New Delhi
 10. Rampal, M.K. and Gupta, S.L., "Services Marketing", Galgotia Publication, New Delhi
- Harsh Verma, " Service Marketing", Tata Mcgraw.

BA- 324A	CONSUMER BEHAVIOUR
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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 its 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 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

4. Blackwell, Roger, Miniard, Paul and Engel, James, "Consumer Behaviour", Thomson Learning, New Delhi
5. Solomon, Michael R, "Consumer Behaviour – Buying Having and Being", Pearson Education; New Delhi
6. 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.

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBI)

BA-212A	E-COMMERCE
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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
4. Electronic Commerce: Opportunities and Challenges by Syed MahbuburRahman, Mahesh Raisinghani, Publisher: Idea Group

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

EN-214

MANAGERIAL COMMUNICATION

OBJECTIVES: The course is aimed at equipping the students with necessary techniques and skills of communication to inform others inspire them and enlist their activity and willing cooperation in the performance of their jobs.

1. COMMUNICATION IN BUSINESS: Importance of Communication Forms of Communication, -- Communication Network of the Organization, Process of Communication: Different Stages, Difference between Oral & Written Communication.

2. ORAL COMMUNICATION: Fundamentals of Oral Communication: Introduction, Barriers and Gateways in Communication, Listening, Feedback, Telephonic Messages, Public Speaking and Presentation of Reports, PowerPoint Presentation, Body Language

BODY LANGUAGE: Facial Expressions, Non-verbal Communication, emotional Intelligence, Creativity in Oral Communication, Persuasive Communication, Communication through organizing various events like conferences, committee meetings, press meets, seminars, fests and the like

3. REPORT WRITING: Writing an Effective Report, Stages of Writing, Composing Business Messages, Style and Tone, Five Ws and one H of Report Writing, Planning and Types of Reports, Divisions, Numbering and use of Visual Aids, Creativity in Written Communication, Use of Pictures, Diagrams in Written Communication.

BUSINESS COMMUNICATION: Writing Commercial Letters, Business Letter Format, Types of Letters - Routine Business Letters, Sales Letters, Resume and Job Applications

4. BUSINESS MEMOS eMail Messages, Proposals, Technical Articles, Telegrams, Telex Messages, and Facsimiles, Electronic Mail, Handling a Mail, Maintaining a Diary, Legal Aspects of Business Communication, and Negotiation Skills.

5. ROUTINE CORRESPONDENCE:-- Circulars, Drafting Notices, Handling Complaints, Evaluating Interview Performance, Articles, Formal Invitations, -- Proforma for Performance Appraisals, Letters of Appointment, Captions for Advertising, Company Notice related Shares, dividends, MoA, AoA, Annual Reports, Minutes of Meetings, Action taken on Previous Resolution.

SUGGESTED BOOKS:

1. Scot Ober, Contemporary Business Communication, Biztantra
2. Bovee, Thill & Schatzman, Business Communication Today, Pearson
3. Nageshwar Rao and Rajendra Das, Business skills, HPH
4. Mary Ellen Guffy, Business Communication, Thomson
5. M Ashraf Rizvi, Effective Technical Communication, TMH
6. Meenakshi Raman and Sangeeta Sharma, Technical Communication, Oxford
7. Micheal Osborn and Suzanne Osborn, Public Speaking, Biztantra
8. John Seely, Oxford Writing and Speaking, Oxford
9. Parag Diwan, Business Communication, EB

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

BA-405A	TALENT MANAGEMENT
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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 brendly 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

BACHELOR OF BUSINESS ADMINISTRATION (BBI)

BA-406A	INDUSTRIAL RELATIONS AND LABOR LEGISLATIONS
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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

5. Ramaswamy, E., "Managing Human Resources", Oxford University Press, New Delhi

6. Monappa, A., "Managing Human Resources", Tata McGraw Hill, New Delhi
7. Dutta, S.K., "Guide to Disciplinary Action", Tata McGraw Hill, New Delhi.
8. Venkataratnam, Sinha, "Trade Union Challenges at the Designing of 21st Century". Excel Books, New Delhi.
5. Venkataratnam, "Industrial Relations", Oxford University Press, N.Delhi.

BACHELOR OF BUSINESS ADMINISTRATION (BMI)

BA-407A	STRATEGIC HUMAN RESOURCE MANAGEMENT
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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

4. Agarwala, Tanuja, "Strategic Human Resource Management", Oxford University Press, New Delhi
5. Mello, Jeffrey A., "Strategic Human Resource Management", Thomson Learning Inc.
6. Greer, Charles, "Strategic Human Resource Management", Pearson Education

BA-408A	CROSS-CULTURAL HUMAN RESOURCE MANAGEMENT	L T P	Cr
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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.

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

4. Holt, David H, "International Management–Text and Cases", Dry Den Press, Thomson Learning, Bombay
5. Peter, J., Dolling, Danice, E. Welch, "International Human Resource Management", Thomson learning – Excel books
6. Cullen, "Multinational Management", Thomson Learning Bombay
4. Harzing and Van Ruysseveldt, "International Human Resource Management", Sage Publication, New Delhi

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

BA-120A	INTERNATIONAL BUSINESS
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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.

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

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.

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

2. Singhania, V.K. and Singhania, Kapil, "Direct Taxes Law and Practices", Taxman Publications
2. Mehrotara and Goyal, "Income Tax Law and Practice", SahityaBhawan Pub. Agra.

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BACHELOR OF BUSINESS ADMINISTRATION (BBI)

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

2. Shekhar, K.C. and Shekhar, Lekshmy, "Banking Theories and Practices", Vikas Publication
2. Risk management, "Indian Institute of banking and Finance", McMillan Publisher

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBI)

BA-411A	SECURITY ANALYSIS and PORTFOLIO MANAGEMENT
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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 cost-prices securities & variables income security, fundamental & technical analysis.

3. **PORTFOLIO:** 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

4. Reiley and Brown, "Investment Analysis and Portfolio Management", Thomson Learning, Bombay
5. Sharpe, Alexander and Wiley, "Investment", Prentice Hall of India, New Delhi
6. Alexander, Gordon 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

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBI)

BA-417A	GLOBAL STRATEGIC MANAGEMENT
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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

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBI)

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

4. Govt of India, An Overview of Customs ,Commissionate of Customs and ICDs, New Delhi

5. Govt. of India, Ministry of Commerce and Industry – Handbook of Procedure, Govt. of India, New Delhi.

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.

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBI)

BA-421A	CUSTOMER RELATIONSHIP MANAGEMENT
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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

3. Dyche, Jill, "The CRM Handbook", Pearson Education, New Delhi
4. Sheth, Jagdish N, "Customer Relationship Management", Tata McGraw Hill
- Greenberg, Paul, "CRM at The Speed of Light", Tata McGraw Hills, New Delhi

BA-422A	ADVERTISING MANAGEMENT
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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

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BBI)

BA-423A	RETAIL MANAGEMENT
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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.

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

4. Pradhan, Swapna, "Retailing Management", Tata McGraw Hill, New Delhi
5. Berman, Barry and Evans, Joel R., "Retail Management-A Strategic approach", Pearson Education/Prentice Hall of India, New Delhi
6. 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

BA-424A	SALES AND DISTRIBUTION MANAGEMENT
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OBJECTIVE

The Objective of paper is two acquaint the students about selling process, designing the distribution channels, distribution logistics etc.

5. **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.
6. **SALES FORCE MANAGEMENT:** Recruitment and selection of salesperson, compensation and motivation of sales force; training of sales force, performance evaluation, Monitoring and performance evaluation.
7. **SALES CONTROL:** sales displays; sales territories; sales budget; sales quota; types of sales quota, sales meetings & contest; controlling of evaluation, controlling the sales effort.
8. **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. Havaladar, "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

BA 256A: PROJECT

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 within two weeks of the commencement of the Fifth Semester. 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 Board of Examiners to be appointed by the Director / Principal of the Institution. This internal Board of Examiners shall comprise of a minimum of two Internal Faculty Members. The project is given to the student, so that they can experience the practical knowledge and being trained & ready to face the market risk.

BACHELOR OF BUSINESS ADMINISTRATION (BMA)

BA-2312	ENTREPRENEURSHIP DEVELOPMENT
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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.

6. **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
7. **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
8. **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
9. **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.
10. **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
- 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. Jersy.
5. Lall, Mahurima and Shikha, Entrepreneurship, Excel Book, N. Delhi

LINGAYA'S UNIVERSITY, FARIDABAD
BACHELOR OF BUSINESS ADMINISTRATION (BMI)

BA-418A	INTERNATIONAL FINANCIAL MANAGEMENT
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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 MARKEITNG:** 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 BUDETING:** 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

5. Madura, Jeff, "International Financial Management", Thomson learning
 6. 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

PD 293A- INTERPERSONAL SKILLS

Objectives

1. To develop the skills of the professional undergraduate students for proper self expression, social communication, spoken English, correct pronunciation, voice modulation and business etiquettes.
2. The students should improve their personality, communication skills and enhance their self-confidence.

Course Contents

Unit-I

Lectures:-12 Fundamental of Grammar and their Usage: How To Improve Command Over Spoken and Written English with Stress on Noun, Verb, Tense and Adjective. Sentence Errors,Punctuation, Vocabulary Building to Encourage the Individual to Communicate Effectively, Common Errors in Business Writing.

Unit-II

Lectures:-14 Introduction to Business Communication: Basic Forms of Communication, Process of Communication, Principles of Effective Business Communication, 7Cs; Media of Communication: Types of Communication: Barriers of Communication (Practical exercise in communication)

Unit-III

Lectures:-14 Business letter writing: Need, Functions and Kinds, Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters, Complaints and Adjustments; Departmental Communication: Meaning, Need and Types: Interview Letters,Promotion. Letters, Resignation Letters, News Letters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, Press Release.

Unit-IV

Lectures:-12 Business Etiquettes and Public Speaking:

Business Manners. Body Language Gestures, Email and Net Etiquettes, Etiquette of the Written Word, Etiquettes on the Telephone, Handling Business Meetings; Introducing Characteristic, Model Speeches, Role Play on Selected Topics with Case Analysis and Real Life Experiences.

Text Books:

1. Boove, C.L.,Thill, J.V., and Chaturvedi,M., (2009) Business Communication Today, Pearson Education.
2. Murphy and Hildebrandt, (2008) Effective Business Communication, McGrawHill Education.

3. BA 1581 A: MAJOR PROJECT & INTERNSHIP

4. 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 within two weeks of the commencement of the Fifth Semester. 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 Board of Examiners to be appointed by the Director / Principal of the Institution. This internal Board of Examiners shall comprise of a minimum of two Internal Faculty Members. The project is given to the student, so that they can experience the practical knowledge and being trained & ready to face the market risk.

5.

6. LINGAYA'S UNIVERSITY, FARIDABAD
BBA-MBA(I)

7. CS-3151 : Computer Applications Project

8. A group of 4 students would be allotted with any IT Application Database Project. The Project would be based on any Front-end and Backend Concept. . The project is given to the student, so that they can experience the practical knowledge and being trained & ready to face the market risk.



Scheme for B.Com (Hons.)

B.Com (Hons.)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM-101	Financial Accounting	6	0	0	6
2	BCOM-102	Management Principles and Organization Behavior	6	0	0	6
3	BCEN-101	English	2	0	0	2
4	BCCS-101	Introduction to Information Technology	6	0	0	6
5	BCCS-151	Computer Lab	0	0	6	3
6	PD-193	Corporate & Social Skills	0	1	0	1
7	PD 191	Co-Curricular Activities	0	1	0	1
Total			20	2	6	25

B.Com (Hons.)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM-106	Micro Economics-I	6	0	0	6
2	BCOM-108	Corporate Accounting	6	0	0	6
3	BCOM-107	Corporate Laws-I	6	0	0	6
4	BCOM-109	Macro Economics-I	6	0	0	6
5	PD 193	PDP	0	1	0	1
Total			24	1	0	25

B.Com (Hons.)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM-212A	Human Resource Management	6	0	0	6
2	BCOM-213A	Income-tax Law and Practice	6	0	0	6
3	BCOM-111A	Business Law	6	0	0	6
4	BCMA-201A	Business Statistics	6	0	0	6
5	BCCS-201A	E-Commerce	4	0	0	4
6	PDP 201	PDP	0	1	0	1
Total			28	1	0	29

B.Com (Hons.)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM-113A	Business Communication (Language-English/Hindi/MIL)	2	0	0	2
2	BCOM-215A	Cost Accounting	6	0	0	6
3	BCMA-202A	Business Mathematics	6	0	0	6
4	BCCE-201A	Environmental Studies	2	0	0	2
5	BCOM-216A	Indian Economy	6	0	0	6
6	BCOM-217A	Entrepreneurship	4	0	0	4
7	PD-293A	Interpersonal Skills	0	1	0	1
Total			26	1	0	27

B.Com (Hons.)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM-320A	Principles of Marketing	5	0	0	5
2	BCOM-320A	Fundamentals of Financial Management	5	0	0	5
3	DSE-1	(Choose Any one of Group A)	5	0	0	5
4	DSE-2	(Choose Any one of Group A)	5	0	0	5
5	PDP 492	PDP	0	1	0	1
Total			25	1	0	26

Discipline Specific Elective (DSE) Group A

BCOM -323A. Management Accounting

BCOM -325A. Advertising

BCOM -326A. Banking and Insurance

BCOM -328A .Financial Markets, Institutions and Financial Services

B.Com (Hons.)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BCOM-321A	Auditing and Corporate Governance	5	0	0	5
2	BCOM-322A	Indirect Tax Law	5	0	0	5
3	DSE-3	(Choose Any one of Group B)	5	0	0	5
4	DSE-4	(Choose Any one of Group B)	5	0	0	5
5	PDP 302	PDP	0	1	0	1
Total			20	1	0	21

Discipline Specific Elective (DSE) Group B

BCOM -329A. Fundamentals of Investment

BCOM -330A. Consumer Affairs and Customer Care

BCOM -331A. Business Tax Procedures and Management

BCOM -332A. International Business

BCOM -333A. Industrial Relations and Labour Laws

BCOM -334A.. Business Research Methods and Project Work

Syllabus for B.Com

BCOM 110A-Financial Accounting

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

Lectures: 18

Introduction: Meaning and scope of financial accounting. Objectives, nature and functions. Relationship of accounting with other disciplines - accounting as an information system. Advantages and limitations of accounting, basis of accounting - cash vs. Accrual Accounting principles, concepts and conventions. Introduction to Accounting standards: concept, benefits, procedure for issuing accounting standards in India. Need and significance of International Financial Reporting Standards (IFRS), XBRL.

Unit II

Lectures: 14

Ledger Posting and Trial Balance: Ledger. Posting and preparation of Trial Balance. Capital and Revenue: Classification of Income, Classification of Expenditure, Classification of Receipts. Journal and Subsidiary books of accounts.

Unit III

Lectures: 20

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)

Inventories: Meaning, Valuation and Record systems. Periodic and Perpetual. Methods of Valuation. FIFO, LIFO and Weighted Average - Accounting Standard (AS) - 2 (ICAI).

Final Accounts: Preparation of Financial Accounts of Sole Proprietorship and Partnership Firms from a Trial Balance with adjustments. Preparation of Final Accounts of Non-Profit Organizations. Bank Reconciliation Statement.

Unit IV

Lectures: 18

Consignment and Joint Venture Accounts, Hire Purchase and Instalment Systems.

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.

Accounting for Partnership/LLP Firms: Admission, Retirement and Death of a Partner.

Text Books

1. Tulsian, P.C., (2011), Financial Accounting, S. Chand Publishers, New Delhi, 1st edition.
2. Maheshwari, S.N. and S. K. Maheshwari, (2008), Financial Accounting, Vikas Publishing House, New Delhi.

Reference Books

1. Jain, S.P. and Narang, K.L., (2010), Financial Accounting, Kalyani Publishers, New Delhi.
2. Gupta R.L. Radhaswami, M., (2010), Advance Accountancy Vol. I, Sultan Chand & Sons..
3. Sehgal, Ashok, and Sehgal, Deepak, (2011), Advanced Accounting Part - I, Taxmann Publishers, New Delhi.
4. Narayanaswami, R., (2011), Financial Accounting: A Managerial Perspective, Prentice Hall International, 4th Edition.

BCOM 214A-Management Principle and Application

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:20

Introduction: Concept, Nature, Process and Significance of Management; **Managerial levels, skills, Functions and Roles; Management vs. Administration; Coordination as Essence of Management; Development of Management Thought: Classical, Neo-Classical, Behavioural, Systems and Contingency Approaches; Management and Society: The External Environment, Social Responsibility, and Ethics: An Overview; Managerial Communication; Role of technology in communication.**

Unit II

Lectures:20

Planning: Nature, Scope and Objectives of Planning; Types of plans; Planning Process; Business Forecasting; MBO: Concept, Types, Process and Techniques of Decision-Making.

Organising: Concept, Nature, Process and Significance; Principles of an Organization; Span of Control; Departmentation; Types of an Organization; Authority-Responsibility; Delegation and Decentralization; Formal and Informal Organization.

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.

Unit III

Lectures:16

Individual & Group Behaviour in Organization: Individual Determinants of OB: Perception, Learning, Emotions, Attitudes, Personality, **Stress and Its Implication on Management Practices, Managing emotions in organizations; Structural Dynamics of work groups and Work Teams, Power, Politics, Conflict and Negotiation, Interpersonal Behaviour and Relations; concept of Psychological contract; Transactional Analysis; Organizational commitment; Determinants of Job satisfaction.**

Unit IV

Lectures:14

Organizational Processes: Organizational change, Organizational Culture, innovation and creativity, Strategic change in organisations.

Text Books

1. Nelson, Quick, Khandelwal, (2012), Organisational Behaviour, 2nd edition, Cengage Learning.
2. Robbins, (2009), Fundamentals of Management: Essentials Concepts and Applications, 6th edition, Pearson Education.

Reference Books

1. Koontz, H. (2008), Essentials of Management, McGraw Hill Education.
2. Gupta, C.B. (2008), Management Concepts and Practices, Sultan Chand and Sons, New Delhi.
3. Stoner, Freeman and Gilbert Jr. (2010) Management, 8th Edition, Pearson Education

Mukherjee,K,(2009),PrinciplesofManagement,2ndEdition,McGrawHillEducation.

BCEN101-English

Objective: The objective of this course is to familiarize students about the dynamics of business language and discourse.

Course Content:

UNIT-I

Lectures:20

Remedial Grammar: Parts of Speech, Sentence Structure, Clauses, Tenses, Voices, Narration, Subject-Verb Agreement, Conditional Sentences, Punctuations.

UNIT- II

Lectures:15

Communication: Communication process-idea, made, medium, barriers, remedies; Interpersonal communication-presentations, Group discussions, Interviews, Meetings, Public speaking.

UNIT-III

Lectures:15

Professional

Writing: Types of writing-

Descriptive, Narrative, Discursive, Argumentative, Reflective, Literary etc: Audience analysis; formal correspondence-letters, Reports, Projects/business plans, memorandums, curriculum vitae/Resume.

UNIT-IV

Lectures:20

Value added texts:

- "Life Lessons from Narayana Murthy"-Lecture delivered at New York University.
- "Why We Need Innovation, Not Just Insulation" by Bill Gates
- "Creativity" by Osho
- "My Experiments with Truth" by M.K. Gandhi
- "Fortune at the Bottom of the Pyramid" by C.K. Prahalad

Textbooks:

- Maison, Margaret M. (2010), Examine Your English, Hyderabad: Orient Longman.
- Sharma, R.S. (1999), Technical Writing. Delhi: Radha Publication.

Reference Books

- Wren, P.C., Martin, H. (2007), English Grammar and Composition, S. Chand.
- Sudarsanam, R. (2008), Understanding Technical English. Delhi: Sterling Publishers Pvt. Ltd.
- Gannon, Robert, Ed., (1991), Best Science Writing: Readings and Insights. Hyderabad: University Press (India) Limited.
- M. Alderton Pink, M.A. Pink & S.E. Thomas, (2008), English Grammar and Composition, S. Chand

BCCS101-Introduction to Information Technology

Objectives: This is a basic paper for Commerce students to familiarize with computer and its applications in the relevant fields and expose them to other related papers of IT.

Course Contents

Unit I

Lectures:-20

Basics of Computer and its Evolution: Evolution of Computer, Data, Instruction and Information, Characteristics of Computers, Input-output Devices (Hardware, Software, Humanware and Firmware), Function of Different Units of Computer, Classification of Computers. **Data Representation: Different Number System (Decimal, Binary, Octal and hexadecimal) and their Inter Conversion (Fixed Point Only), Binary Arithmetic (Addition, Subtraction, Multiplication and Division), Computer Memory: Primary Memory, Secondary memory, Magnetic Disks, Optical Disks, Flash Memory, Mass storage devices, NAJ&SAN's.**

Unit II

Lectures:-15

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

Lectures:-20

Operating System Concept: Introduction to DBMS, Structure of a DBMS, Advantages of DBMS, Data Models, E-R Modelling, SQL queries: Select, union; Intersect, except operators, Aggregate operators, creating and altering tables and views, Introduction to MS-Word, Spreadsheets and Graphical Solutions. All Directory Manipulations. Operating system commands.

Unit IV

Lectures:-15

Computer Networks and IT Applications:

Data communication concepts, types of communication media, Concepts of Computer Networks, **Network topologies, Networking devices, OSI model, Internet, Intranet and Extranets; Applications of internet. Information Technology and Society: Indian IT Act, Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel management, Education, entertainment and health, security issues in information technology.**

Text Books & Reference Books

1. ITL, ESL, (2012) Introduction to Infotech, 2nd edition, Pearson Education.
2. Goyal, Anita, (2010) Computer Fundamentals, 1st Edition, Pearson Education.
3. Leonard Leon, (1999), Introduction to Information Technology, Vikas Publishing House.
4. Joseph A. Brady and Ellen F Monk, (2007), Problem Solving Cases in Microsoft and Excel, Fourth Annual Edition, Thomson Learning.

BCOM112AMICROECONOMICS

Course Objective This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations. Course

Learning Outcomes The course introduces the students to the first course in economics from the perspective of individual decision making as consumers and producers. The students learn some basic principles of microeconomics, interactions of supply and demand, and characteristics of perfect and imperfect markets.

Unit-1 Exploring the subject matter of Economics

Why study economics? Scope and method of economics; the economic problem: scarcity and choice; the question of **what to produce, how to produce and how to distribute output; science of economics**; the basic competitive model; prices, property rights and profits; incentives and information; rationing; opportunity sets; economics systems; reading and working with graphs.

Unit-2 Supply and Demand: How Markets Work, Markets and Welfare

Markets and competition; determinants of individual demand/supply; demand/supply schedule and demand/supply curve; market versus individual demand/supply; shifts in the demand/supply curve, demand and supply together; **how prices allocate resources; elasticity and its application; control on prices; taxes and the costs of taxation; consumer surplus; producer surplus and the efficiency of the markets.**

Unit-3 The Households

The consumption decision - budget constraint, consumption and income/price changes, demand for all other goods and price changes; description of preferences (representing preferences with indifference curves); properties of indifference curves; consumer's optimum choice; income and substitution effects; labour supply and savings decision - choice between leisure and consumption.

Unit-4 The Firm and Perfect Market Structure

Behaviour of profit maximizing firms and the production process; short run costs and output decisions; costs and output in the long run. **Imperfect Market Structure:** Monopoly and anti-trust policy; government policies towards competition; imperfect competition. **Input Markets:** Labour and land markets - basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product); demand for labour; input demand curves; shifts in input demand curves; competitive labour markets; and labour markets and public policy.

Readings

1. Karl E. Case and Ray C. Fair, *Principles of Economics*, Pearson Education Inc., 8th Edition, 2007.
2. N. Gregory Mankiw, *Economics: Principles and Applications*, India edition by South Western, a part of Cengage Learning, Cengage Learning India Private Limited, 4th edition, 2007.
3. Joseph E. Stiglitz and Carl E. Walsh, *Economics*, W.W. Norton & Company, Inc., New York, International Student Edition, 4th Edition, 2007.

Paper-BCOM114ACORPORATEACCOUNTING

Duration: 3hrs. Marks: 100 Lectures: 65

Objectives: To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.

Unit1. Accounting for Share Capital & Debentures

12 Lectures

Issue, forfeiture and reissue of forfeited shares: concept & process of book building; Issue of rights and bonus shares; Buy back of shares; Redemption of preference shares; Issue and Redemption of Debentures

Unit2. Final Accounts

9 Lectures

Preparation of profit and loss account and balance sheet of corporate entities, excluding calculation of managerial remuneration, Disposal of company profits

Unit3. Valuation of Goodwill and Valuation of Shares

6 Lectures

Concepts and calculation: simple problem only

Unit4. Amalgamation of Companies

12

Lectures Concepts and accounting treatment as per Accounting Standard: 14 (ICAI) (excluding inter-company holdings). Internal reconstruction: **concepts and accounting treatment excluding scheme of reconstruction.**

Unit5. Accounts of Holding Companies/Parent Companies

12

Lectures Preparation of consolidated balance sheet with one subsidiary company. Relevant provisions of Accounting Standard: 21 (ICAI).

Unit 6. Banking Companies

7 Lectures

Difference between balance sheet of banking and non banking company; prudential norms. Asset structure of a commercial bank. Non-performing assets (NPA).

Unit7. Cash Flow Statement

7 Lectures

Concepts of funds. Preparation of cash flow statement as per Indian Accounting Standard (Ind-AS): 7.

Note:

1. The relevant Indian Accounting Standards in line with the IFRS for all the above topics should be covered.

2. Any revision of relevant Indian Accounting Standard would become applicable immediately.

Suggested Readings:

1. J.R. Monga, *Fundamentals of Corporate Accounting*. Mayur Paper Backs, New Delhi.
2. M.C. Shukla, T.S. Grewal, and S.C. Gupta. *Advanced Accounts*. Vol.-II. S. Chand & Co., New Delhi.
3. S.N. Maheshwari, and S.K. Maheshwari. *Corporate Accounting*. Vikas Publishing House, New Delhi.
4. Ashok Sehgal, *Fundamentals of Corporate Accounting*. Taxman Publication, New Delhi.
5. V.K. Goyal and Ruchi Goyal, *Corporate Accounting*. PHI Learning.

**Jain,S.P.andK.L.Narang.CorporateAccounting.KalyaniPublishers,NewDelhi
Paper-BCOM115A:CORPORATELAWS-I
Duration:3hrs.Marks:100Lectures:65**

Objective: The objective of the course is to impart basic knowledge of the provisions of the Companies Act 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.

UNIT1: Introduction

15 Lectures

Administration of Company Law [including National Company Law Tribunal (NCLT), National Company Law Appellate Tribunal (NCLAT), Special Courts]; Characteristics of a company; lifting of corporate veil; types of companies including one person company, small company, and dormant company; association not for profit; illegal association; formation of company, on-line filing of documents, promoters, their legal position, pre-incorporation contract; on-line registration of a company.

UNIT2: Documents

15 Lectures

Memorandum of association, Articles of association, Doctrine of constructive notice and indoor management, prospectus-shelf and red herring prospectus, misstatement in prospectus, GDR; book-building; issue, allotment and forfeiture of share, transmission of shares, buyback and provisions regarding buyback; issue of bonus shares.

UNIT3: Management

15 Lectures

Classification of directors, women directors, independent director, small shareholder's director; disqualifications, director identity number (DIN); appointment; Legal positions, powers and duties; removal of directors; Key managerial personnel, managing director, manager;

Meetings: Meetings of shareholders and board of directors; Types of meetings, Convening and conduct of meetings, Requisites of a valid meeting, postal ballot, meeting through video conferencing, e-voting.

Committees of Board of Directors - Audit Committee, Nomination and Remuneration Committee, Stakeholders Relationship Committee, Corporate Social Responsibility Committee

UNIT4:

15 Lectures

Dividends, Accounts, Audit: Provisions relating to payment of Dividend, Provisions relating to Books of Account, Provisions relating to Audit, Auditors' Appointment, Rotation of Auditors, Auditors' Report, Secretarial Audit.

Winding Up: Concept and modes of Winding Up.

Insider Trading, Whistle Blowing: Insider Trading; meaning & legal provisions; Whistleblowing: Concept and Mechanism.

UNIT 5: Depositories Law

5 Lectures

The Depositories Act 1996–

Definitions; rights and obligations of depositories; participants issuers and beneficial owners; inquiry and inspections, penalty. Suggested Readings:

1. MC Kuchhal, *Modern Indian Company Law*, Shri Mahavir Book Depot (Publishers), Delhi.
2. GKKapoor and Sanjay Dhamija, *Company Law*, Bharat Law House, Delhi.
3. Anil Kumar, *Corporate Laws*, Indian Book House, Delhi
4. Reena Chadha and Sumant Chadha, *Corporate Laws*, Scholar Tech Press, Delhi.
5. Avtar Singh, *Introduction to Company Law*, Eastern Book Company

6. **BCOM116A**

7. **Macroeconomics**

8. **Duration: 3hrs. Marks: 100 Lectures: 65**

9. **UNIT– I:** Introduction Macro Economics – Concept of Circular Flow of Incomes – National Income Analysis: Concepts and Components – **Methods of Measurement – Difficulties and Limitations in the Estimation of National Income.**

10. **UNIT–**

II: Theories of Income and Employment Keynesian Theory of Income and Employment: Effective Demand – Consumption Function: **Average Propensity to Consume (APC) and Marginal Propensity to Consume (MPC) – Factors Determining Consumption Function – Savings Function: Average Propensity to Save and Marginal Propensity to Save – Concepts of Multiplier and Accelerator**

11.

12. **UNIT–**

III: **Investment & Theories of Interest Rate Capital and Investment:** Types of Investment, Determinants of Level of Investment – Marginal Efficiency of Capital and Marginal Efficiency of Investment, Neo-Classical and Keynesian Theories of Interest.

13.

14. **UNIT – IV:** Supply of Money & Demand for Money Functions and Classification of Money – Money Supply – Measures of Money Supply with reference to India: **M1, M2, M3 and M4 – Classical Theories of Money: Fisher's and Cambridge Versions of Quantity Theory of Money – Keynes' Theory of Money and Prices.**

15.

16. **UNIT– V:** Inflation & Trade Cycles Inflation: Concept, Types, Causes and Measurement – Effects of Inflation – **Measures to Control Inflation – Concepts of Phillips Curve, Deflation and Stagflation – Trade Cycles: Concept, Causes and Phases of trade cycle.**

17.

18. **Reference Books:** Ackley, G (1976): *Macroeconomics: Theory and Policy*, Macmillan, New York Shapiro, E (1996) : *Macro Economic Analysis*, Galgotia Publications, New Delhi Hansen A H (1953): *A Guide to Keynes*, McGraw Hill, New York Keynes JM (1936) : *The General Theory of Employment, Interest and Money*, MC Vaish : *Macro Economic Theory* HL Ahuja : *Macro Economic Theory & Policy* Vanitha Agarwal : *Macro Economic Theory & Policy*, Pearson Education HL Ahuja : *Macro Economic Analysis* Gupta, SB: *Monetary Economics: Institutions, Theory and Policy* M.L.Seth: *Macroeconomics*, Lakshmi Narain Agarwal, Agra, 2006

B.Com.(Hons.): Semester-III

Paper–BCOM212A

:HUMANRESOURCEMANAGEMENT

Duration:3hrs.

Marks:100

Lectures:65

Objective:The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organisation.

Unit1:Introduction

13Lectures

Human Resource Management: Concept and Functions, Role, Status and competencies of HR Manager, HR Policies, Evolution of HRM, HRM vs HRD. Emerging Challenges of Human Resource Management; Workforce diversity; Empowerment; Downsizing; VRS; Human Resource Information System

Unit2:AcquisitionofHumanResource

13Lectures

Human Resource Planning-Quantitative and Qualitative dimensions; job analysis-job description and job specification; Recruitment- Concept and sources; Selection - Concept and process; test and interview; placement and induction

Unit3:TrainingandDevelopment

13Lectures

Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role-Specific and Competency-Based Training; Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development.

Unit4:PerformanceAppraisal

13Lectures

Nature, objectives and importance; Modern techniques of performance appraisal; potential appraisal and employee counseling; job changes- transfers and promotions; Compensation: concept and policies; job evaluation; methods of wage payments and incentive plans; fringe benefits; performance linked compensation.

Unit5:Maintenance

13Lectures

Employee health and safety; employee welfare; social security; Employer-Employee relations-an overview; grievance-handling and redressal; Industrial Disputes: causes and settlement machinery

Suggested Readings:

1. Gary Dessler. *A Framework for Human Resource Management*. Pearson Education.
2. DeCenzo, D.A. and S.P. Robbins, *Personnel/Human Resource Management*, Pearson Education.
3. Bohlendar and Snell, *Principles of Human Resource Management*, Cengage Learning
4. Ivancevich, John M. *Human Resource Management*. McGraw Hill.
5. Wreather and Davis. *Human Resource Management*. Pearson Education.
6. Robert L. Mathis and John H. Jackson. *Human Resource Management*. Cengage Learning.
7. TN Chhabra, *Human Resource Management*, Dhanpat Rai & Co., Delhi
8. Biswajeet Pattanayak, *Human Resource Management*, PHI Learning

Note: Latest edition of textbooks may be used.

B.Com.(Hons.):Semester-III

Paper-
BCOM213A INCOME TAX LAW AND PRACTICE
E

Duration:3hrs.

Marks:100

Lectures:52, Practical lab 26

Objective:To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961 and the relevant Rules.

Unit1:Introduction

10Lectures

Basic concepts:Income, agricultural income, person, assessee, assessment year, previous year, gross total income, total income, maximum marginal rate of tax; Permanent Account Number (PAN)
Residential status; Scope of total income on the basis of residential status Exempted income under section 10

Unit2:ComputationofIncomeunderdifferentheads-1

18Lectures

Income from Salaries; Income from house property

Unit3:ComputationofIncomeunderdifferentheads-2

10Lectures

Profits and gains of business or profession; Capital gains; Income from other sources

Unit4:ComputationofTotalIncomeandTaxLiability

14Lectures

Income of other persons included in assessee's total income; Aggregation of income and set-off and carry forward of losses; Deductions from gross total income; **Rebates and reliefs**

Computation of total income of individuals and firms; Tax liability of an individual and a firm; Five leading cases decided by the Supreme Court

Unit5:PreparationofReturnofIncome

Practical Lab 26 Filing of

returns: Manually, On-line filing of Returns of Income & TDS; Provision & Procedures of Compulsory On-Line filing of returns for specified assesses.

Note:

1. There shall be a practical examination of 20 Marks on E-filing of Income Tax Returns using a software utility tool. The student is required to fill appropriate Form and generate the XML file.
2. There shall be 4 Credit Hrs. for Lectures + one Credit Hr. (Two Practical Periods per week per batch) for Practical Lab + one credit Hr for Tutorials (per group)
3. Latest edition of textbooks and Software may be used.

Suggested readings:

1. Singhanian, Vinod K. and Monica Singhanian. *Students' Guide to Income Tax, University Edition*. Taxmann Publications Pvt. Ltd., New Delhi.
2. Ahuja, Girish and Ravi Gupta. *Systematic Approach to Income Tax*. Bharat Law House, Delhi.

Journals

1. *Income Tax Reports*. Company Law Institute of India Pvt. Ltd., Chennai.
2. *Taxman*. Taxman Allied Services Pvt. Ltd., New Delhi.
3. *Current Tax Reporter*. Current Tax Reporter, Jodhpur.

Software

1. Vinod Kumar Singhanian, *e-filing of Income Tax Returns and Computation of Tax*, Taxmann Publication Pvt. Ltd, New Delhi .Latest version
2. 'Excel Utility' available at incometaxindiaefiling.gov.in

**B.Com.(Hons.):Semester-III Paper–
BCMA-201A:BUSINESS STATISTICS**

Duration:3hrs.

Marks:100

Lectures:52,Practical Lab:26

Objective: The objective of this course is to familiarise students with the basic statistical tools used for managerial decision-making.

Unit1: Statistical Data and Descriptive Statistics

(9 Lectures)

- a. Nature and Classification of data: univariate, bivariate and multivariate data; time-series and cross-sectional data
- b. Measures of Central Tendency
 - i. Mathematical averages including arithmetic mean, geometric mean and harmonic mean. Properties and applications.
 - ii. Positional Averages
Mode and Median (and other partition values including quartiles, deciles, and percentiles) (including graphic determination)
- c. Measures of Variation: absolute and relative.
Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance
- d. **Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis**

Unit2: Probability and Probability Distributions

(10 Lectures)

- a. Theory of Probability. Approaches to the calculation of probability; Calculation of event probabilities. Addition and multiplication laws of probability (Proof not required); Conditional probability and Bayes' Theorem (Proof not required)
- b. Expectation and variance of a random variable
- c. **Probability distributions:**
 - i. **Binomial distribution: Probability distribution function, Constants, Shape, Fitting of binomial distribution**
 - ii. **Poisson distribution: Probability function, (including Poisson approximation to binomial distribution), Constants, Fitting of Poisson distribution**
 - iii. **Normal distribution: Probability distribution function, Properties of normal curve, Calculation of probabilities**

Unit3: Simple Correlation and Regression Analysis

(10 Lectures)

- a. **Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's coefficient of correlation; calculation and properties (Proof not required). Correlation and Probable error; Rank Correlation**
- b. **Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate and its use in interpreting the results.**

Unit4: Index Numbers

(10 Lectures)

Meaning and uses of index numbers; Construction of index numbers: fixed and chain base: univariate and composite. Aggregative and average of relatives – simple and weighted.
Tests of adequacy of index numbers, Base shifting, splicing and deflating. Problems in the construction of index numbers; Construction of consumer price indices:
Important share price indices, including BSE SENSEX and NSE NIFTY

Unit5: Time Series Analysis

(8 Lectures)

Components of time series; Additive and multiplicative models; Trend analysis: Fitting of trend line using principle of least squares – linear, second degree parabola and exponential. Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages; Seasonal variations: Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices

UNIT 6: Sampling Concepts, Sampling Distributions and Estimation: (5 Lectures) **Sampling:** Populations and samples, Parameters and Statistics, Descriptive and inferential statistics; Sampling methods (including Simple Random sampling, Stratified sampling, Systematic sampling, Judgements sampling, and Convenience sampling)

Concept of Sampling distributions and Theory of Estimation: Point and Interval estimation of means (large samples) and proportions.

Practical Lab: 26

The students will be familiarized with software (Spreadsheet and/or SPSS) and the statistical and other functions contained therein related to formation of frequency distributions and calculation of averages, measures of Dispersion and variation, correlation and regression co-efficient.

Note:

1. There shall be 4 Credit Hrs. for Lectures + one Credit hr. (Two Practical Periods per week per batch) for Practical Lab + one credit Hr for Tutorials (per group)
2. Latest edition of textbooks may be used.

Suggested Readings:

1. Levin, Richard, David S. Rubin, Sanjay Rastogi, and HMSiddiqui. *Statistics for Management*. 7th ed., Pearson Education.
2. David M. Levine, Mark L. Berenson, Timothy C. Krehbiel, P. K. Viswanathan, *Business Statistics: A First Course*, Pearson Education.
3. Siegel Andrew F. *Practical Business Statistics*. McGraw Hill Education.
4. Gupta, S.P., and Archana Agarwal. *Business Statistics*, Sultan Chand and Sons, New Delhi.
5. Vohra N.D., *Business Statistics*, McGraw Hill Education.
6. Murray R Spiegel, Larry J. Stephens, Narinder Kumar. *Statistics (Schaum's Outline Series)*, McGraw Hill Education.
7. Gupta, S.C. *Fundamentals of Statistics*. Himalaya Publishing House.
8. Anderson, Sweeney, and Williams, *Statistics for Students of Economics and Business*, Cengage Learning.

B.Com. (Hons.): Semester-III Paper - BCCS-201A

E-COMMERCE

Duration: 3hrs.

Marks: 100

Lectures: 40, **Practical Lab:** 26 **Objectives:** To enable the student to become familiar with the mechanism for conducting business transaction through electronic means

Contents

Unit 1: Introduction:

(8 Lectures)

Meaning, nature, concepts, advantages, disadvantages and reasons for transacting online, types of E-Commerce, e-commerce business models (introduction, key elements of a business model and categorizing major E-commerce business models), forces behind e-commerce.

Technology used in E-commerce: The dynamics of world wide web and internet (meaning, evolution and features) ; **Designing, building and launching e-commerce website** (A systematic approach involving decisions regarding selection of hardware, software, outsourcing vs. in-house development of a website)

Unit 2: Security and Encryption:

(8 Lectures)

and concepts, the e-commerce security environment: (dimension, definition and scope of e-

security), security threats in the E-commerce environment (security intrusions and breaches, attacking methods like hacking, sniffing, cyber-vandalism etc.), technology solutions (Encryption, security channels of communication, protecting networks and protecting servers and clients),

Unit 3: IT Act 2000 and Cyber Crimes

(8 Lectures)

IT Act 2000: Definitions, Digital signature, Electronic governance, Attribution, acknowledgement and dispatch of electronic records, Regulation of certifying authorities, Digital signatures certificates, Duties of subscribers, Penalties and adjudication, Appellate Tribunal, Offences and Cyber-crimes

Unit 4: E-payment System:

(8 Lectures, 4 Practical Lab)

Models and methods of e-payments (Debit Card, Credit Card, Smart Cards, e-money), digital signatures (procedure, working and legal position), payment gateways, online banking (meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting), risks involved in e-payments.

Unit 5: On-line Business Transactions:

(8 Lectures, 4 Practical Lab)

Meaning, purpose, advantages and disadvantages of transacting online, E-commerce applications in various industries like { banking, insurance, payment of utility bills, online marketing, e-tailing (popularity, benefits, problems and features), online services (financial, travel and career), auctions, online portal, online learning, publishing and entertainment } Online shopping (amazon, snapdeal, alibaba, flipkart, etc.)

Unit 6: Website designing

(18 Practical Lab)

Introduction to HTML; tags and attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets.

Note:

1. There shall be 3 Credit Hrs. for lectures + One Credit hr. (2 Practical periods per week per batch) for Practical Lab

Latest edition of textbooks may be used Suggested Readings

1. Kenneth C. Laudon and Carlo Guercio Traver, *E-Commerce*, Pearson Education.
2. David Whiteley, *E-commerce: Strategy, Technology and Applications*, McGraw Hill Education
3. Bharat Bhaskar, *Electronic Commerce: Framework, Technology and Application, 4th Ed.*, McGraw Hill Education
4. PT Joseph, *E-Commerce: An Indian Perspective*, PHI Learning
5. KK Bajaj and Debjani Nag, *E-commerce*, McGraw Hill Education
6. TN Chhabra, *E-Commerce*, Dhanpat Rai & Co.
7. Sushila Madan, *E-Commerce*, Taxmann
8. TN Chhabra, Hem Chand Jain, and Aruna Jain, *An Introduction to HTML*, Dhanpat Rai & Co.

Paper-BCOM

215 ACOST ACCOUNTING

Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment and cost accounting bookkeeping systems.

CONTENTS:

Unit1:Introduction (6Lectures)

Meaning, objectives and advantages of cost accounting; Difference between cost accounting and financial accounting; Cost concepts and classifications; Elements of cost; Installation of a costing system; Role of a cost accountant in an organisation

Unit2:ElementsofCost:MaterialandLabour (14Lectures)

- a. *Materials*: Material/inventory control techniques. Accounting and control of purchases, storage and issue of materials. Methods of pricing of materials issues — FIFO, LIFO, Simple Average, Weighted Average, Replacement, Standard Cost. Treatment of Material Losses
- b. *Labour*: Accounting and Control of labour cost. Time keeping and time booking. Concept and treatment of idle time, overtime, labour turnover and fringe benefits. Methods of wage payment and the Incentive schemes—Halsey, Rowan, Taylor's Differential piece wage.

Unit3:ElementsofCost:Overheads (8Lectures)

Classification, allocation, apportionment and absorption of overheads; Under- and over-absorption; Capacity Levels and Costs; Treatment of certain items in costing like interest on capital, packing expenses, bad debts, research and development expenses; Activity based cost allocation.

Unit4:Methodsof Costing (28Lectures)

Unit costing, Job costing, Contract costing, Process costing (process losses, valuation of work in progress, joint and by-products), Service costing (only transport).

Unit5:BookKeepinginCostAccounting (9Lectures)

Integral and non-integral systems; Reconciliation of cost and financial accounts

- Suggested Reading:**
1. Charles T. Horngren, Srikant M. Datar, Madhav V. Rajan, *Cost Accounting: A Managerial Emphasis*, Pearson Education.
 2. Drury, Colin. *Management and Cost Accounting*. Cengage Learning.
 3. Jawahar Lal, *Cost Accounting*. McGraw Hill Education
 4. Nigam, B. M. Lall and I. C. Jain. *Cost Accounting: Principles and Practice*. PHI Learning
 5. Rajiv Goel, *Cost Accounting*. International Book House
 6. Singh, Surender. *Cost Accounting*, Scholar Tech Press, New Delhi.
 7. Jain, S. P. and K. L. Narang. *Cost Accounting: Principles and Methods*. Kalyani Publishers
 8. Arora, M. N. *Cost Accounting—Principles and Practice*. Vikas Publishing House, New Delhi.
 9. Maheshwari, S. N. and S. N. Mittal. *Cost Accounting: Theory and Problems*. Shri Mahavir Book Depot, New Delhi.
 10. Iyengar, S. P. *Cost Accounting*, Sultan Chand & Sons
 11. H. V. Jhamb, *Fundamentals of Cost Accounting*, Ane Books Pvt. Ltd.

Note: Latest edition of textbooks may be used.

BCCE-102A-Environment Studies (NUES)

Objectives:

1. To gain an understanding of the concepts fundamental to environmental science
2. To understand the complexity of ecosystems and possibly how to sustain them
3. To understand the relationships between humans and the environment.

COURSE CONTENTS

Unit I

Lectures-8

Ecosystems and how they work: Types of Eco-Systems, Geosphere–

Biosphere and Hydrosphere introduction. Major issues of Biodiversity, Conservation of Bio-Diversity

Concepts of sustainability and international efforts for environmental protection: Concept of Sustainable Development, Emergence of Environmental Issues, Stockholm Conference on Environment, 1972 and Agenda 21. International Protocols, WTO, Kyoto Protocol, International Agreement on Environmental Management.

Unit II

Lectures-8

Pollution and Public Policy

Water Pollution: Water Resources of India, Hydrological Cycle, Methods of Water Conservation and Management, 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.

Solid Waste: Management – and Various Method Used, Composting, Land Fill Sites etc. Hazardous Waste Management, Biomedical Waste Management.

Unit III

Lectures-8

Environmental Impact Assessment (EIA) and Environmental Management System (EMS): Introduction to EIA, its impact, **Notification of MOEF, Introduction to ISO 9000 and 14000 Standards, . Introduction to Indian Environmental Laws:** Legal framework, the Indian Penal Code, Role of Judiciary in Environmental Protection, **Wild Life (Protection) Act, 1972, Water (Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution) Act, 1981, Delhi Environment Law.**

UNIT IV

Lectures-4

Fieldwork/Case Studies: Visit to related site – river/urban/rural or industrial land demonstration project including water bodies.

Text Books

1. Sulphery, M.M., (2012), Introduction to Environment Management, Prentice Hall International.
2. Nath, Manju, (2008), Environment Studies, Pearson Education.

Paper–BCMA-

202A BUSINESS MATHEMATICS

Duration: 3hrs.

Marks: 100

Lectures: 52, Practical Lab: 26

Objective: The objective of this course is to familiarize the students with the basic mathematical tools, with an emphasis on application to business and economics 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 of terms of these 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 3×3 matrices), properties of determinants, minors, cofactors and application 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 function expressed in parametric forms. Second order derivatives.

Rate of change, maxima and minima. Simple problems

Unit-5: Integrals

Integration as an 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**

Reference Books:

1. R. D. SHARMA – BASIC SOF MATHEMATICS
2. R. S. AGRAWAL – MATHEMATICS FUNDAMENTALS

PRADEEP'S –

Mathematics Logics & Fundamental **BACHELOR OF COMMERCE (Hons)**

Paper – BCCS-

202A COMPUTER APPLICATIONS IN BUSINESS

Duration: 3hrs.

Marks: 100

Lectures: 52, Practical Lab 52

Objectives: To provide computer skills and knowledge for commerce students and to enhance the student understanding of usefulness of information technology tools for business operations.

Unit1:WordProcessing

6 Lectures,Practical Lab

6Introduction to word Processing, **Word processing concepts**, Use of Templates, Working with word document: Editing text, Find and replace text, Formatting, spell check, Auto correct, Auto text; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Tables: Inserting, filling and formatting a table; Inserting Pictures and Video; Mail Merge: including linking with Database; Printing documents

Creating Business Documents using the above facilities

Unit2:Preparing Presentations

6 Lectures,Practical Lab

6 Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slideshow.

Creating Business Presentations using above facilities

Unit3:Spreadsheet and its Business Applications

12 Lectures,Practical Lab

12 Spreadsheet concepts, Managing worksheets; Formatting, Entering data, Editing, and Printing a worksheet; **Handling operators in formula**, Project involving multiple spreadsheets, Organizing Charts and graphs

Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions

Unit4:Creating Business Spreadsheet

12 Lectures,Practical Lab

12 Creating spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; **Graphical representation of data**; Frequency distribution and its statistical parameters; Correlation and Regression

Unit5:Database Management System

16 Lectures,Practical Lab 16 Data

base Designs for Accounting and Business Applications: Reality-Expressing the Application; Creating Initial design in **Entity Relationship (ER) Model**; Transforming ER Model to Relational data model concepts; Implementing RDM design using an appropriate DBMS.

SQL and Retrieval of

Information: Basic Queries in SQL; Embedded Queries in SQL; Insert, Delete and Update statements in SQL

DBMS Software: Environment; Tables; Forms; Queries; Reports; Modules;

Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, Managing the data records of Employees, Suppliers and Customers.

Note:

1. The General Purpose Software referred in this course will be notified by the University Department every three years. If the specific features, referred in the detailed course above, is not available in that software, to that extent it will be deemed to have been modified.
2. There shall be a practical examination of 100 Marks (Practical-80 Marks, Viva-10 Marks and Workbook-10 Marks) and duration of Examinations shall be 3 Hrs.
3. Teaching arrangement need to be made in the computer Lab
4. There shall be four lectures per class and 4 Practical Lab periods per batch to be taught in computer Lab.

Suggested Readings: The suggested readings and guidelines shall be notified by the university department at least once in three years based on the selected software.

Paper-BCOM-216 INDIAN ECONOMY

Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: This course seeks to enable the student to grasp the major economic problems in India and their solution.

Unit 1: Basic Issues in Economic Development (10 Lectures)

Concept and Measures of Development and Underdevelopment; Human Development

Unit 2: Basic Features of the Indian Economy at Independence

(10 Lectures) Composition

Position of national income and occupational structure, the agrarian scene and industrial structure

Unit 3: Policy Regimes

(15 Lectures)

- The evolution of planning and imports substituting industrialization.
- Economic Reforms since 1991.
- Monetary and Fiscal policies with their implications on economy

Unit 4: Growth, Development and Structural Change

(15 Lectures)

- The experience of Growth, Development and Structural Change in different phases of growth and policy regimes across sectors and regions.
- The Institutional Framework: Patterns of asset ownership in agriculture and industry; Policies for restructuring agrarian relations and for regulating concentration of economic power;
- Changes in policy perspectives on the role of institutional framework after 1991.
- Growth and Distribution; Unemployment and Poverty; Human Development; Environmental concerns.
- Demographic Constraints: Interaction between population change and economic development.

Unit 5: Sectoral Trends and Issues

(15 Lectures)

- Agriculture Sector:* Agrarian growth and performance in different phases of policy regimes i.e. pre-green revolution and the two phases of green revolution; Factors influencing productivity and growth; the role of technology and institutions; price policy, the public distribution system and food security.
- Industry and Services Sector:* Phases of industrialisation – the rate and pattern of industrial growth across alternative policy regimes; Public sector – its role, performance and reforms; The small scale sector; Role of Foreign capital.
- Financial Sector:* Structure, Performance and Reforms. Foreign Trade and balance of Payments: Structural Changes and Performance of India's Foreign Trade and Balance of Payments; Trade Policy Debate; Export policies and performance; Macro Economic Stabilisation and Structural Adjustment; India and the WTO, Role of FDI, Capital account convertibility,

Suggested Readings:

- Mishra and Puri, *Indian Economy*, Himalaya Publishing House
- ICDhingra, *Indian Economics*, Sultan Chand & Sons
- Gaurav Dutt and KPMSundaram, *Indian Economy*, S. Chand & Company.
- Bhagwati, J. and Desai, P. *India: Planning for industrialization*, OUP, Ch 2 Patnaik, Prabhat. *Some Indian Debates on Planning*, T.J. Byres (ed.). *The Indian Economy: Major Debates since Independence*, OUP.
- Ahluwalia, Montek S. *State-level Performance under Economic Reforms in India* in A. O. Krueger. (ed.). *Economic Policy Reforms and the Indian Economy*, The University of Chicago Press.
- Dreze, Jean and Amartya Sen. *Economic Development and Social Opportunity*. Ch. 2. OUP.
- Khanna, Sushil. *Financial Reforms and Industrial Sector in India*. *Economic and Political Weekly*. Vol. 34. No. 45.
- Uma Kapila (ed), "Indian Economy since Independence", Relevant articles.
- Rangarajan, C. and N. Jadhav. *Issues in Financial Sector Reform*. Bimal Jalan. (ed). *The Indian Economy*. Oxford University Press, New Delhi.

Note: Latest edition of textbooks may be used.

**B.Com.(Hons.):Semester-IVPaper–
PD-193**

Entrepreneurship&ProfessionalSkills

Duration:3hrs.

Marks:100

Lectures:50

Objective: The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior.

Contents:

Unit1:Introduction

(10Lectures)

Meaning, elements, determinants and importance of entrepreneurship and creative behavior; Entrepreneurship and creative response to the society's problems and at work; Dimensions of entrepreneurship: intrapreneurship, technopreneurship, cultural entrepreneurship, international entrepreneurship, netpreneurship, ecopreneurship, and social entrepreneurship

Unit2:EntrepreneurshipandMicro,SmallandMediumEnterprises

(10Lectures)

Concept of business groups and role of business houses and family business in India; The contemporary role models in Indian business: their values, business philosophy and behavioural orientations; Conflict in family business and its resolution

Unit3:Publicandprivatesystemofstimulation

(10Lectures)

Support and sustainability of entrepreneurship. Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of industries/entrepreneur's associations and self-help groups, The concept, role and functions of business incubators, angel investors, venture capital and private equity fund.

Unit4:Sourcesof businessideasandtestsoffeasibility.

(10Lectures) Significance of writing the business plan/project proposal; Contents of business plan/project proposal;

Designing business processes, location, layout, operation, planning & control; preparation of project report (various aspects of the project reports such as size of investment, nature of product, market potential may be covered); Project submission/presentation and appraisal thereof by external agencies, such as financial/non-financial institutions

Unit5:MobilisingResources

(10Lectures)

Mobilising resources for start-up.

Accommodation and utilities; Preliminary contracts with the vendors, suppliers, bankers, principal customers; Contract management: Basic start-up problems

Suggested Readings:

1. Kuratko and Rao, *Entrepreneurship: A South Asian Perspective*, Cengage Learning.
2. Robert Hisrich, Michael Peters, Dean Shepherd, *Entrepreneurship*, McGraw-Hill Education
3. Desai, Vasant. *Dynamic of Entrepreneurial Development and Management*. Mumbai, Himalaya Publishing House.
4. Dollinger, Mare J. *Entrepreneurship: Strategies and Resources*. Illinois, Irwin.
5. Holt, David H. *Entrepreneurship: New Venture Creation*. Prentice-Hall of India, New Delhi.
6. Plsek, Paul E. *Creativity, Innovation and Quality*. (Eastern Economic Edition), New Delhi: Prentice-Hall of India. ISBN-81-203-1690-8.

7. Singh, Nagendra P. *Emerging Trends in Entrepreneurship Development*. New Delhi: ASEED.
8. SSKhanka, *Entrepreneurial Development*, S. Chand & Co, Delhi.
9. K Ramachandran, *Entrepreneurship Development*, McGraw-Hill Education
10. SIDBI Report on Small Scale Industries Sector.

Note: Latest edition of textbooks may be used. B.Com. (Hons.): Semester-V Paper – BCOM-319A

PRINCIPLES OF MARKETING

Duration: 3hrs.

Marks: 100

Lectures: 65 Objective:

The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.

Contents:

Unit 1: Introduction:

13 Lectures

Nature, scope and importance of marketing; Evolution of marketing; Selling vs Marketing; Marketing mix, Marketing environment: concept, importance, and components (Economic, Demographic, Technological, Natural, Socio-Cultural and Legal).

Unit 2:

13 Lectures

a. Consumer Behaviour: Nature and Importance, Consumer buying decision process; Factors influencing consumer buying behaviour.

b. Market segmentation: concept, importance and bases; Target market selection; Positioning concept, importance and bases; **Product differentiation vs. market segmentation.**

Unit 3: Product:

13 Lectures

Concept and importance, Product classifications; Concept of product mix; Branding, packaging and labeling; Product-Support Services; **Product life-cycle; New Product Development Process; Consumer adoption process.**

Unit 4:

13 Lectures

a. Pricing: Significance. Factors affecting price of a product. Pricing policies and strategies.

b. Distribution Channels and Physical Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Functions of middleman; Factors affecting choice of distribution channel; Wholesaling and retailing; Types of Retailers; e-tailing, Physical Distribution.

Unit 5:

13 Lectures

a. Promotion: Nature and importance of promotion; **Communication process**; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics; **Promotion mix and factors affecting promotion mix decisions;**

b. Recent developments in marketing: Social Marketing, online marketing, direct marketing, services marketing, green marketing, Rural marketing; Consumerism

Suggested Readings:

1. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and Ehsanul Haque. *Principles of Marketing*. 13th edition. Pearson Education.
2. Michael, J. Etzel, Bruce J. Walker, William J. Stanton and Ajay Pandit. *Marketing: Concepts and Cases*. (Special Indian Edition)., McGraw Hill Education
3. William D. Perreault, and McCarthy, E. Jerome., *Basic Marketing*. Pearson Education.
4. Majaro, Simon. *The Essence of Marketing*. Pearson Education, New Delhi.
5. The Consumer Protection Act 1986.
6. Iacobucci and Kapoor, *Marketing Management: A South Asian Perspective*. Cengage Learning.

7. DhruvGrewalandMichaelLevy,*Marketing*, McGrawHillEducation.
8. Chhabra, T.N., and S. K. Grover.*MarketingManagement*.FourthEdition.DhanpatRai &Company.
9. NeeruKapoor,*PrinciplesofMarketing*,PHILearning
10. RajendraMaheshwari,*PrinciplesofMarketing*,InternationalBookHouse

**B.Com. (Hons.):Semester -
VPaper-BCOM320A**

FUNDAMENTALSOFFINANCIALMANAGEMENT

Duration:3hrs.

Marks:100

Lectures:52, Practical Lab 26Objective:

To familiarize the students with the principlesand practicesof financialmanagement. **CONTENTS**

Unit1:Introduction

(8Lectures)

Nature,scopeandobjectiveofFinancialManagement,Timevalueofmoney,Riskandreturn(includingCapitalAssetPricingModel),Valuationofsecurities–BondsandEquities

Unit2:InvestmentDecisions

(12 Lectures,16 Practical

Lab)TheCapitalBudgetingProcess,CashflowEstimation,PaybackPeriodMethod,AccountingRateofReturn,NetPresentValue(NPV),NetTerminalValue,InternalRateofReturn(IRR),ProfitabilityIndex,CapitalbudgetingunderRisk–CertaintyEquivalentApproachandRisk-AdjustedDiscountRate.

Unit3:FinancingDecisions

(15 Lectures,10 Practical

Lab)CostofCapitalandFinancingDecision:Sourcesoflong-termfinancingEstimationofcomponentsofcostofcapital.MethodsforCalculatingcostofequitycapital,CostofRetainedEarnings,CostofDebtandCostofPreferenceCapital,WeightedAveragecostofcapital(WACC)andMarginofcostofcapital.Capitalstructure–TheoriesofCapitalStructure(NetIncome,NetOperatingIncome,MMHypothesis,TraditionalApproach).Operatingandfinancialleverage;Determinantsofcapitalstructure

Unit4:DividendDecisions

(12Lectures)

TheoriesforRelevanceandirrelevanceofdividenddecisionforcorporatevaluation;
Cashandstockdividends;Dividendpoliciesinpractice

Unit5:WorkingCapitalDecisions

(15Lectures)

Conceptsofworkingcapital,therisk-returntradeoff,sourcesofshort-termfinance,workingcapitalestimation,cashmanagement,receivablesmanagement,inventorymanagementandpayablesmanagement.

Note:

1. In additionthe studentswill work on Spreadsheetfor doingbasic calculationsinfinance(Unit2 and3above)andhencecanbeusedforgivingstudentssubjectrelatedassignmentsfortheirinternalassessment.
2. There shall be 4 Credit Hrs. for Lectures + one Credit hr. (Two Practical Periods perweekperbatch)forPracticalLab+onecreditHrforTutorials(pergroup)
3. Latesteditionoftextbooksmaybeused.

SuggestedReadings

1. JamesC.VanHorneandSanjayDhamija,*FinancialManagementandPolicy*,PearsonEducation
2. LevyH.andM.Sarnat.*PrinciplesofFinancialManagement*.PearsonEducation
3. BrighamandHouston,*FundamentalsofFinancialManagement*,CengageLearning
4. KhanandJain.*BasicFinancialManagement*,McGrawHillEducation
5. PrasannaChandra,*FundamentalsofFinancialManagement*.McGrawHillEducation
6. Singh,J.K.*FinancialManagement-textandProblems*.DhanpatRai andCompany,Delhi.

7. Rustagi, R.P. *Fundamentals of Financial Management*. Taxmann Publication Pvt. Ltd.
1. Singh, Surender and Kaur, Rajeev. *Fundamentals of Financial Management*. Mayur Paperback, New Delhi.
2. Pandey, I.M. *Financial Management*. Vikas Publications.
3. Bhabatosh Banerjee, *Fundamentals of Financial Management*, PHI Learning

B.Com. (Hons.): Semester-V

Paper: BCOM- 323A: MANAGEMENT ACCOUNTING

Duration: 3 hours

Marks: 100

Lectures: 65

Objective: To impart the students, knowledge about the use of financial, cost and other data for the purpose of managerial planning, control and decision making.

COURSE CONTENTS:

Unit 1: Introduction

(6 Lectures)

Meaning, Objectives, Nature and Scope of management accounting, Difference between cost accounting and management accounting, Cost control and Cost reduction, Cost management

Unit 2: Budgetary Control

(10 Lectures)

Budgeting and Budgetary Control: Concept of budget, budgeting and budgetary control, objectives, merits, and limitations. Budget administration. Functional budgets. Fixed and flexible budgets. Zero base budgeting. Programme and performance budgeting.

Unit 3: Standard Costing

(12 Lectures)

Standard Costing and Variance Analysis: Meaning of standard cost and standard costing, advantages, limitations and applications. Variance Analysis – material, labour, overheads and sales variances. Disposition of Variances, Control Ratios.

Unit 4: Marginal Costing

(12 Lectures)

Absorption versus Variable Costing: Distinctive features and income determination. Cost-Volume-Profit Analysis, Profit/Volumeratio. Break-even analysis- algebraic and graphic methods. Angle of incidence, margin of safety, Key factor, determination of cost indifference point.

Unit 5: Decision Making

(20 Lectures)

Steps in Decision Making Process, Concept of Relevant Costs and Benefits, Various short term decision making situations – profitable product mix, Acceptance or Rejection of special/ export offers, Make or buy, Addition or Elimination of a product line, sell or process further, operate or shutdown. Pricing Decisions: Major factors influencing pricing decisions, various methods of pricing

Unit 6: Contemporary Issues

(5 Lectures)

Responsibility Accounting: Concept, Significance, Different Responsibility Centres, Divisional Performance Measurement: Financial and Non-Financial measures. Transfer Pricing

Suggested Reading:

1. Charles T. Horngren, Gary L. Sundem, Dave Burgstahler, Jeff O. Schatzberg. *Introduction to Management Accounting*, Pearson Education.
2. Anthony A. Atkinson, Robert S. Kaplan, Ella Mae Matsumura, S. Mark Young. *Management Accounting*. Dorling Kindersley (India) Pvt. Ltd.

3. Ronald W. Hilton and David E. Platt. *Managerial Accounting: Creating Value in a Global Business Environment*, McGraw Hill Education.
4. Singh, Surender. *Management Accounting*, Scholar Tech Press, New Delhi.
5. Goel, Rajiv, *Management Accounting*. International Book House,
6. Arora, M.N. *Management Accounting*. Vikas Publishing House, New Delhi.
7. Maheshwari, S.N. and S.N. Mittal. *Management Accounting*. Shree Mahavir Book Depot, New Delhi.
8. Singh, S.K. and Gupta Lovleen. *Management Accounting – Theory and Practice*. Pinnacle Publishing House.
9. Khan, M. Y. and Jain, P. K. *Management Accounting*. McGraw Hill Education
10. H. V. Jhamb, *Fundamentals of Management Accounting*, Ane Books Pvt. Ltd.

Note: Latest edition of textbooks may be used.

Paper: BCOM-325A Group A(c): ADVERTISING

Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: The objective of this course is to familiarize the students with the basic concepts, tools and techniques of advertising used in marketing.

Unit 1: Introduction

(10 Lectures)

Communication Process; Advertising as a tool of communication; Meaning, nature and importance of advertising; **Types of advertising**; Advertising objectives. Audience analysis; Setting of advertising budget; Determinants and major methods

Unit 2: Media Decisions:

(15 Lectures)

Major media types - their characteristics, internet as an advertising media, merits and demerits; **Factors influencing media choice**; media selection, media scheduling. Advertising through the Internet - media devices

Unit 3: Message Development:

(15 Lectures)

Advertising appeals, Advertising copy and elements, Preparing ads for different media

Unit 4: Measuring Advertising Effectiveness:

(15 Lectures)

Evaluating communication and sales effects; **Pre- and Post-testing techniques.**

Unit 5:

(10 Lectures)

- a) **Advertising Agency:** Role, types and selection of advertising agency. b) **Social, ethical and legal aspects of advertising in India.**
- b) **Social, ethical and legal aspects of advertising in India.**

Suggested Readings:

1. George E Belch, Michael A Belch, Keyoor Purani, *Advertising and Promotion: An Integrated Marketing Communications Perspective (SIE)*, McGraw Hill Education
2. S. Wats Dunn, and Arnold M. Barban. *Advertising: Its Role in Marketing*. Dryden Press
3. Burnett, Wells,

- and Moriarty. Advertising: Principles and Practice. 5th ed. Prentice Hall of India, New Delhi.
4. Batra, Myers and Aakers. Advertising Management. PHI Learning.
 5. Terence A. Shimp. Advertising and Promotion: An IMC Approach. Cengage Learning.
 6. Sharma, Kavita. Advertising: Planning and Decision Making, Taxmann Publications
 7. Jaishree Jethwaney and Shruti Jain, Advertising Management, Oxford University Press, 2012
 8. Chuna wala and Sethia, Advertising, Himalaya Publishing House
 9. Ruchi Gupta, Advertising, S. Chand & Co.

O'Guinn, Advertising and Promotion: An Integrated Brand Approach, Cengage Learning.

Note: Latest edition of textbooks may be used Paper: BCOM-

326A Group A(d): BANKING AND INSURANCE Duration: 3hrs. Marks: 100 Lectures: 65

Objective: To impart knowledge about the basic principles of the banking and insurance

Contents

Unit 1: Introduction:

13 Lectures

Origin of banking: definition, banker and customer relationship, General and special types of customers, Types of deposits, **Origin and growth of commercial banks in India.** Financial Services offered by banks, changing role of commercial banks, types of banks

Unit 2: Cheques and Paying Banker

13 Lectures

Crossing and endorsement - meaning, definitions, types and rules of crossing. Duties, Statutory **protection in due course**, collecting bankers: duties, statutory protection for holder in due course, Concept of negligence.

Unit 3: Banking Lending

13 Lectures

Principles of sound lending, Secured vs. unsecured advances, Types of advances, Advances against various securities.

Unit 4: Internet Banking

13 Lectures

Meaning, Benefits, **Home banking, Mobile banking, Virtual banking, E-payments, ATM Card/Biometric card, Debit/Credit card, Smart card, NEFT, RTGS, ECS (credit/debit), E-money, Electronic purse, Digital cash.**

Unit V: Insurance

13 Lectures

Basic concept of risk, Types of business risk, **Assessment and transfer**, Basic principles of utmost good faith, Indemnity, Economic function, Proximate cause, Subrogation and contribution, Types of insurance: Life and Non-life, Re-insurance, Risk and return relationship, Need for coordination. Power, functions and Role of IRDA, Online Insurance

Suggested readings:

1. Agarwal, O.P., *Banking and Insurance*, Himalaya Publishing House
2. Satyadevi, C., *Financial Services Banking and Insurance*, S. Chand
3. Suneja, H.R., *Practical and Law of Banking*, Himalaya Publishing House
4. Chabra, T.N., *Elements of Banking Law*, Dhanpat Rai and Sons
5. Arthur, C. and C. William Jr., *Risk Management and Insurance*, McGraw Hill
6. Saxena, G.S.; *Legal Aspects of Banking Operations*, Sultan Chand and Sons

7. Varshney, P.N., *Banking Law and Practice*, Sultan Chand and Sons
8. Jyotsna Sethi and Nishwan Bhatia, *Elements of Banking and Insurance*, PHI Learning

Note: Latest edition of textbooks may be used.

Paper: BCOM-328A Group A(f): Financial Markets, Institutions and Financial Services Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: To provide the student a basic knowledge of financial markets and institutions and to familiarise them with major financial services in India.

Contents

Unit 1: Introduction

(8 Lectures)

Financial System and its Components –

financial markets and institutions; Financial intermediation; Flow of funds matrix; Financial system and economic development; An overview of Indian financial system

Unit 2: Financial Markets

(17 Lectures)

Money market – functions, organisation and instruments. Role of central bank in money market; Indian money market – An overview

Capital Markets – functions, organisation and instruments. Indian debt market; Indian equity market – primary and secondary markets; Role of stock exchanges in India

Unit 3: Financial Institutions

(20 Lectures)

Commercial banking – introduction, its role in project finance and working capital finance; Development Financial Institutions (DFIs) – An overview and role in Indian economy; Life and non-life insurance companies in India; Mutual Funds – Introduction and their role in capital market development. Non-banking financial companies (NBFCs).

Unit 4: Financial Services

(8 Lectures)

Overview of financial services industry: Merchant banking – pre and post issue management, underwriting. Regulatory framework relating to merchant banking in India

Unit 5: Leasing and hire-purchase

(22 Lectures)

Consumer and housing finance; Venture capital finance; Factoring services, bank guarantees and letter of credit; Credit rating; Financial counseling.

Suggested Readings:

1. LMBhole, and Jitendra Mahakud. *Financial Institution and Markets*, McGraw-Hill Education
2. Khan, M. Y. *Indian Financial System*, McGraw-Hill Education.
3. Dhanekar. *Pricing of Securities*. New Delhi: Bharat Publishing House.
4. Prasanna, Chandra. *Financial Management: Theory and Practice*. McGraw-Hill Education.
5. Clifford Gomez, *Financial Markets, Institutions and Financial Services*, PHI Learning
6. MY Khan and PK Jain. *Financial Services*. McGraw Hill Education.
7. Singh, J. K. *Venture Capital Financing in India*. Dhanpat Rai and Company, New Delhi.
8. Annual Reports of Major Financial Institutions in India.

Note: Latest edition of textbooks may be used

**B.Com.(Hons.):Semester-VIPaper–
BCOM-321A**

AUDITINGANDCORPORATEGOVERNANCE

Duration:3hrs.

Marks:100

Lectures:65

Objective: To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility

Contents:

Unit1:Introduction

(11Lectures)

Auditing: Introduction, Meaning, Objectives, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities.

Unit2:AuditofCompanies

(11Lectures)

Audit of Limited Companies: Company Auditor – Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report – Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013

Unit3:SpecialAreasof Audit

(11Lectures)

Special Areas of Audit: Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDPE Environment; Computer aided audit techniques and tools; Auditing Standards; Relevant Case Studies/Problems;

Unit4:CorporateGovernance

(11Lectures)

Conceptual framework of Corporate Governance: Theories & Models, Broad Committees; Corporate Governance Reforms. Major Corporate Scandals in India and Abroad; Common Governance Problems Noticed in various Corporate Failures. Codes & Standardson Corporate Governance

Unit5:BusinessEthics

(10Lectures)

Morality and ethics, business values and ethics, approaches and practices of business ethics, corporate ethics, ethics program, codes of ethics, ethics committee; Ethical Behaviour: Concepts and advantages; Rating Agencies; Green Governance; Clause 49 and Listing Agreement

Unit6:CorporateSocialResponsibility(CSR):

(11

Lectures) Concept of CSR, Corporate Philanthropy, Strategic Planning and Corporate Social Responsibility; Relationship of CSR with Corporate Sustainability; CSR and Business Ethics, CSR and Corporate Governance; CSR provisions under the Companies Act 2013; CSR Committee; CSR Models, Codes, and Standardson CSR

Suggested Readings:

1. Ravinder Kumar and Virender Sharma, *Auditing Principles and Practice*, PHI Learning
2. Aruna Jha, *Auditing*. Taxmann Publication.

3. A.K.Singh, and Gupta Lovleen. *Auditing Theory and Practice*. Galgotia Publishing Company.
4. Anil Kumar, *Corporate Governance: Theory and Practice*, Indian Book House, New Delhi
5. MC Kuchhal, *Modern Indian Company Law*, Shri Mahaveer Book Depot. (Publishers). (Relevant Chapters)
6. KVBhanumurthy and Usha Krishna, *Politics, Ethics and Social Responsibility of Business*, Pearson Education
7. Erik Banks, *Corporate Governance: Financial Responsibility, Controls and Ethics*, Palgrave Macmillan
8. NBalasubramanian, *A Casebook on Corporate Governance and Stewardship*, McGraw Hill Education
9. B.N.Ghosh, *Business Ethics and Corporate Governance*, McGraw Hill Education
10. SK Mandal, *Ethics in Business and Corporate Governance*, McGraw Hill Education
11. Bob Tricker, *Corporate Governance - Principles, Policies, and Practice* (Indian Edition), Oxford University Press
12. Christine Mallin, *Corporate Governance (Indian Edition)*, Oxford University Press
13. Relevant Publications of ICAI on *Auditing (CARO)*
14. Sharma, J.P., *Corporate Governance, Business Ethics, and CSR*, Ane Books Pvt Ltd, New Delhi

Note: Latest edition of textbooks may be used.

B.Com.(Hons.): Semester-VI

Paper: BCOM-329A Group B(a): FUNDAMENTALS OF INVESTMENT

Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Contents

Unit 1: The Investment Environment

(10 Lectures) The investment decision process, Types of Investments –

Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, **Concept of return and risk, Impact of Taxes and Inflation on return.**

Unit 2: Fixed Income Securities

(15 Lectures)

Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating.

Unit 3: Approaches to Equity Analysis

(15 Lectures) Introduction to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalisation models, and **price-earnings multiple approach to equity valuation.**

Unit 4: Portfolio Analysis and Financial Derivatives

(15 Lectures) Portfolio

and Diversification, **Portfolio Risk and Return; Mutual Funds;** Introduction to Financial Derivatives; Financial Derivatives Markets in India

Unit5:InvestorProtection

(10Lectures)

RoleofSEBIandstockexchangesininvestorprotection;Investorgrievancesandtheirredressalsystem,insidertrading,investors'awarenessandactivism

SuggestedReadings

1. C.P.Jones,*InvestmentsAnalysisandManagement*,Wiley,8thed.
2. PrasannaChandra,*InvestmentAnalysisandPortfolioManagement*,McGrawHillEducation
3. R.P.Rustogi,*FundamentalsofInvestment*,SultanChand&Sons,NewDelhi.
4. N.D.VohraandB.R.Bagri,*FuturesandOptions*,McGrawHillEducation

Mayo,*AnIntroductiontoInvestment*,CengageLearning**B.Com.(Hons.):Semester-VI**

Paper:BCOM-330AGroupB(b):CONSUMERAFFAIRSANDCUSTOMERCARE

Duration:3hrs.

Marks:100

Lectures:65

Objective: This paper seeks to familiarise the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Unit1:ConceptualFramework

(13Lectures)

ConsumerandMarkets:Conceptof Consumer,Nature ofmarkets,Conceptof Price in RetailandWholesale,**MaximumRetailPrice(MRP)andLocalTaxes,FairPrice,labelingandpackaging**

ExperiencingandVoicingDissatisfaction:ConsumerSatisfaction/dissatisfaction-Grievances-complaint,ConsumerComplaining Behaviour: Alternativesavailable to Dissatisfied Consumers;InternalandExternalComplainthandling:**CorporateRedressSystemsandPublicRedressSystems**

Unit2:TheConsumerProtectionAct,1986(CPA)

(13Lecture)Objecti

vesandBasicConcepts:Consumer,goods,service,defectingoods,deficiencyinservice,spuriousgoodsandservices,unfairtradepractice,**restrictivetradepractice.**

Organizationalset-

upundertheConsumerProtectionAct:**AdvisoryBodies:**ConsumerProtectionCouncilsattheCentral,Stateand DistrictLevels,BasicConsumerRights;Adjudicatory Bodies: DistrictForums,StateCommissions,NationalCommission:TheirComposition,Powers,and Jurisdiction(Pecuniaryand Territorial),**RoleofSupremeCourtundertheCPA.**

Unit3:GrievanceRedressMechanismundertheConsumerProtectionAct,1986:

(13 lectures)Who

can file a complaint? Groundsof filing a complaint;Limitation period; **Procedure for filingand hearingof a complaint;Disposalof cases,Relief/Remedyto be provided;**TemporaryInjunction,Enforcementof order,Appeal,frivolousandvexatiouscomplaints;Offencesandpenalties.

SevenLeadingCasesdecidedunderConsumerProtectionAct:MedicalNegligence;Banking; Insurance; Housing & Real Estate; Electricity, Water, and Telecom Services; Education;DefectiveProduct;**UnfairTradePractice.**

Unit4:IndustryRegulatorsandConsumerComplaintRedressMechanism

(13lectures)

- i. Banking: RBI and Banking Ombudsman
- ii. Insurance: IRDA and Insurance Ombudsman
- iii. Telecommunication: TRAI
- iv. Food Products: FSSAI (an overview)
- v. Electricity Supply: Electricity Regulatory Commission
- vi. Advertising: ASCI

Unit 5: Consumer Protection in India (13

Lectures) Consumer Movement in India: Evolution of Consumer Movement in India. Formation of consumer organizations and their role in consumer protection, Recent developments in Consumer Protection in India, National Consumer Helpline, Citizens Charter, Product testing **Quality and Standardization:** Voluntary and Mandatory standards; Role of **BIS, Indian Standards Mark (ISI), Agmark, Hallmarking, Licensing and Surveillance; ISO:** An overview

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H. K. Awasthi. *Consumer Affairs* (2007) Delhi University Publication. 334pp.
2. Aggarwal, V. K. (2003). *Consumer Protection: Law and Practice*. 5th ed. Bharat Law House, Delhi, or latest edition.
3. Girimaji, Pushpa (2002). *Consumer Right for Everyone* Penguin Books.
4. Nader, Ralph (1973). *The Consumer and Corporate Accountability*. USA, Harcourt Brace Jovanovich, Inc.
5. Sharma, Deepa (2011). *Consumer Protection and Grievance-Redress in India: A Study of Insurance Industry* (LAP LAMBERT Academic Publishing GmbH & Co. KG, Saarbrücken, Germany. 263pp.
6. Empowering Consumer e-book, www.consumeraffairs.nic.in
7. e-book, www.bis.org
8. *The Consumer Protection Act, 1986*

Articles

1. Verma, D. P. S. (2002). Developments in Consumer Protection in India. *Journal of Consumer Policy*. Vol. 25. No. pp 107-123.
2. Verma, D. P. S. (2002). Regulating Misleading Advertisements, Legal Provisions and Institutional Framework. *Vikalpa*. Vol. 26. No. 2. pp. 51-57.
3. Ralph L. Day and Laird E. Landon, Jr. (1997). Towards a Theory of Consumer Complaining Behaviour. A g Woodside, et al. (eds.). *Consumer and Industrial Buying Behaviour*. New York; North Holland pp. 425-37.
4. George, S. Day and A. Aaker (1970). A Guide to consumerism. *Journal of Marketing*. Vol. 34. pp 12-19.
5. Sharma, Deepa (2003). New measures for Consumer Protection in India. *The Indian Journal of Commerce*. Vol. 56. No. 4. pp. 96-106
6. Sharma, Deepa (2011). Consumer Grievance Redress by Insurance Ombudsman. *BIMAQUEST*. Vol. 11. pp. 29-47.

Periodicals

1. Consumer Protection Judgments (CPJ) (Relevant cases reported in various issues)
2. Recent issues of magazines: *Insight*, published by CERC, Ahmedabad 'Consumer Voice', Published by VOICES Society, New Delhi.
3. *Upbhokta Jagran*, Ministry of Consumer Affairs, Govt. of India. New Delhi.

Note: The latest edition of textbooks and Acts should be used.

B.Com.(Hons.):Semester-VI

Paper: BCOM-331A Group B(c): BUSINESS TAX PROCEDURE AND MANAGEMENT

Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: To provide basic knowledge of business tax procedures and management under different provisions of the Income tax.

Unit1: (18 Lectures)

Advance payment of tax;
Tax deduction/collection at source, documentation, returns, certificates; Interest payable by Assessee/Government; Collection and recovery of tax

Unit2: (17 Lectures)

Assessment, re-assessment, rectification of mistakes Appeals and revisions
- Preparation and filing of appeals with appellate authorities
- Drafting of appeal; statement of facts and statement of law

Unit3: (12 Lectures)

Penalties and prosecutions, Settlement Commission, Search, seizure and survey

Unit4: (12 Lectures)

Transactions with persons located in notified jurisdictional area; General anti-avoidance rule Tax clearance certificate; Securities transaction tax

Unit5: (6 Lectures)

Information Technology and Tax administration
TAN (Tax Deduction and Collection Account Number), TIN (Tax Information Network), e-TDS/e-TCS

Suggested Readings:

1. Singhania, Vinod K. and Monica Singhania. *Corporate Tax Planning and Business Tax Procedures*. Taxmann Publications Pvt. Ltd., New Delhi.
2. Ahuja, Girish. and Ravi Gupta. *Corporate Tax Planning and Management*. Bharat Law House, Delhi.
3. Singhania, Vinod K. and Kapil Singhania. *TDS on CD*. Taxmann Publications Pvt. Ltd., New Delhi.
4. Bajpai, Om Shanker. *Search, Seizure and Survey*. Taxmann Publications Pvt. Ltd., New Delhi.
5. Singhania, Vinod K. and Monica Singhania. *Students' Guide to Income Tax*. Taxmann Publications Pvt. Ltd., New Delhi.
6. Ahuja, Girish. and Gupta, Ravi. *Systematic Approach to Income Tax*. Bharat Law House, Delhi.
7. Akhileshwar Pathak and Savan Godiawala, *Business Taxation*, McGraw Hill Education

Journals

1. *Income Tax Reports*, Company Law Institute of India Pvt. Ltd., Chennai.
2. *Taxman*, Taxmann Allied Services Pvt. Ltd., New Delhi.
3. *Current Tax Reporter*, Current Tax Reporter, Jodhpur.

Note: Latest edition of textbooks may be used.

B.Com.(Hons.):Semester-V

Paper:BCOM-332AGroupB(d):INTERNATIONALBUSINESS

Duration:3hrs.

Marks:100

Lectures:65

Objective:The objective of the course is to familiarise the students with the concepts,importanceand dynamicsof international businessand India's involvementwith global business.The coursealsoseeksto providetheoreticalfoundationsof internationalbusinessto the extenttheseare relevanttotheglobalbusinessoperationsanddevelopments.

Unit1: (13Lectures)

- a. *IntroductiontoInternationalBusiness*:Globalisationanditsimportanceinworldeconomy;Impactofglobalization;**Internationalbusinessvs.domesticbusiness**:Complexitiesofinternationalbusiness;Modesofentryintointernationalbusiness.
- b. *InternationalBusinessEnvironment*:**Nationalandforeignenvironments**andtheircomponents-economic,culturalandpolitical-legalenvironments

Unit-II (13Lectures)

- a. *Theories of InternationalTrade* – an overview (**Classical Theories, Product Life Cycletheory,Theoryof NationalCompetitiveAdvantage**);CommercialPolicyInstruments-tariff and non-tariff measures – difference in Impact on trade, types of tariff and non tariffbarriers(Subsidy,Quotaand Embargo in detail) ; **Balance of paymentaccountand itscomponents.**
- b. *InternationalOrganizationsandArrangements*:**WTO–Itsobjectives,principles,organizational structure and functioning; An overview of other organizations – UNCTAD,;Commodityandothertradingagreements(OPEC).**

Unit-III (13Lectures)

- a. *Regional Economic Co-operation*: Forms of regional groupings; Integration efforts amongcountriesinEurope,NorthAmericaandAsia(**NAFTA,EU ,ASEANand SAARC**).
- b. *InternationalFinancialEnvironment*:Internationalfinancial system and institutions(IMFandWorldBank– ObjectivesandFunctions);**Foreignexchangemarketsandriskmanagement**;Foreigninvestments-typesandflows;ForeigninvestmentinIndianperspective

Unit-IV (13Lectures)

- a. Organisationalstructureforinternationalbusinessoperations;Internationalbusinessnegotiations.
- b. *DevelopmentsandIssuesinInternationalBusiness*:OutsourcinganditspotentialsforIndia;**RoleofITininternationalbusiness**;Internationalbusinessandecologicalconsiderations.

Unit-V (13Lectures)

- a. Foreign Trade Promotion Measures and Organizationsin India; Special economic zones(SEZs) and export oriented units (EOUs); Measuresfor promoting foreign investmentsintoandfromIndia;Indianjointventuresandacquisitionsabroad.
- b. Financing of foreign trade and payment terms – sources of trade finance (Banks, factoring,forfaiting, Banker'sAcceptance and Corporate Guarantee) and forms of payment (Cash inadvance,LetterofCredit,DocumentaryCollection,OpenAccount)

SuggestedReadings:

1. CharlesW.L.HillandArunKumarJain,*InternationalBusiness*.NewDelhi:McGrawHillEducation
2. DanielsJohn,D.LeeH.RadenbaughandDavidP.Sullivan.*InternationalBusiness*.PearsonEducation
3. Johnson,Derbe., and Colin Turner. *InternationalBusiness - Themes& Issues in the ModernGlobalEconomy*.London:Roulledge.
4. SumatiVarma,*InternationalBusiness*,PearsonEducation.
5. Cherunilam,Francis.*InternationalBusiness:TextandCases*.PHILearning

6. Michael R. Czinkota et al. *International Business*. Fort Worth: The Dryden Press.
7. Bennett, Roger. *International Business*. Pearson Education.
8. Peng and Srivastava, *Global Business*, Cengage Learning

Note: Latest edition of textbooks may be used.

B.Com.(Hons.):Semester-VI

Paper: BCOM-333A Group B(e): INDUSTRIAL RELATIONS AND LABOUR LAWS

Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: To enable the student to learn the concepts of industrial relations including trade unions, collective bargaining, discipline and various labour enactments.

Contents:

Unit 1: Industrial Relations (IR)

Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Factors affecting IR in changing Environment; Evolution of IR in India; Role of State; Trade Union; Employers' Organisation; Human Resource Management and IR; Role of ILO in Industrial Relations; International Dimensions of IR

Unit 2: Trade Union

Trade Union: Origin and growth, unions after Independence, unions in the era of liberalisation; Factors Affecting Growth of Trade Unions in India, Multiplicity & Recognition of Trade Unions; Major Provisions of Trade Union Act 1926

Unit 3: Collective Bargaining and Workers' Participation in Management

- a) Collective Bargaining: Meaning, Nature, Types, Process and Importance of Collective Bargaining, pre-requisites, issues involved; Status of Collective Bargaining in India, Functions and role of Trade Unions in collective bargaining
- b) Workers' Participation in Management: Concept, practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing

Unit 4: Discipline and Grievance Redressal

Discipline: Causes of indiscipline, Maintenance of discipline and misconduct; Highlights of domestic enquiries; Principle of Natural Justice; Labour turnover; Absenteeism; Grievance: Meaning of Grievance, Grievance redressal machinery in India, Grievance handling procedure; salient features of Industrial Employment (Standing Orders) Act 1946

Unit 5:

- a) **The Industrial Disputes Act, 1947:** Definitions of Industry, workman, and Industrial Dispute; Authorities under the Act: Procedure, Powers and Duties of Authorities; Strikes and Lock outs; Lay-off and Retrenchment: Provisions relating to Layoff, Retrenchment, and closure
- b) **The Factories Act, 1948:** Provisions relating to Health, Safety, Welfare facilities, working hours, Employment of young persons, Annual Leave with wages

Suggested Readings:

1. PK Padhi, *Industrial Relations and Labour Law*, PHI Learning
2. Arun Monappa, *Industrial Relations and Labour Law*, McGraw Hill Education
3. SCSrivastav, *Industrial Relations and Labour Law*, Vikas Publishing House
4. C.S Venkata Ratnam, *Industrial Relations*, Oxford University Press
5. P.L. Malik's *Handbook of Labour and Industrial Law, Vol 1 and 2*, Eastern Book Company
6. JP Sharma, *Simplified Approach to Labour Laws*, Bharat Law House (P) Ltd

Note: Latest edition of textbooks may be used.

B.Com. (Hons.): Semester-VI

Paper: BCOM-334A Group B (f): BUSINESS RESEARCH METHODS AND PROJECT

WORK

Duration: 3hrs.

Marks: 100

Lectures: 65

Objective: This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

Section A: Business Research Methods **50 Marks**

Unit 1: Introduction

(10 Lectures)

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 2: Research Process

(10 Lectures)

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**

Unit 3: Measurement and Hypothesis Testing

(19 Lectures)

Measurement: Definition; Designing and writing items; Uni-dimensional and Multi-dimensional 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**

Testing the assumptions of Classical Normal Linear Regression

Section B: Project Report **Marks 50**

Unit 4: Report Preparation

(26 Lectures)

Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification

Note:

1. There shall be a written examination of 50% Marks on the basis of Unit I to III.

The student will write a project report under the supervision of a faculty member assigned by the college/institution based on fieldwork. The Project Report carries 50% Marks and will be evaluated by University appointed examiners



Scheme for Ph.D.

Ph.D.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	GE-501	Research Methodology	4	0	0	4
2	LS-501	Literature Survey	0	2	0	2
3	BA 209A	Advanced Management Imperative I	3	0	0	3
4	BA 209B	Advanced Management Imperative II	3	0	0	3
Total			10	2	0	12



Scheme for B. TECH.

B. TECH.			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101A	Applied Mathematics –I	3	0	0	3
2	PHB-101A	Applied Physics	3	0	0	3
3	CE-102 A	Basics of Civil Engineering	3	0	0	3
4	CSB-101 A	Computer Programming	3	0	0	3
5	CHB-101 A	Applied Chemistry	3	0	0	3
6	ENA-101A	Communication Skills-I	3	0	0	3
7	CHB-151A	Applied Chemistry Lab	0	0	2	1
8	PHB-151A	Applied Physics Lab	0	0	2	1
9	ENA-151A	Communication Skills Lab –I	0	0	2	1
10	CSB-151A	Computer programming Lab	0	0	2	1
11	CE-152A	Basics of Civil Engineering Lab	0	0	2	1
12	ME-153A	Computer Based Engineering Graphics	0	0	4	2
Total			18	0	14	25

B. TECH.			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102 A	Applied Mathematics –II	3	0	0	3
2	ME-102 A	Basics of Mechanical Engineering	3	0	0	3
3	EL-101A	Basics of Electrical Engineering	3	0	0	3
4	EC-101A	Basics of Electronics Engineering	3	0	0	3
5	CEA-101A	Environmental Science and Ecology	2	0	0	2
6	EN-102A	Communication Skills-II	2	0	0	2
7	ME-152 A	Workshop Practice	0	0	2	1
8	ME-154A	Basics of Mechanical Engineering Lab	0	0	2	1
9	EL-151A	Basics of Electrical Engineering Lab	0	0	2	1
10	EN-152A	Communication Skills Lab –II	0	0	2	1
11	EC-151A	Basics of Electronics Engineering Lab	0	0	2	1
12	PD-193A	Entrepreneurship and Professional Skills	0	1	0	1
13	PD-191A	Co-curricular Activities	0	1	0	1
Total			16	2	10	23

B. TECH.			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-273A	Economics and Industrial Management	3	0	0	3
2	MA-202A	Applied Numerical Methods	3	0	0	3
3	ME-201A	Thermodynamics	3	1	0	4
4	ME-203A	Engineering Mechanics	3	1	0	4
5	ME-205A	Manufacturing Technology	4	0	0	4
6	ME-207A	Machine Drawing & CAD	1	0	6	4
7	MA-252A	Applied Numerical Methods Lab	0	0	2	1
8	ME-235A	Manufacturing Technology Lab	0	0	2	1
9	ME-239A	Computer Methods in Mechanical Engineering Lab	1	0	4	3
10	HOT-201A	Hands on Training for two weeks	0	0	2	1
11	PD-291	Co-curricular Activities	0	1	0	1
Total			18	3	16	29

B. TECH.			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-200A	Strength of Materials -1	3	1	0	4
2	ME-202A	Kinematics of machines	3	1	0	4
3	ME-204A	Energy conversion	3	1	0	4
4	ME-206A	Fluid Mechanics	3	1	0	4
5	ME-208A	Manufacturing Science	3	0	0	3
6	ME-240A	Strength of Materials Lab	0	0	2	1
7	ME-242A	Kinematics of machines Lab	0	0	2	1
8	ME-244A	Energy conversion Lab	0	0	2	1
9	ME-246A	Fluid Mechanics Lab	0	0	2	1
10	ME-248A	Manufacturing Science Lab	0	0	2	1
11	PD-293/PD-192	Intra & Inter-personal Skills	0	1	0	1
	PD-291	Co-curricular Activities	0	1	0	1
Total			15	6	10	26

B. TECH.			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-301A	Dynamics of Machines	3	1	0	4
2	ME-303A	Fluid Machines	3	1	0	4
3	ME-305A	Internal Combustion Engine and Gas Turbine	3	1	0	4
4	ME-307A	Computer Aided Design	3	0	0	3
5	ME-309A	Strength of Material-II	3	1	0	4
6	ME-311A	Industrial Engineering	4	0	0	4
7	ME-351A	Dynamics of Machines Lab	0	0	2	1
8	ME-353A	Fluid Machines Lab	0	0	2	1
9	ME-355A	Internal Combustion and Gas Turbine Lab	0	0	2	1
10	ME-357A	Computer Aided Design Lab	0	0	2	1
11	PD-391	Co-curricular Activities	0	1	0	1
12	PD-393	Departmental PDP/ Problem Solving Skill	0	1	0	1
Total			19	6	8	29

B. TECH.			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-300A	Heat Transfer	3	1	0	4
2	ME-302A	Machine Design-I	3	2	0	5
3	ME-304A	Material science	3	0	0	3
4	ME-306A	Measurement Instrumentation & control	3	1	0	4
5	ME-308A	Optimization Techniques	4	0	0	4
6		Dept. Elective –I	3	0	0	3
7	ME-360A	Heat Transfer Lab	0	0	4	2
8	ME-364A	Material Science Lab	0	0	2	1
9	ME-366A	Measurement Instrumentation & control Lab	0	0	2	1
10	PD-392/ PD-393	Departmental PDP/ Problem Solving Skill Intra & Inter-personal Skills	0	1	0	1
11	PD-391	Co-curricular Activities	0	1	0	1
Total			19	6	8	28+1*

B. TECH.			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-401A	Machine Design-II	3	2	0	5
2	ME-405A	Refrigeration and Air conditioning	3	1	0	4
3		Deptt Elective –II	3	0	0	3
4		Deptt Elective –III	3	0	0	3
5		Open Elective	3	0	0	3
6	ME-475A	Refrigeration and Air conditioning Lab	0	0	2	1
7	ME-477A	Project Work	0	0	8	4
8	PD-358	Dept. PDP	0	1	0	1
	PD-491	Co-curricular Activities	0	1	0	1
Total			15	5	10	25

B. TECH.			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-400A	Internship /Dissertation Phase	0	0	24	12
2	ME-480A	Seminar based on Internship	0	0	2	1
3	ME-402A	Mechanical and Automobile Engineering Technology	4	0	0	4
Total			4	0	26	17

Scheme for B.TECH AUTOMOBILE ENGINEERING

B. TECH. (Automobile)			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-101A	Applied Mathematics –I	3	0	0	3
2	PHB-101A	Applied Physics	3	0	0	3
3	CE-102 A	Basics of Civil Engineering	3	0	0	3
4	CSB-101 A	Computer Programming	3	0	0	3
4	CHB-101 A	Applied Chemistry	3	0	0	3
6	ENA-101A	Communication Skills-I	3	0	0	3
7	CHB-151A	Applied Chemistry Lab	0	0	2	1
8	PHB-151A	Applied Physics Lab	0	0	2	1
9	ENA-151A	Communication Skills Lab –I	0	0	2	1
10	CSB-151A	Computer programming Lab	0	0	2	1
11	CE-152A	Basics of Civil Engineering Lab	0	0	2	1
12	ME-153A	Computer Based Engineering Graphics	0	0	4	2
Total			18	0	14	25

B. TECH. (Automobile)			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102 A	Applied Mathematics –II	3	0	0	3
2	ME-102 A	Basics of Mechanical Engineering	3	0	0	3
3	EL-101A	Basics of Electrical Engineering	3	0	0	3
4	EC-101A	Basics of Electronics Engineering	3	0	0	3
5	CEA-101A	Environmental Science and Ecology	2	0	0	2
6	EN-102A	Communication Skills-II	2	0	0	2
7	ME-152 A	Workshop Practice	0	0	4	2
8	ME-154A	Basics of Mechanical Engineering Lab	0	0	2	1
9	EL-151A	Basics of Electrical Engineering Lab	0	0	2	1
10	EN-152A	Communication Skills Lab -II	0	0	2	1
11	EC-151A	Basics of Electronics Engineering Lab	0	0	2	1
12	PD-193A	Entrepreneurship and Professional Skills	0	1	0	1
13	PD-191A	Co-curricular Activities	0	1	0	1
Total			16	2	12	24

B. TECH. (Automobile)			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BA-273A	Economics and Industrial Management	3	0	0	3
2	MA-202	Applied Numerical Methods	3	0	0	3
3	ME-201A	Thermodynamics	3	1	0	4
4	ME-203A	Engineering Mechanics	3	1	0	4
5	ME-205A	Manufacturing Technology	4	0	0	4
6	ME-207A	Machine Drawing & CAD	1	0	6	4
7	ME-209A	Computer Methods in Mechanical Engineering	1	0	0	1
8	MA-252	Applied Numerical Methods Lab	0	0	2	1
9	ME-235A	Manufacturing Technology Lab	0	0	2	1
10	ME-239A	Computer Methods in Mechanical Engineering Lab	1	0	4	3
11	HOT-201A	Hands on Training for two weeks	0	0	2	1
12	PD-291	Co-curricular Activities	0	1	0	1
TOTAL			19	3	16	30

B. TECH. (Automobile)			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AE-200A	Motor vehicle Technology	3	1	0	4
2	AE-202A	Hydraulics & Pneumatics	3	0	0	3
3	AE-204A	Automotive Technology	3	0	0	3
4	ME-200A	Strength of Materials-1	3	1	0	4
5	ME-202A	Kinematics of Machine	3	1	0	4
6	AE-240A	Motor Vehicle Technology Lab	0	0	2	1
7	AE-242A	Hydraulics & pneumatics Lab	0	0	2	1
8	AE-244A	Automotive Technology Lab	0	0	2	1
9	ME-240A	Strength of Materials-1 Lab	0	0	2	1
10	ME-242A	Kinematics of Machine Lab	0	0	2	1
11	PD-293	Intra & Inter-personal Skills	0	1	0	1
12	PD-291	Co-curricular Activities	0	1	0	1
Total			15	5	10	25

B. TECH. (Automobile)			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AE-301A	Automobile Pollution control	4	0	0	4
2	AE-303A	Automotive Engines	3	1	0	4
3	AE-305A	Design of Auto Components-I	3	2	0	5
4	ME-301A	Dynamics of Machines	3	1	0	4
5	ME-311A	Industrial Engineering	4	0	0	4
6	AE-351A	Automobile Pollution Control Lab	0	0	2	1
7	AE-353A	Automotive Engines Lab	0	0	2	1
8	AE-357A	Auto shop Practices-I Lab	0	0	2	1
9	ME-351A	Dynamics of Machines Lab	0	0	2	1
10	PD-393	Departmental PDP/Problem Solving skill	0	1	0	1
11	PD-391	Co-curricular Activities	0	1	0	1
Total			17	6	8	27

B. TECH. (Automobile)			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AE-300A	Production Engineering	3	0	0	3
2	AE-302A	Design of Auto Components-II	3	2	0	5
3	ME-300A	Heat Transfer	3	1	0	4
4	ME-304A	Material Science	3	0	0	3
5	ME-306A	Measurement Instrumentation & Control	3	1	0	4
6		Elective-1	3	0	0	3
7	AE-360A	Production Engineering Lab	0	0	2	1
8	AE-364A	Auto shop Practices-II Lab	0	0	2	1
9	ME-360A	Heat Transfer Lab	0	0	2	1
10	ME-364A	Material Science Lab	0	0	2	1
11	ME-366A	Measurement Instrumentation & Control Lab	0	0	2	1
12		Research Based Minor Project	0	0	2	1
13	PD-358	Departmental PDP	0	1	0	1
14	PD-391	Co-curricular Activities	0	1	0	1
TOTAL			18	6	12	30

B. TECH. (Automobile)			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AE-401A	Automotive Air Conditioners	3	0	0	3
2	AE-403A	Automobile Maintenance & Services	3	0	0	3
3	AE-405A	Automotive Electricals & Electronics	3	0	0	3
4		Department Elective-II				
5		Department Elective-III				
6		Open Elective				
7	AE-479A	STC Workshop Practice Lab	0	0	2	1
8	AE-477A	Major Project	0	0	8	4
9	PD-358	Departmental PDP	0	1	0	1
10	PD-491	Co-curricular Activities	0	1	0	1
		TOTAL	9	2	10	16

B. TECH. (Automobile)			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	AE-400A	Internship-6 Month	0	0	24	12
2	AE-402A	Mechanical & Automobile Engineering Technology	4	0	0	4
3	AE-480A	Seminar based on Internship	0	0	2	1
		TOTAL	4	0	26	17

Syllabus for B.Tech. (Automobile)

ME-102A

L- T- P Cr

3- 1- 0 3

Unit-1 Mechanics

Classification of forces, parallelogram law, triangle law, Lami's theorem, resolution of forces, moment, couple, equilibrium in two dimensions, numerical.

Unit-2 Thermodynamics

Thermodynamic work, p-dV work in various processes, p-V representation of various thermodynamic processes and cycles Ideal gas equations, Properties of pure substance, Statements of I and II laws of thermodynamics and their applications in Mechanical Engineering. Carnot cycle for Heat engine, Refrigerator and Heat pump numerical.

Unit-3 Energy Conversion Devices

Formation of steam, types of boilers, Babcock and Wilcox boiler, Cochran boiler, mountings and accessories , Turbine(Impulse & Reaction turbine, Gas turbine, Hydraulic turbines), Working principle and applications of Reciprocating I.C. engines, 4-stroke and 2-stroke engine-construction and working.

Unit-4 Stress and Strain

Definition of stress and strain, types of stress and strain, Hooke's law, stress-strain diagram, poisson's ratio, modulus of rigidity, bulk modulus, Elastic constants & their relationships, numerical.

Unit-5 Power transmission

Types of Belts and belt drives, Chain drive, Types of gears and gear train, Types of Couplings, friction clutch (cone and single plate), brakes (types and applications only) Applications of these devices.

Text Books:

Engineering Mechanics -Meriam, J. L. , 6th Edition, John Wiley & Sons, 2005.

Thermodynamics - P. K Nag , Tata McGraw-Hill Publishing Co. Ltd

Elements of Mechanical Engineering – R.K.RajputLakmi Pub., Delhi

Elements of Mechanical Engineering – D.S.Kumar, S.K. Kataria and Sons Engineering

Refrigeration &Airconditioning – Arora&Domkundwar, Dhanpatrai&co.pvt ltd

Reference Books:

Beer, F.P. and Johnston, E.R. "Mechanics of Materials", 3rd Edition, Tata McGraw Hill, 2005.

Strength of Materials – Popov, Pub. - PHI, New Delhi.

Hydraulic Machines – JagdishLal, Pub.- Metropolitan, Allahbad.

Strength of Materials - G.H. Ryder, Pub.- ELBS.

Hydraulic and Fluid Mechanics – Modi and Seth, Pub. – Standard Book House, New Delhi

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.

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.

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.

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

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.**

UNIT I: Relativistic Mechanics

06 Hrs.

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.

UNIT II: Wave Optics

09 Hrs.

Interference: Interference of light, 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.

Polarization: Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate.

UNIT III: Modern Optics

8 Hrs.

Laser: Spontaneous and stimulated emission of radiation, population inversion, concept of 3 and 4 level Laser, 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

Holography: Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.

UNIT IV: Dielectric and Magnetic Properties of Materials

10 Hrs.

Dielectric Properties: Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability). Equation of internal fields in liquid and solid (One- Dimensional), ClausiusMussoti Equation, Frequency dependence of dielectric constant, Dielectric Losses, Important applications of dielectric material,

Magnetic Properties: Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Phenomena of hysteresis and its applications.

UNIT V: Physics of some technologically important Materials

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, BCS theory (Qualitative), High temperature superconductors and Applications of Superconductors.

Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene and Carbon nanotubes, Applications of nanotechnology.

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

- Ajoy Ghatak 'Optics' Tata McGraw-Hill Education, 2005.
- David Halliday, Robert Resnick and Jearl Walker, "Fundamentals of physics", 4th edition.
- David J. Griffiths, 'Introduction to electrodynamics' 3rd edition, Prentice Hall.

PHB-151A	APPLIED PHYSICS LAB	L-T-P	Credits
		0-0-2	2

LIST OF EXPERIMENTS

- To find the wavelength of sodium light by Newton's rings experiment.
- To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
- To find the refractive index and Cauchy's constants of a prism by using spectrometer.
- To find the resolving power of a telescope.
- To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
- To find the specific rotation of sugar solution by using a Polarimeter.
- To find the frequency of A.C. mains by using electric vibrator.
- To determine the moment of inertia by Fly-wheel.
- To find the moment of inertia of an irregular body about an axis through its centre of gravity with torsional pendulum/Inertia Table.
- To find the wavelength of sodium light by Fresnel's bi-prism experiment.
- To determine the variation in wavelength of light by Michelson Interferometer.

TEXT BOOK

- Worshnop, B. L. and Flint, H. T. "Advanced Practical Physics", KPH

REFERENCE BOOKS

- Gupta, S. L. & Kumar, V. "Practical Physics", PragatiPrakashan
- Chauhan & Singh, "Advanced Practical Physics Vol. I & II", PragatiPrakashan.

MA-101A	APPLIED MATHEMATICS-I	L-T-P	Credits
		3-1-0	3

- Advanced Practical Physics; Worsnop and Flint, Methuen & Co., London,

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: 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-II:INFINITE SERIES: Convergence and divergence; comparison test;D'Alembert's ratio test;Cauchy's root test;Raabe's test; logarithmic test;Gauss test;Cauchy's integral test;Leibnitz's alternate series test; absolutely convergent; conditionally convergent.

Unit-III:CALCULUS OF SINGLE VARIABLE: Successive Differentiation and Leibnitz theorem Taylor's series and Maclaurin's series; asymptotes; curvature.

Unit-IV: 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-V: 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", 41st Edition,2010,Khanna Publishers.

REFERENCE BOOKS

1. Kreyszig, E., "Advance Engineering Mathematics", 10th Edition, 2011,Wiley India Publishers, New Delhi
2. Weir, M. D., Hass, J. and Giordano, F. R., "Thomas Calculus", 11th Edition, 2012, Pearson Education.
3. Jain, R.K. and Iyengar, S.R.K., " Advance Engineering Mathematics" ,3rd Edition,2002, Narosa Publishing House New Delhi.
4. Dass, H.K., " Higher Engineering Mathematics",10th Edition, 2008, S. Chand & Company Ltd.
- 5 " Higher Engineering Mathematics" by H.C Taneja.

MA-102A	APPLIED MATHEMATICS-II	L-T-P	Credits
		3-1-0	3

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: ORDINARY DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS:Exact differential equations; equations reducible to exact differential equations; application of differential equations of first order and first degree to simple electrical circuits; Newton's law of cooling, heat flow and orthogonal trajectories. Linear differential equations of second and higher order; complete

solution; method to find C.F.; method to find P.I. ; method of variation of parameters to find P.I.; Cauchy's linear equations and its solutions; Legendre's linear equations and its solution and its solutions; Linear transformation to solve Linear differential equation.

Unit-II: PARTIAL DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS: Formation; solution of partial differential equations in ordinary cases; different solutions of partial differential equations; types of first order non-linear partial differential equations; Lagrange's linear equation; Charpit's method; method of separation of variables. Application to wave equation; one dimensional heat equation.

Unit-III: 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; application of linear differential equations and simultaneous linear differential equations with constant coefficients; periodic function and its LT; Laplace transform of unit step function; unit impulse (direct-delta) function.

Unit IV: 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, saw-toothed wave, half and full rectified wave functions; half range sine and cosine series

Unit V: VECTOR CALCULUS : Differentiation of vectors; scalar and vector point functions; gradient of a scalar field and its physical interpretations; directional derivative; divergence of vector field and its physical interpretations; curl of a vector field and their physical interpretations. Integration of vectors; line integral; surface integral; volume integral; application of Green's theorem, Stoke's theorem and Gauss theorem (without proof)

TEXT BOOK:

1. Higher Engineering Mathematics: B. S. Grewal

REFERENCES:

1. Higher Engineering Mathematics: H.C. Taneja
2. Higher Engineering Mathematics: B. V. Ramana
3. Differential and Integral Calculus: Piskunov
4. Advanced Engineering Mathematics: Jain and Iyenger
5. Advanced Engg Mathematics: Michael D. Greenberg
6. Advanced Engineering Mathematics: E. Kreyszig

CE-102A	Element of Civil Engineering	L T P	Cr
		3 0 2	3

UNIT-I Basics of Civil Engineering:

Impact of Infrastructural Development on the Economy of a Country, Role of Civil Engineers in improving living conditions of society. Basics of Engineering mechanics: Basic properties of metals, composition of coplanar concurrent and non-concurrent force system, centroid of plane figures, equilibrium of forces, Friction, Moment of Inertia of an area.

UNIT-II Construction Materials:

Requirement, types, uses, properties and importance of Civil Engineering materials like Stone, Bricks, Lime, Cement, Ferrous and Non Ferrous Metals, Timber, Sand, Aggregate, Mortar and Concrete, Glass etc. Elements of Building Construction Planning: Elementary principles and basic requirements of a building planning, Construction: Classification of buildings based upon occupancy and structure, Common building components, their functions, Introduction to building byelaws.

UNIT-III Water Resources Engineering:

Elementary Hydrology, Sources of water, Watershed Development, Water requirements and, its conservation, Hydraulic Structures of Storage Water Conveyance System, Canals; Water Conduits.

UNIT-IV Transportation Engineering:

Role of Transportation in National development, Transportation Ways, Surface Transportation Aviation and Waterways, Classification of Highways, Highway materials properties and highway construction, Elements of Traffic Engineering and Traffic Control.

UNIT-V Public Health Engineering:

Water supply systems, Treatments and standards Plumbing Sanitary Engineering, Sewage and Sewerage Systems, Sewage Disposal, Types of Pollutions and Pollutions,

CE-152A	Element of Civil Engineering (LAB)	L T P	Cr
		0 0 2	2

LIST OF EXPERIMENTS

1. Uses of basic construction tools in building construction
2. To determine quality test of bricks
3. Different types of bonds used in brick masonry work
4. To determine angle of repose and visualization of different materials i.e. Gravel, Sand, Clay and Ashes.
5. Physical tests to find the quality of cement
6. Determination of forces in the various members of a truss.
7. Detailing for the Equilibrium of coplanar, concurrent forces.

8. To determine PH value of water and dissolved oxygen in water
9. To study the layout of building plan.
10. To determine the alkalinity of given water sample

CSB-101	COMPUTER PROGRAMMING	L-T-P	Cr
		3-0-0	3

OBJECTIVE

To introduce the students the basic of C and Logic behind the implementation of different features of C like different data types , function, array, control statements, pointers, structures, file processing and recursion

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.
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.

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
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,
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

CSB -151 A	A Computer programming Lab	L-T-P 0-0-2	CR 2
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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
Write a program to find the sum and average of five numbers
- 21
- 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

EN-101	COMMUNICATION SKILLS-1	L T P	Cr
		3-0-0	3

Objective: To enhance the student's word power, listening & reading comprehension and the conversational skill; to introduce phonetics, its importance and to enable the students for phonetic transcription; to make them capable of drafting leave applications and expansion of ideas; to make them aware of the basics of campus etiquettes so that they would behave with a sense of responsibility.

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.

EN-151	COMMUNICATION SKILLS LAB-1	L T P	Cr
		0-0-2	1

English Language Lab: Ten practical classes. Following activities are distributed:-

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.

EN-102	COMMUNICATION SKILLS-2	L T P	Cr
		3-0-0	3

Objective: To strengthen the vocabulary and its application; to enhance grammatical and structural correctness of sentences while speaking & writing; to understand and apply the various business correspondence, and to enhance communication competency through various oral presentations

UNIT 1: Vocabulary:-A new set of 50 synonyms, antonyms, homophones & homonyms and to frame sentences; Phrasal verbs & idioms & foreign words & phrases (30 each) and their usage in sentences.

UNIT 2: Applied Grammar:-Parts of speech – conversion and special usage; Tenses & application; Types of sentences; conditional sentences; Sentence correction with respect to Parts of speech, tenses & types of sentences

UNIT 3:- Spoken English:- Phonetic symbols; Transcription of words; Strategies for effective speaking; JAM & Extempore speech on simple topics from daily life; Objectives & purposes of GD; GD on movies and campus related matters; Public speaking tips

UNIT 4: Reading Comprehension:-Comprehending selected prose & poem, unseen passages and preparing précis; Note making; Summarizing Viewing & reviewing movies, TV Programmes ,books etc. Composition based on cartoons, pictures, slogans etc.; Ad making; Introduction to brochure

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 (2nd 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.

EN-152	COMMUNICATION SKILLS LAB-2	L T P	Cr
		0-0-2	1

English Language Lab: Ten practical classes. Following activities are distributed:-

1. **Listening Skills:** Listening to the Audio clips of important speeches; conducting a discussion on the listened content; writing & presenting the content of the speech / conversation. (Speeches are saved in the system)
2. **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.
3. **Reference Work:** Students are given topics of current importance and are asked to collect information from the Internet and to share it in front of the class. A creative teacher can develop a good discussion on the topic. Suggested topics:- CBCS System by the UGC; Need of foreign language proficiency; Career opportunities for a B.Tech. degree holder; Information on CAT, GMAT, GRE etc.
4. **News Paper Reading:** Reading online news paper; encouraging students on how to catch the headlines and to develop conversation on topics of greater significance.
5. **Extempore Speech:** Discuss the rules for effective Extempore speech; differentiate it from Elocution; conduct extempore speech on topics from daily life.
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. **Presentation** – Discuss the presentation skills and assign the students with topics for effective presentation.
10. **Conversation ability**:- Develop lively and meaningful conversation in pairs or in group. Let them practice writing down the conversation exchanges.

Note: By the end of the second 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.

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 grade

CEA-101	ENVIRONMENTAL SCIENCE AND ECOLOGY	L T P	Cr
		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.

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
5. .Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., Environmental

EC- 101- A	BASICS OF ELECTRONICS ENGG. (EOE- IV)	L-T-P	Credit
		3-0-0	3

1. HISTORICAL BACKGROUND: Vacuum tubes; working of vacuum tube and their characteristics; vacuum diode; triode; tetrode and pentode .

2. PN JUNCTION: Depletion layer; Barrier potential; Forward and reverse bias; Breakdown voltage; PIV; switching characteristics of p-n junction diode; knee voltage; load line; and operating Point Ideal p-n junction diode; junction capacitance; zener diode.

3. RECTIFIERS AND FILTERS: Half wave; centre tap full wave and bridge rectifier; percentage of regulation; PIV; ripple factor; C; RC; LC and PI filter; voltage doubler; clipping and clamping circuit; voltage regulation.

4. BIPOLAR JUNCTION TRANSISTOR: Introduction; basic theory of operation of PNP and NPN transistor-VI characteristics; CB; CE and CC configuration; different biasing techniques.

5. FIELD EFFECT TRANSISTOR AND THYRISTOR FAMILY

A) FET: Introduction; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction; theory of operation; MOSFET parameters; application, different biasing techniques.

B) Introductory idea of multistage and feedback amplifiers; Introduction to Thyristor Family (SCR).

TEXT BOOK

Millman and Halkias, “Electronic Devices and Circuits”, 2nd Edition, Tata McGraw Hill, 2000

REFERENCE BOOKS

1. Millman and Halkias, “Integrated Electronic”, Tata McGraw Hill, 3rd Edition, 2001
2. Boylestad and Nashelsky, “Electronic Devices and Circuits”, 4th Edition, Pearson Education, 1999.
3. Malvino, “Electronic Principles”, 5th Edition, Tata McGraw Hill, 2004.
4. Bell David A., “Electronic Devices and Circuits”, 3rd Edition, Prentice Hall of India, 2007
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:- ELEMENTS OF ENGINEERING - IV (EC-151)

Basics of Electronics Engineering

LIST OF EXPERIMENTS

EXP. No.	TITLE OF EXPERIMENT
1.	To plot and understand the V-I characteristics of P-N Junction Diode and comparison with Zener Diode.
2.	To plot and understand the Common Base Transistor Characteristics of NPN Transistor.
3.	To plot and understand the Common Emitter Transistor Characteristics of NPN Transistor.
4.	To plot and understand the Junction Field Effect Transistor Characteristics (n-channel JFET)
5.	To plot and understand the characteristics of SCR and find the latching and holding current.
6.	To plot and understand the characteristics of UJT.
7.	To plot and understand the characteristics of DIAC/TRIAC
8.	To plot and understand the V-I characteristics of Photo Voltaic or Solar Cell.
9.	Implementation of clipper and clamping circuits

10.	Introduction to the simulation software – PSPICE.
11.	Verification of Half-Wave and Full-Wave Rectifier
12.	To obtain the drain current of the enhancement n-MOS using PSPICE.
13.	V-I CHARACTERISTICS OF LED (LIGHT EMITTING DIODE)

EL 101- A	BASICS OF ELECTRICAL ENGG. (EOE-III)	L-T-P	Credit
		3-0-0	3

1. DC CIRCUITS: Nature of electricity; Electric current, EMF and Potential difference; Passive elements; Ohm's law; Electrical power and energy; Voltage and current sources; Series parallel Circuits; Network Terminology; Kirchoff's laws; Network Simplification by using Loop method and Nodal method.

2. NETWORK THEOREMS: Introduction; Superposition Theorem; Thevenin's theorem; Norton's theorem, Conversion of Thevenin's equivalent into Norton's equivalent and vice versa; Maximum Power Transfer theorem; Reciprocity theorem; Star to Delta and Delta to Star transformation.

3. SINGLE PHASE AC CIRCUITS: Generation of ac voltages; AC Terminology; Derivation of RMS and maximum value of alternating current and voltage; Form factor and peak factor; Phasor representation of alternating quantities; phase and phase difference; polar, rectangular, exponential and trigonometric representation of Phasor; Behavior of pure R, L & C components in ac circuits; single phase series R-L, R-C, R-L-C circuit; Introduction to resonance.

4.THREE PHASE AC CIRCUITS: Introduction; Merits & Demerits of three phase system over single phase system; Generation of three phase voltages; phase sequence; Three phases interconnection using star and Delta arrangement; Derivation of relation between phase and line voltages and currents; Measurement of power in three phase circuits using one wattmeter, two wattmeter and three wattmeter method.

5. 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.

TEXT BOOK

Gupta, J.B. "Electrical Technology", 2nd Edition, Katson Publication, 2007

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. Del Torro Vincent, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall of India, 1994.
4. Theraja, B.L. "Electrical Technology Vol I & II", S. Chand Publications, 2005

EL - 151 ELEMENTS OF ENGINEERING LAB – III

L T P Cr

0-0-2

1

LIST OF EXPERIMENTS

1. To verify KCL and KVL.
2. To verify Thevenin's and Norton's Theorems.
3. To verify maximum power transfer theorem in D.C Circuit and A.C Circuit.
4. To verify Reciprocity and Superposition theorems.
5. To study frequency response of a series R-L-C circuit and determine resonant frequency and Q-Factor for various Values of R, L, C.
6. To study frequency response of a parallel R-L-C circuit and determine resonant frequency and Q-Factor for various values of R, L, C.
7. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
8. To perform open circuit and short circuit tests on a single-phase transformer determine the losses and efficiency.
9. To perform direct load test of a DC shunt generator and plot load voltage Vs load current curve.
10. To study various types of meters.
11. Measurement of power by 3 voltmeter / 3 ammeter method.
12. Measurement of power in a 3 phase system by two watt meter method.
13. Connection and testing of a single-phase energy meter (unit power factor load only).

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.

Department of Chemistry

Course Code: CHB-101A

- (i) **Unit-1: Phase Rule:** Terminology, Definition of phase rule, Derivation of phase rule equation, One component system (H₂O system and CO₂ 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.
- (ii) **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
- (iii) **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.
- (iv) **Unit-IV:**
Part-A 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).
Part-B Cheminformatics: Introduction to Cheminformatics: History and evolution of cheminformatics, Use of cheminformatics, Prospects of cheminformatics, Molecular Modelling and Structure elucidation. Representation of molecules and chemical reactions: Nomenclature, Different types of notations, SMILES coding, Matrix representations.
- (v) **Unit-V: 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 & electro dialysis. Softening of water: Zeolite method. Ion exchange method: Demineralized and mixed bed demineralized method.

Applied Chemistry Practicals, Course Code: CHB-151

- (i) Determination of Ca⁺⁺ and 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 KMnO₄ solution using spectrophotometer.

- (ix) To determine the strength of HCl solution by titrating against NaOH Solution conductometrically.
- (x) To determine the Na⁺ and K⁺ ions with the help of flame photometry

PD – 193 B	CORPORATE & PERSONLAITY SKILLS	L	T	P	Cr
					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. **CORPORATE DRESSING & GROOMING:** The Corporate Fit, Corporate Culture, Dress Codes, Dressing for Interviews, Clothing do's and don'ts. 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.
3. **CREATIVE THINKING:** What is creativity, 6 Thinking Hats, Mental Blocks, Exercises.
4. **SELF DISCOVERY & SELF AWARENESS:** Importance of Knowing Yourself, SWOT Analysis, Benefits, Strengths and Weaknesses, Exercises. Development of our Self Image, Social Comparison, Significant others, Self Esteem, Self Confidence
5. **ASSERTIVENESS & CONFIDENCE:** Assertiveness, Being Confident, Strategies to make Assertive NO Easier, Dealing with Emotions, Difference between being Aggressive and being Assertive.

REFERENCE BOOKS

1. Haddon, F. Peter, "Mastering Personal and Interpersonal Skills", Viva Books Pvt. Ltd., 2003
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

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/>

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
BA-273A	ECONOMICS AND INDUSTRIAL MANAGEMENT	3	0	0	3

Course Objectives:

The purpose of this course is to acquaint the students in the basic economic concepts and their operational significance. Stimulate them to think systematically and objectively about contemporary economic problems.

UNIT-1: INTRODUCTION

Definition of economics; Central problems of economy and the Production Possibility Curve, Application of PPC, Concept of Utility, Marginal Utility, Law of Diminishing Marginal Utility (DMU); Law of Equimarginal Utility (EMU)

UNIT-2: DEMAND

Meaning of Demand, Law of demand, Demand function & Factors affecting Demand; Changes in the Demand curve; Elasticity of demand; Types of Elasticity, Price elasticity & its degrees, Measurement of elasticity of demand; Factors affecting elasticity of demand; Importance of Price Elasticity of demand.

UNIT-3: PRODUCTION FUNCTION

Meaning of production and production function; Law of Variable Proportions; Law of Returns to Scale, Internal and External Economies and Diseconomies of scale

UNIT-4: COST FUNCTION

Cost concepts- fixed cost, variable cost, average cost, marginal cost, opportunity cost; Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

UNIT-5: MARKET STRUCTURES

Meaning of market; Main features of Perfect competition; Monopoly; Oligopoly; monopolistic competition, Equilibrium Price, Role of demand and supply in Equilibrium price; Effect of changes in demand and supply on it; Indian economy features, Privatization; Globalization (merits & demerits).

TEXT BOOK

1. Raj Kumar, Kuldeep Gupta, Economics for Engineers, UDH publications

2. Jain T.R., Economics for Engineers, VK Publication

REFERENCE BOOKS

1. Chopra P. N., Principle of Economics, Kalyani Publishers
2. Dewett K. K., Modern economic theory, S. Chand
3. H. L. Ahuja., Modern economic theory, S. Chand
4. Mishra S. K., Modern Micro Economics, Pragati Publications

Course outcomes:	
1.	Upon successful completion of this course, students will acquire the skills to apply the basics of economics and cost analysis to engineering and take economically sound decisions.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
MA-202-A	APPLIED NUMERICAL METHODS	3	0	0	3

Course Objectives:
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-1: 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; 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 by least square method

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; Romberg' method.

UNIT-5: SOLUTION OF ORDINARY DIFFERENTIAL EQUATION

Euler method; Euler modified method; Rungekutta method; Milne's predictor -corrector method; Adams-Bashforth method for finding solution of differential equation.

TEXT BOOK

Grewal, B. S., "Numerical methods in Engineering and Science", 9th Edition, 2010, Khanna publishers.

REFERENCE BOOKS

1. Jain, R.K. and Iyengar, S.R.K., "Numerical Methods for Scientific and Engg. Computations" 5th Edition, 2007, New Age International publishers.
2. Sastry, S.S., "Introductory Methods of Numerical Analysis", 3rd Edition, 1999, Prentice Hall of India.
3. Applied Numerical Analysis" by Curtis F, Gerald and Patrik.
4. Numerical Methods by E. Balagurusamy T.M.H

Course outcomes:	
1.	It helps the students to have a clear perception of the power of statistical and numerical techniques, ideas.
2.	Students can able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
ME-201A	THERMODYNAMICS	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, Numericals Steady flow systems and their analysis, Steady flow energy equation, Boilers, Condensers, Turbine, Throttling process, Pumps etc., Numericals

UNIT-3: SECOND LAW OF THERMODYNAMICS AND ENTROPY

Limitations of Ist 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 it's 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 it's 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

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
ME-203A	ENGINEERING MECHANICS	3	1	0	4

Course Objectives:

The primary purpose of this course is to make student understand and develop skill to predict the effect of force and motion while carrying out design function. It is foundation for design of various mobile devices.

UNIT-1: KINEMATICS OF PARTICLES & KINETICS OF PARTICLES

Particle motion; velocity and acceleration in rectangular path; relative motion; motion of constrained particles; Force; mass and acceleration; Newton's Law for rectangular coordinates. Equations of motion and solution of problems; work energy equations; work energy equations for system of particles.

UNIT-2: PLANE KINEMATICS OF RIGID BODIES

Plane motion; translation and rotation of rigid bodies; Chasles theorem relative velocity; Instantaneous center of zero velocity; relative acceleration; Coriolis acceleration.

UNIT-3: PLANE KINETICS OF RIGID BODIES

Force; mass and acceleration; general equations of motion; Translation; fixed axis rotation; general plane motion.

UNIT-4: STATIC FORCE ANALYSIS

Static force analysis of planer mechanisms; dynamic force analysis including inertia and frictional forces of planar mechanisms.

UNIT-5: DYNAMIC FORCE ANALYSIS

Dynamic force analysis of reciprocating engines.

TEXT BOOK

Meriam, J. L., "Dynamics", Wiley India, 5th edition, 2006

REFERENCE BOOKS

1. Shames I H "Engineering Mechanics – Statics & Dynamics" Prentice Hall of India 4th ed; 2003
2. "Vector Mechanics for Engineers Dynamics" 8th ed; Ferdinand P Beer; E Russel Johnston

Course outcomes:

1.	Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
2.	Ability to analyze the forces in any structures.
3.	Ability to solve rigid body subjected to dynamic forces.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
ME 205A	MANUFACTURING TECHNOLOGY	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 arc welding; inert gas shielded arc welding ;tungsten inert gas welding(TIG);metal inert gas welding (MIG);Submerged arc welding (SAW) Principle;resistance spot welding;resistance seam welding;upset welding;flash welding Other welding processes; introduction of thermit welding; electro slag welding; electron beam welding; friction welding; diffusion welding; brazing and soldering

TEXT BOOK

1 Rao P.N., "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", Voll., 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.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
ME-207A	MACHINE DRAWING & CAD	1	0	6	4

Course Objectives:

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. Autocad is introduced to facilitate this process

UNIT-1: INTRODUCTION TO CAD

Advantages of CAD; Starting Autocad program; Autocad screen; Autocad commands; Function key assignments; shortcut key characters; VCS and VCS cone; Coordinate system; units; Drawing Aids Objectsnap; Drawing basic entities; Correcting mistakes; object section; modify commands; modify properties; match properties

UNIT-2: SECTIONAL VIEWS

Types of sections; conventions in sectioning; hatching; using Autocad; Isometric projections; Isometric Scale; Drawing isometric drawing of Circles; conversion of isometric to orthographic and vice versa; Isometric grid with CAD Examples;

UNIT-3: JOINTS AND COUPLINGS

Riveted joints; Bolts and Nuts threads; welded joints; shafts; keys; cotter and pin joints; couplings

UNIT-4: TOLERANCES

LIMITS & FITS & MATERIALS SPECIFICATION: Limits and fits; Geometrical Tolerances and surface finish; Material Specifications.

UNIT-5: MACHINE PARTS AND ASSEMBLY DRAWINGS

SPRINGS, BELTS & PULLEYS, BEARINGS, GEARS Assembly of a connecting rod; crank shaft of a four cylinder; Assembly of a screw Jack; assembly drawing of a stop valve; assembly of a spring loaded safety Valve; assembly of Tail stock; assembly of shaper tool slide; Block diagrams.

TEXT BOOK

Singh, Ajeet., “Machine Drawing”, McGraw-Hill 2008

REFERENCE BOOKS:

1. Gill, P. S., “Machine Drawing”, S K Kataria and Sons, 2008
2. Bhatt, N. D, and Panchal, V. M., “Machine Drawing”, Charotar Publishing House, 2008

Course outcomes:	
1.	Upon completion of this course, the students can able to perform free hand sketching of basic geometrical constructions and multiple views of objects.
2.	students can able to prepare isometric and perspective sections of simple solids
3.	Students can able to demonstrate computer aided drafting.

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
MA 252-A	APPLIED NUMERICAL METHODS LAB	0	0	2	1

Course Objectives:
To acquaint the students with the various concepts and tools of numerical methods in Mathematics.

LIST OF EXPERIMENTS

1. To find theroots ofnon-linear equation using Bisection method.
2. To find theroots ofnon-linear equation using Secant method.
3. To find theroots ofnon-linear equation using Newton’s method.
4. To solve thesystem of linear equations using Gauss-Elimination method.
5. To solve thesystem of linear equation using Gauss-Seidal iteration method.
6. To find thevalues offunction at a particular point using Newton’s forwardformula.
7. To find thevalues offunction at a particular point using Newton’s backward formula.
8. To find the values offunction at a particular point usingLagrange’s interpolation formula.
9. To integrate numericallyusing Trapezoidal rule.

10. To integrate numerically using Simpson's rule.
11. To find the solution of o.d.e (ordinary differential equation) by Euler's method.
12. To find the solution of o.d.e by Runge-Kutta method.
13. To find the numerical solution of Laplace equation.
14. To find the numerical solution of heat equation.
15. To find the numerical solution of wave equation.

Course outcomes:

1.	Upon completion of this course, the students can able to understand roots of non-linear equation.
2.	Students can able to various methods of Matrix problems by using Gauss-Elimination, Gauss-Seidal equations.

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School of Mechanical Engineering

B.Tech Automobile Engineering (III SEMESTER)

Course code	Course title	L	T	P	Credits
ME-235A	MANUFACTURING TECHNOLOGY LAB	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

Course outcomes:

- | | |
|----|---|
| 1. | Upon completion of this course, the students can able to demonstrate and fabricate different types of components using the machine tools. |
|----|---|

Course code	Course title	L	T	P	Credits
ME-239-A	COMPUTER METHODS IN MECHANICAL ENGINEERING LAB	0	0	4	2

Course Objectives:

To Study and practice the various mathematical equations by using some computer applications and also to inculcate the knowledge about MAT lab.

LIST OF EXPERIMENTS

1. To perform the operations of Interactive computing; Array and Matrix manipulation; saving loading data from excel sheets; saving m-files
2. To write simple programs for manipulation Of arrays; matrices; solving polynomial expressions; differentiating and integrating simple equations
 - a. To perform plotting of different variables in 2D and 3D workspace
 - b. To perform exercises related to for-loop; if statements and while loop and understanding the variables and debugging in MatLab
3. To write programs for manipulation strings; symbols and numbers;
 - a. To perform the experiment no. 2 using symbolic tool box
4. To perform the experiment no. 3 using symbolic tool box
5. To write a program for solving a set of linear system of equations using different algorithms an compare with built in functions of MatLab To perform experiment no. using symbolic tool box
6. . To write programs for solving differential equations numerically using different algorithms
7. To write programs to solve the set of differential equations using different algorithms
8. To perform experiment no. 11 using symbolic tool Box

Course outcomes:

- | | |
|----|--|
| 1. | Upon completion of this course, the students can able to understand array and Matrix manipulation. |
| 2. | Students will be capable of solving polynomial expressions by using computer applications. |

Course code	Course title	L	T	P	Credits
AE-200A	MOTOR VEHICLE TECHNOLOGY	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, Ihp, 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, synchromesh 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, ¾ 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”, DhanpatRai& Sons, 1998

Course outcomes:	
1.	Upon successful completion of this course, students will acquire the skills to apply the basics of components and anatomy analyze the automobile.

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (IV SEMESTER)

Course code	Course title	L	T	P	Credits
AE 202A	HYDRAULIC & PNEUMATIC SYSTEMS	3	0	0	3

Course Objectives:
At the end of the semester students will be understand the structure and the properties of the fluid, to understand and appreciate the complexities involved in solving the fluid flow problems, To understand the mathematical techniques already in vogue and apply them to the solutions of practical flow problems, To understand the energy exchange process in fluid

mechanics handling incompressible fluids.

UNIT-1: BASIC CONCEPT AND PROPERTIES

Fluid: definition, distinction between solid and fluid: units and Dimensions: Properties of fluids: density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension – Fluid statics: concept of fluid static pressure, absolute and gauge pressure measurements by manometers and pressure gauges, problems.

UNIT-2: FLUID KINEMATICS AND FLUID DYNAMICS

Fluid Kinematics: Flow visualization : lines of flow : types of flow –velocity field and acceleration : continuity equation (one and three dimensional differential forms) : Equation of streamline: stream function : velocity potential function : circulation : flow net, equations of motion- Euler's equation along a streamline, Problems.

UNIT-3: INCOMPRESSIBLE FLUID FLOW

Viscous flow : Navier, Stoke's equation (statement only) :Shear stress, pressure gradient relationship laminar flow between parallel plates ; Laminar flow through circular tubes (Hagen Poiseuille's) , Hydraulic and energy gradient ; flow through pipes : Darcy-Weisback's equation ; pipe roughness ;friction factor; Moody's diagram ; minor losses ; flow through pipes in series and in parallel ; power transmission ; Boundary layer flows, boundary layer thickness, boundary layer separation ; drag and lift coefficients, problems.

UNIT-4: HYDRAULIC TURBINES & HYDRAULIC PUMPS

Impact of jet on flat, curved and moving plates ;Fluid machines: definition and classification; exchange of energy ; Euler's equation for turbo machines ;Construction of velocity vector diagram's ; head and specific work ; component of energy transfer ; degree of reaction, performance curves.: Pumps: definition and classifications; Centrifugal pump: classifications, working principles, velocity triangles, specific speed, efficiency and performance curves; reciprocating pump: classification, working principles, indicator diagram, work saved by air vessels and performance curves; cavitations in pumps rotary pumps: working principles of gear and vane pumps.

UNIT-5: COMPRESSOR AND FANS

Definition–Classification difference, efficiency, performance curves special application in Auto mobile Industries, working and construction of reciprocating, volumetric efficiency, performance curves, inter-cooling, two stage compression optimum inter-cooling pressure, applications of compressors and fans in automobile industry. Dimensional numbers, their application: Buckingham's π theorem: applications: similarity laws and models; problems.

TEXT BOOK

Bansal, R. K., "Fluid Mechanics and Hydraulics Machines", 5th Edition, Laxmi Publications, 1995

REFERENCE BOOKS

1. Kumar, D. S., "Fluid Mechanics and Machines", Kataria Publication.
2. White, F. M., "Fluid Mechanics", 5th Edition, Tata McGraw-Hill, 2003.

Course outcomes:

1.	Students can Understand the fundamentals of fluid power system.
2.	Design the components of pneumatic systems and circuits.
3.	Optimize and Identify the components of hydraulic systems.

Course code	Course title	L	T	P	Credits
AE-204A	AUTOMOTIVE TECHNOLOGY	3	0	0	3

Course Objectives:

Automotive technology is one of core subject which will provide the knowledge about Braking, suspension, steering, lubrication and Air-conditioning system about the Automobile Technology.

UNIT-1: BRAKING SYSTEM

Fundamentals, frictional forces, braking terms—stopping distance, braking efficiency, brake fade, weight transfer, brake torque, work done. Safe deceleration, road adhesion, Forces acting on vehicle when on a level road, while cornering; Calculation of normal reaction when all wheels are braked; Numericals; Principle, construction working of Parking brakes, Hydraulic brakes, pneumatic brakes, compressed air brakes, air hydraulic brakes, Drum brakes – Principle, leading and trailing shoes twin leading shoes; Hydraulic brakes – brakes shoes, brake lining, brake drums, back plate; Conventional and tandem master cylinder, wheel cylinder, component parts and working; Disc brakes: Types swinging ; sliding caliper, two and four cylinder caliper, principle, double disc; Construction and working; Advantages over drum brakes; Properties of friction lining & pad material, hydraulic brake oil; Procedure for bleeding of brakes, trouble and diagnosis; Electronic ABS system – Layout, working details.

UNIT-2: SUSPENSION SYSTEM

Vehicle dynamics and suspension system; Requirements. Springs—types, coil, leaf, torsion bar, rubber and pneumatic; Laminated - classification, fully - elliptic, Semielliptic, transverse, three quarter, elliptic. Design features – grading, nipping, Constant and variable rating, cambering, uniform stress distribution, inter leaf inserts; Types: Conventional and independent suspension system: component parts and working details; Shackles, rubber bushes, metal bushes, advantages of coil springs; Torsion bar suspension system, Hydro elastic suspension, Air suspension : component parts and working; Design of laminated springs; Numericals; Hydraulic dampers: Shock Absorbers : construction and working details; Mc – Phearson strut, Independent rear suspension, Suspension Service.

UNIT-3: FRONT AXLE AND STEERING SYSTEM

Front axles : types, Elliot and Lemoine, Hubassembly, calculation of bearing loads; Numericals; Front wheel alignment – Need caster, camber, KPI, toe – in, toe-out adjustments; Centre-point steering; Steering mechanism – Ackermann & Davis; Condition for true rolling; Over steer, under steer, slip angle; Turning circle radius; Steering systems: Function and requirements; Steering linkage steering components – column, steering gearbox: rack and pinion, re-circulating ball, Cam and peg, Worm and roller, worm and sector : Construction and working details; Power steering : Hydraulic and electronic- working and component parts details; Four wheel steering; Effects of wrong steering geometry on tyres.

UNIT-4: AUTOMOBILE AIR-CONDITIONING AND AUTOMOTIVE SAFETY

Requirements, Theoretical vapour compression cycle; Components: Dehydrator, Desiccant, Fitter, Strainer, sight glass, accumulator, Thermostatic Expansion Valve, Evaporator, compressor, types Driving system, Condenser, Hoses and fitting, valves, refrigerant and oil, Heater: Heater core, Vacuum motors, Heater control, blower, time-delay relay, heat switch; electromagnetic clutch; Sensors working of all component parts; Air Conditioner Service, Trouble shooting. Types of automotive body work-monocoque, semi-monocoque tube frame, space frame. Body design for safety, engine location, concept of crumple zone, safety sandwich construction; Definitions: Front floor side, reinforcement C-pillar, seat cross beam, accoustical cross beam, Body style : Sedan, Hard top, coupe and limousine. Roadster, convertible and cabriolet, Station wagon, hatch back; Collapsible steering column, tiltable steering, seat adjustment, collision warning device, air bags (SRS) circuit, head lamps, fog lamps, speedometer, odometer, GPS, seat belt system; Auto Safety and Crash Testing: NCAP (New Car assessment rating), Frontal: Impact tests, offset, side impact, roll-over, roadside hardware, old Vs new full width frontal tests, Head restraints rating.

UNIT-5: TWO AND THREE WHEELED VEHICLES AND MODERN FUEL INJECTION TECHNOLOGY

Idea of two and four stroke SI, CI and CNG engines used in two and threewheelers. Component parts and working of: fuel system : Mikuni and zenith carburetors; lubrication system; cooling system; magnetic coil; capacitive discharge ignition (CDI) system, AC generator; clutch system; transmission system; starting system : kick and battery; drive train systems; Engine tuning data; Frames : types; backbone, tubular and double cradle type; Component parts of brake, suspension and steering systems; Panel meters and controls on handle bar, connection of brake, clutch and accelerator cables.

MODERN FUEL INJECTION TECHNOLOGY

Gasoline MPFI and diesel CRDI systems; Petrol and diesel engine emission norms – EURO V and BS – III, Construction and function of : ECM, ALDL, CALPAK, manifold vacuum sensor, oxygen sensor, VSS, TBI, TPS, MAF, CTS, MAP, ECM input and output diagram; Computer controlled carburetor systems : Air fuel ratio control, throttle body injection systems, idle air control (IAC) motor, injectors; Fuel system components, operation. Electronic diesel injection pump and control system, Pressure valve and injection lines. Injection nozzles, glow plug circuits.

TEXT BOOK

Kohli, P. L., “Automotive Chassis & Body”. Tata McGraw Hill, 1987

REFERENCE BOOK

Sethi, H. M., “Automotive Technology”, Tata McGraw Hill, 2003

Course outcomes:	
1.	At the end of the course the students will have command over automotive engines and the recent development in the area of engines.
2.	Students can Understand the basic principles of engines used for automobiles and different systems.
3.	Students will have the brief knowledge about modern fuel injection system.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (IV SEMESTER)

Course code	Course title	L	T	P	Credits
ME-200A	STRENGTH OF MATERIALS - I	3	1	0	4

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.

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 REACTION OF BEAMS

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.

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: MOHR CIRCLE OF STRESSES

Mohr's circle of stress for a material under similar stresses in two mutually perpendicular plane, Mohr's circle of stress for a material under dissimilar stresses in two mutually perpendicular plane Mohr's circle of stress for a material under similar stresses in two mutually perpendicular plane along with shear stresses acting on all the planes, Mohr's circle for a material under dissimilar stresses in two mutually perpendicular plane along with shear stresses acting on all the planes. Numerical.

TEXT BOOK

Ferdinand P Beer & Russel E Johnston;—Mechanics of Materials, Tata McGraw Hill; 2009

REFERENCE BOOKS

- Hibbeler, R. C.,—Mechanics of Materials, Pearson Education, 2005
- Ryder, G H., —Strength of Materials, Macmillan, 2001
- Srinath L S,—Strength of Materials, Macmillan, 2001

4. Andrew / Kiusalaas, Jaan., —Mechanics of Materials, Thomson, 2003

Course outcomes:	
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
ME-202A	KINEMATICS OF MACHINES	3	1	0	4

Course Objectives:
<ul style="list-style-type: none"> • 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: INTRODUCTION OF MECHANISMS AND MACHINES

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, Corioli'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/REFERENCE BOOKS:

1. Theory of machines by S.S. Rattan.

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 motion transmission 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
AE-240A	MOTOR VEHICLE TECHNOLOGY LAB	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.

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| 3. | Students can have the knowledge about the transmission elements like propeller shaft, universal joints, etc., |
|----|---|

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (IV SEMESTER)

Course code	Course title	L	T	P	Credits
AE-242A	HYDRUALIC AND PNEUMATICS SYSTEM LAB	0	0	2	1

Course Objectives:

Students can able to have hands on experience in flow measurements using different devices and also perform calculation related to losses in pipes and also perform characteristic study of pumps, turbines etc.,

LIST OF EXPERIMENTS

1. Determine the Coefficient of discharge of given Orifice meter.
2. Determine the Coefficient of discharge of given Venturi meter
3. Determine friction factor of given set of pipes.
4. Determine the co-efficient of impact for vanes.
5. Study the constructional details of a centrifugal pump and draw its characteristic curves.
6. Study the constructional details of a reciprocating pump and draw its characteristic curves.
7. Study the constructional details of gear pump and draw its characteristics curves.
8. Study the constructional details of Pelton wheel and draw its characteristics curves.
9. Study the constructional details of Francis turbine and draw its characteristic curves.
10. Study the constructional details of Kaplan turbine and draw its characteristic curves.
11. Verify Bernoulli's theorem.

12. Study the constructional details of centrifugal / reciprocating compressor.
13. Study the constructional details of fan.

Course outcomes:	
1.	Utilize basic measurement techniques of fluid flow
2.	Demonstrate practical understanding and applications of Bernoulli's Equation
3.	Analyse the friction losses in pipes.

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B.Tech Automobile Engineering (IV SEMESTER)

Course code	Course title	L	T	P	Credits
AE-244A	AUTOMOTIVE TECHNOLOGY LAB	0	0	2	1

Course Objectives:
To train the Students to know the details of different components, dismantle and assembling them.

LIST OF EXPERIMENTS

1. Study and function of each component of Drum, Disc, Multiplate Disc and ABS brake system.
2. Study of mechanical, hydraulic and pneumatic brake system.
3. Identification and function of each component of front and rear Suspension System.
4. Study of manual and power assisted steering mechanism.
5. Evaluate steering systems and steering linkage geometry.
6. Study and function of each component of different types of front axles with hub.
7. Layout of A.C system of a car. Identify and give functions of its each unit.
8. Study of 3-wheeler chassis frame and power transmission system and comparison of their various parameters.
9. Study the carburetor of motor cycle/ scooter. Set mixture screw for idle running

10. Study motor cycle drive train system and adjust
 - a. (a). Clutch play
 - b. (b). Gears Play
 - c. (c). Front & rear brakes
11. Study capacitive discharge ignition system for engine of a motor cycle/scooter.
12. Study of MPFI System for a gasoline engines along with sensors and catalytic converter.
13. Study of diesel injection system, reciprocating F.I.P, rotary pumps and injectors used in TDI and CRDI system.\

Course outcomes:	
1.	Ability to handle brake mechanism.
2.	Students could be familiar in operating the steering mechanisms.
3.	Students can have the knowledge about various clutches and gears in automobiles.

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B.Tech Automobile Engineering (IV SEMESTER)

Course code	Course title	L	T	P	Credits
ME-240A	STRENGTH OF MATERIALS LAB	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.

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School of Mechanical Engineering

B.Tech Mechanical Engineering (IV SEMESTER)

Course code	Course title	L	T	P	Credits
ME-242A	KINEMATICS OF MACHINE LAB	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 EXPERIMENT

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

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School of Mechanical Engineering

B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
AE-301A	AUTOMOTIVE POLLUTION AND CONTROL	4	0	0	4

Course Objectives:

To impart the knowledge of hydrocarbons NOX, Sulphur and other pollutants which come out during the operation of Automobile.

UNIT-1: INTRODUCTION

Harmful air pollution emissions from all type of engines, Formation of harmful emissions; smog; temperature inversion; suspended particulates (SPM) and RSPM; control strategies. Effect of harmful emissions on human health; environment and plants; global warming; Vehicle population in cities; Safe limits for SPM and RSPM and other pollutants in cities

UNIT-2: ENGINE EMISSIONS AND EMISSION CONTROL

Types of emissions from SI and CI two stroke and four stroke engines; Reasons for their formation; Sources of emission – engine exhaust; petrol tank; carburetor; crankcase blow by: Effect of valve timing; ignition timing; combustion chamber design; fuel injection; fuel composition; air-fuel ratio; mechanical condition of engine components and driving modes; Origin and content of particulate emissions and formation. Crankcase emission control; causes of blow by; Draft tube ventilation; positive crankcase ventilation (PCV) systems; open PCV systems; closed PCV systems: components and working; Evaporative emission control (EEC) systems : components and working Charcoal canister : construction and working; Air injection system: components and working; Engine design and modification; Spark timing control; Exhaust gas recirculation (EGR): component parts and working; Catalytic converters; Multipoint fuel injection and common rail direct injection

UNIT-3: CATALYTIC CONVERTERS AND PARTICULATE

FILTERS: Oxidation and reduction reactions; Converter design-oxidation and reduction converter; Operation and operating precautions; Fuel requirements; engine condition; applications. Three-way catalytic converters-performance; structure; Particulate filters used in CI engines: construction and working; Catalyst loading; Deactivation of catalysts. Substrates: ceramic and metallic. Advantages of metallic substrate over ceramic; Regeneration methods

UNIT-4: INSTRUMENTATION FOR EXHAUST EMISSION MEASUREMENT and EMISSION

NORMS: Non dispersive infrared analysis (NDIR); flame ionization detector (FID); five gas analyzer; optical smoke meter; units of measurement; NOx chemiluminescent analyzer; Sampling methods: Orsat apparatus; Gas chromatograph. European norms: EURO I to EURO V; Indian pollution norms: Bharat stage I to Bharat stage-III; Central Motor Vehicle Rules (CMVR); Maximum pollution allowed as per motor vehicle act -1988 for SI and CI engines; Diesel particulate emission standards.

UNIT-5: GLOBAL WARMING

Meaning; effect on humanity; smog formation; ozone layer function; Gases which create holes in ozone layer; Ultraviolet rays: effects on humanity; Future thoughts by G-8 nations.

TEXT BOOK

Robert, E. F., "I. C Engines and Air Pollution", 1988

REFERENCE BOOKS:

1. Giri, N. K., "Automotive Technology", Khanna Publishers, 2009.
2. Automobiles Emission by SAE Transactions-1982 (3Vols)

Course outcomes:	
1.	After the completion of this course students can learn emission norms and skills to operate the automobile within the pollution control norms and learn analysis of pollutants.

Course code	Course title	L	T	P	Credits
AE-303A	AUTOMOTIVE ENGINES	3	1	0	4

Course Objectives:
Impart 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:	
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

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School of Mechanical Engineering

B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
AE-305A	DESIGN OF AUTO COMPONENT-1	3	2	0	5

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

Problem identification; problem statement; specifications; constraints; Feasibility study; technical feasibility; economic and financial feasibility; societal and environmental feasibility; Generation of solution field (solution variants); Preliminary design; selection of best possible solution; detailed design; selection of fits and tolerances and analysis of dimensional chains

UNIT-2: MECHANICAL JOINTS

Bolted joints-in tension; eccentrically loaded bolted joints in shear and under combined stresses; Design of power screws; Coupling design; Design of various types of welding joints under different static load conditions; eccentrically loaded riveted joints; design of cotter and knuckle joints.

UNIT-3: BRAKES AND CLUTCH

Types of clutches in use; Design of friction clutches-Disc; Multidisc; cone and centrifugal; Torque transmitting capacity; 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

UNIT-4: VEHICLE FRAME, SUSPENSION AND STEERING SYSTEM

Study of loads; moments; and stresses on frame members; design of frame for passenger and commercial vehicles; materials for automobile structure; design of leaf springs; coil springs and torsion bar springs. determination of optimum dimensions and proportions for steering linkages ensuring minimum error in steering; Constant velocity joints for front wheel drive. Hydraulic and Electronics Power Steering systems

UNIT-5: FRONT AXLE, REAR AXLE AND FINAL DRIVE

Analysis of loads; moments and stresses at different sections of front axle; determination of loads at kingpin bearings; wheel spindle bearings; choice of bearings; design details of full floating; semi-floating and three quarter floating rear shafts and rear axle housings. Design of propeller shaft; design details of final drive gearing

TEXT BOOK

Giri, N. K., “Automobile Mechanics”, Khanna Publisher

REFERENCE BOOKS

1. Heldt, P. M., “Automotive Chassis”, Chilton Co., New York, 1992.
2. Giles, K. G., “Steering Suspension and Tyres”, Illiffe Books Ltd., London, 1998
3. Newton Steeds and Garret., “Motor Vehicle”, Illiffe Books Ltd., London 2000.
4. Heldt, P. M., “Torque converter”, Chilton Book Co., New York, 1982.

Course outcomes:	
1.	Upon completion of this course, the students can able to apply the successfully design various mechanical components
2.	The students can able to understand the basic design principle of vehicle, able to draw the performance curves pertain to engine and chassis
3.	Students can able to Design the propeller shaft and gears.

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School of Mechanical Engineering

B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
ME-301A	DYNAMICS OF MACHINES	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 planer 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. Benson H. Tongue, "Principles of Vibrations", Oxford University Press, 2nd Edition, 2007
4. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.

Course outcomes:	
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.

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B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
ME-311A	INDUSTRIAL ENGINEERING	4	0	0	4

Course Objectives:

The course provides knowledge of work study; work force management; cost analysis; PPC; MIS and product design. After going through the course; the student will be able to manage factory activities in a proper and efficient manner.

UNIT-1: WORK STUDY

Objectives; Method study; Principle of motion economy; techniques of method study – various charts; THERBLIGS; Work measurement – various methods; time study PMTS; determining std time; work sampling; Numericals

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 payment 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; overhead in volume; rate and efficiency; break even analysis; marginal costing and contribution; numericals

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 – P; Q; Ss Systems; Service level; Stock out risk; determination of order point and safety stock; selective inventory control – ABC; FSN; SDE; VED and three dimensional; Numericals

UNIT-4: QUALITY MANAGEMENT

Definition of quality; various approaches; concept of quality assurance systems; costs of quality; statistical quality control (SQC); Variables and Attributes; 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; Numericals

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 Operation Management”, John Wiley SE
- 6 Turner, MIZE, CHASE., “Industrial and Systems Engineering”, Prentice Hall of India.

Course outcomes:

1.	Upon completion of this course, the students can able to use the concepts of process planning and cost estimation for various products.
2.	Students can able to understand the work study & motion study and also implement in industries.
3.	Students could be aware about ISO.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
AE-351A	AUTOMOBILE POLLUTION AND CONTROL LAB	0	0	2	1

Course Objectives:

To impart the knowledge about pollution and how to control that.

LIST OF EXPERIMENTS

1. Measurement of CO and HC emissions of a fourstroke SI engine at different loads and air fuel ratios. Draw graphs.
2. Measurement of NO_x emissions of a two-stroke SI engine at different loads. Draw a graph.
3. Measurement of NO_x emissions of a four-stroke SI engine at different loads. Draw a graph.
4. Measurement of NO_x emissions of a four-stroke single cylinder diesel engine at different loads. Draw a graph
6. Measurement of NO_x emissions of a four-stroke multi cylinder diesel engine at different loads. Draw a graph
7. Measurement of smoke level of the given single cylinder CI engine after the installation of a particulate filter at different loads. Draw a graph.
8. Measurement of smoke level of the given multi cylinder diesel engine in Hartridge or Bosch units.
5. Give a comparison chart between the two units.
6. Compare HC and CO emission level of the given two-stroke SI engine with a catalytic converter at different loads. Draw graphs.

9. Measurement of NO_x emissions of single cylinder CI engine with particulate filter at different loads. Draw a graph Conduct a noise level test on a given single cylinder diesel engine at distances of (a) 1 meter (b) 7 meters with and without particulate filter; compare the two results.

Course outcomes:	
1.	Students will have the ability to measure pollution in the air.
2.	After the completion of this course students can able control the pollution by following various parameters.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
AE-353A	AUTOMOTIVE ENGINES LAB	0	0	2	1

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

1. Identification and function of each component of lubrication system of an automotive engine.
2. Measurement of BHP; F.H.P by William's line method using dynamometer.
3. Performance test on automotive multi cylinder S.I and C.I engines and draw performance curves.
4. Morse test on multi cylinder S.I engines and find BHP.
5. Heat balance test on automotive multi cylinder C.I engine.
6. Study of P-θ and PV diagrams for IC engine with piezoelectric pick up; charge amplifier; angle encoder.
7. Draw a line diagram of fuel system of petrol and diesel engine and explain function of each component.
8. Identification and function of each component of different types of Injectors.
9. Identification and functions of each component of in-line fuel injection pumps.
10. Identification and functions of each component of rotary fuel injection pumps.
11. 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.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
AE-357A	AUTOSHOP PRACTICE-I LAB	0	0	2	1

Course Objectives:

Impart the knowledge of Automobile Engine diagnosis.

LIST OF EXPERIMENTS

1. Identification and specifications of standard and non standard tools and garage equipments used in an Automobile repair workshop.
2. Wet / Dry servicing of a vehicle which includes washing; cleaning; changing engine oil; oil filter; air filter and fuel filter and engine tuning.
3. Dismantle clutch assembly from a vehicle; Inspect and replace defective parts; reassemble and adjust clutch free play.
4. Overhaul gear box and propeller shaft with U J Cross of Maruti vehicle.
5. Study the steering geometry of a vehicle. Carryout wheel balancing and wheel-alignment of vehicle.
6. Remove punctured tyre from vehicle; repair the puncture; and do tyre rotation
7. Overhaul master cylinder (Single and Tandem) of hydraulic brake system of vehicle and do bleeding operation.
8. Overhaul front suspension of Maruti Vehicle.
9. Remove engine from Maruti vehicle; dismantle engine; clean its components and
10. Inspect engine for damaged/defective and wornout parts.
11. Water jackets; (ii) oil galleries; (iii) cracks;(iv) main and big end bearings; (v) crankshaft (vi) camshaft;(vii) connecting rod(vii) timing gears etc.
12. Measurement and recording of:
Cylinder bore dimensions; its ovality; taper and wear (ii) Ovality; taper and wear of crankshaft; (iii) Connecting rod alignment; inspect the components for wear and tear; (iv) Engine cylinder ridge cutting; boring and honing.
13. Reassemble the Engine and mount engine on the vehicle
14. Top overhauling of an engine i.e. remove cylinder head from engine. Dismantle; inspect; for defective/ damaged/ worn out- valves; push rods; tappets; valve springs; valve seats; valve guides.

Carry out valve grinding; valve seat cutting; valve lapping and cylinder head resurfacing and reassemble cylinder head and fit it on engine block.

15. Overhaul differential; rear axle and hub of a vehicle.

Course outcomes:

- | | |
|----|---|
| 1. | After completion of this course student can able to diagnosis engines and they will have knowledge in valve timings and timing gears. |
|----|---|

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (V SEMESTER)

Course code	Course title	L	T	P	Credits
ME-351A	DYNAMICS OF MACHINES LAB	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 i) 4 bar mechanism ii) radial cam with roller follower Kinematic study of mechanisms i) shaper machine mechanism ii) power hacksaw mechanism
- 3 To study various types of cam and follower arrangement and plot follower displacement v/s cam rotation for various cam follower systems
 - a. 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
 - b. To study various types of gear laws; simple; compound; reverted; epicyclic and differential
 - c. To perform experiment for static balancing / dynamic balancing on balancing apparatus
 - d. Determine M O I of connecting rod by compound pendulum method and tri filer suspension pendulum
 - e. 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. |

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
AE-300A	PRODUCTION ENGINEERING	3	0	0	3

Course Objectives:

To provide knowledge on mechanism of material cutting; cutting tools casting; sheet metal; metal working and after completion of the course. The student to select the proper manufacturing and sequence for given components.

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; Numericals on cutting forces and merchant circle.

UNIT-2: CUTTING TOOL 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.

UNIT-4: CASTING TECHNOLOGY

Sand casting; Pattern making; Mould making; Shell moulding; Precision investment casting permanent mould casting investment Die casting; Centrifugal casting;

UNIT-5: 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.

TEXT BOOK

Hazare, S.K., "Elements of Workshop", Vol I & II

REFERENCE BOOKS

1. Rao, P. N.; "Manufacturing Technology"; Tata McGraw Hill
2. Sharma, P. C., "A Text Book of Production Engineering", S. Chand & Co.

Course outcomes:

- | | |
|----|---|
| 1. | After completion of this course students can able to understand the mechanism of metal cutting and also they will have the knowledge in cutting tool materials. |
|----|---|

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
AE-302A	DESIGN OF AUTO COMPONENT-2	3	2	0	5

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

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; problems.

UNIT-2: SHAFTS AND SPRINGS

Detailed design of shafts for static and dynamic loading; Rigidity and deflection consideration. Type of springs; design for helical springs against tension and their uses; compression and fluctuating loads; design of leaf springs; surging phenomenon in springs; design problem.

UNIT-3: BEARINGS

Selection of ball and roller bearing based on static and dynamic load carrying capacity using load life relationship; selection of bearings from manufacturer's catalogue; type of lubrication: boundary; mixed and hydrodynamic lubrication; design of journal bearings using Raimondi and Boyd's charts; design of pivot and collar bearing; 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: Barth equation and Buckingham equation and their comparison; gear lubrication; 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; determining minimum length of connecting rod; small end and big end design; shank design; design of big end cap bolts; connecting rod failures; design of flywheel.

TEXT BOOK

“Design Data Book”, PSG College of Technology, Coimbatore, 2000.

REFERENCE BOOKS

1. Heldt, P. M., “High Speed Combustion Engines”, Oxford-IBH Publishing Co., 1965.
2. Heywood, B., “Internal Combustion Engine Fundamentals”, McGraw Hill 1988.
3. Newton Steeds and Garret., “Motor Vehicle”, Illiffe Books Ltd., London; 2000.
4. Joseph Edward., “Mechanical Engg. Design”., McGraw Hill.
5. 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

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
ME-300A	HEAT TRANSFER	3	1	0	4

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; I-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; Numerical

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, VS., “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.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
ME 304A	MATERIAL SCIENCE	3	0	0	3

Course Objectives:

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.

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; strain rate sensitivity; recovery; recrystallization 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 VanVlack., “Elements of Material Science and Engineering”, Wesley Pub Comp 1998

3 Raghuwanshi, B. S., “Workshop Technology”, VolIDhanpatRai& 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.

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
ME-306A	MEASUREMENT INSTRUMENTATION AND CONTROL	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.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
AE-3E2A	SPECIAL PURPOSE VEHICLES	3	0	0	3

Course Objectives:

Such vehicles are used for agricultural work and land excavation work; Study of such vehicles is imperative.

UNIT-1:INTRODUCTION

Classification of special purpose vehicles; wheel type and track type; applications; Study of working principles and design considerations of different systems involved like power system; transmission; final drive; lubrication; electrical; braking; steering; pneumatic and hydraulic control circuits.

UNIT-2: EARTH MOVING MACHINERY

Constructional and working features of different types of earth moving machinery such as rippers; shovels; loaders; excavators; dumpers; dozers; fork lift;

UNIT-3: FARM TRACTOR AND EQUIPMENTS

Layout; load distribution; engine; transmission and drive line; steering; braking system; wheels and tyres; hydraulic system; auxiliary systems; draw bar; PTO shaft; Harrow disc; leveller; sprayer; seeder.

UNIT-4: MOBILE CRANES

Basic characteristics of truck cranes; stability and design features; control systems and safety devices

UNIT-5: MISCELLANEOUS VEHICLES AND INSTRUMENTATION

Tracked vehicles; articulated vehicles; multi-axle vehicles; Study of instrumentation applied to such machines.

TEXT BOOK

“Hand book of Earth Moving Machinery”, Central Water and Power Commission, Govt. of India.

REFERENCE BOOKS

1. Astskhov A., “TruckCranes”, MIR, Moscow.
2. Rudenko N., “Material Handling Equipment”, M R Publishers.

Course outcomes:

- | | |
|----|--|
| 1. | After successful completion of this course students can able to understand the requirements of special vehicles, cranes and Earth moving vehicles. |
|----|--|

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
AE-360A	PRODUCTION ENGINEERING LAB	0	0	2	1

Course Objectives:

The objective of this course is to inculcate the knowledge about molding process and welding process.

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. Prepare a job on surface grinder.
8. Development and manufacture of sheet metal component such as elbows and transition pieces
9. Manufacture and assembly of a unit concept of tolerances and fits (shaft and bush assembly or shaft; key and bush assembly) Multi slot cutting on milling machine by indexing.

Course outcomes:

- | | |
|----|---|
| 1. | After the successful completion of this course students can have the knowledge in moulding process and the manufacturing processes. |
|----|---|

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
AE-364A	AUTO SHOP PRACTICE-II	0	0	2	1

Course Objectives:

This course is intended to inculcate the knowledge and practice in cleaning and inspecting all the automobile components.

LIST OF EXPERIMENTS

1. Study of special tools & apparatus including digital & analogue multimeter used for testing of automotive electrical units.
2. Dismantle dynamo/generator. Clean & inspect all components. repair/ replace defective parts.
3. Reassemble, test & record procedure.
4. Dismantle alternator. Clean & inspect all components. Repair/replace defective parts. Reassemble, test & record procedure.
5. Dismantle solenoid switch & self starter (Starter Motor). Clean & inspect all components. Repair/ replace defective parts. Reassemble, test & record procedure.
6. Study different methods of charging automotive battery. Check & record specific gravity & voltage of each cell of a 12 Volt Battery.

7. Check & set ignition timing, dwell angle, C.B. point, and spark plug gap of a petrol engine. Record procedure
8. Diagnosis of ignition system faults of engine having MPFI system & diagnostics codes.
9. Draw layout & check:
10. (i). Electrical wiring harness of lighting circuit
11. (ii). Specifications of different bulbs used.
12. (iii). Head light alignment.
13. Dismantle Fuel Injector of a diesel engine. Clean & inspect all components. Carry out nozzle grinding & lapping. Repair/ replace defective parts. Reassemble, Test & Record procedure.
14. Dismantle fuel injection Pump of a single cylinder diesel engine. Clean & inspect all components. Repair/ replace defective parts. Reassemble; Carry out phasing & calibration test & record procedure.
15. Test various units like compressor, thermostat, hoses etc. of an air conditioning unit of a car.
16. Draw a layout plan of an automobile workshop having service station, FIP reconditioning facilities & other units repair sections

Course outcomes:

- | | |
|----|---|
| 1. | After successful completion of this course Students can able to clean and inspect the Automobile components. And also they can acquire the knowledge in assembling and dismantling the auto components. |
|----|---|

Course code	Course title	L	T	P	Credits
ME-360A	HEAT TRANSFER LAB	0	0	3	2

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.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
ME-364A	MATERIAL SCIENCE LAB	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 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 300oC and measure hardness
7. To temper the given hardened steel specimen at 500oC 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:	
1.	Interpret the hardness values obtained from different heat treatment processes.
2.	Identify the materials based on their microstructures.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VI SEMESTER)

Course code	Course title	L	T	P	Credits
ME- 366A	MEASUREMENT INSTRUMENTATION AND CONTROL LAB	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 setup 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 proximity sensors;
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.

Lingaya's Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VII SEMESTER)

Course code	Course title	L	T	P	Credits
AE – 401A	AUTOMOBILE AIR CONDITIONING	3	0	0	3

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, CO₂ (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 handling systems; evaporator care air flow through the dash re-circulating unit.

UNIT-5: AIRCONDITIONINGCONTROL

Testing sensors – temperature (NTC and PTC), sun load sensors, 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

1. Paul Lung., “Automotive Air Conditioning”, C.B.S Publisher and Distributor
2. Steven Daly, “Automotive Air Conditioning and Climate Control System”, BH Publication
3. Crouse and Anglin, “Automotive Air Conditioning”, McGraw Hills

REFERENCE BOOKS

1. "Heating and Air Conditioning Systems”, Mitchel Information Services.
2. American Society of Heating, Refrigeration and Air Conditioning, “ASHRAE Handbook – Fundamentals”, 1985
3. L.F. Goings, “Automotive Air Conditioning”, ATS

Course outcomes:	
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

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VII SEMESTER)

Course code	Course title	L	T	P	Credits
AE-403A	AUTOMOBILE MAINTENANCE & SERVICES	3	0	0	3

Course Objectives:
To know about the various methods of maintaining vehicles and their subsystems.

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; performance 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; NO_x; 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; carburetor 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

1. Kohli, P.L., “Automotive Chassis and Body”, McGraw Hill.
2. 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.

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VII SEMESTER)

Course code	Course title	L	T	P	Credits
AE-405A	AUTOMOTIVE ELECTRICAL & ELECTRONICS	3	0	0	3

Course Objectives:
In an automobile the electrical systems are important. It has number of subsystems like starting, charging system etc. Most of the control systems are being converted from mechanical to electronics. The components and systems are described.

UNIT-1: BATTERIES AND ACCESSORIES

Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries various tests on batteries, maintenance and charging. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn and wiper system.

UNIT-2: STARTING SYSTEM

Condition at starting, behavior of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, care and maintenance of starter motor, starter switches, spark plug, magneto.

UNIT-3: CHARGING SYSTEM

Simple generator, automobile generator, armature reaction, third brush regulation, cutout, voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers.

UNIT-4: FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS

Current trends in automotive electronic engine management system, electromagnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system.

UNIT-5: SENSORS AND ACTIVATORS

Types of sensors: Sensor for speed, throttled position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors relay. Introduction to Microprocessor & Applications in Automobiles.

TEXT BOOK

Kohli, P. L., “Automotive Electrical Equipment”, Tata McGraw-Hill.

REFERENCE BOOKS

1. Young A.P. & Griffiths. L. “Automotive Electrical Equipment”, ELBS & New Press - 1999.
2. William B. Riddens “Understanding Automotive Electronics”, 5th edition – Butter worth Heinemann Woburn, 1998.
3. Bechhold “Understanding Automotive Electronics”, SAE, 1998.
4. Crouse, W.H “Automobile Electrical Equipment”, McGraw-Hill Book Co., Inc., New York, 3rd edition, 1986.

Course outcomes:	
1.	The student will have to know about all theoretical information and about electrical components used in a vehicle.
2.	Students can gain Knowledge in vehicle electrical and electronics components for engine operation
3.	Students have gained knowledge of revsor and microprocessor applications in vehicle control systems.

Lingaya’s Vidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VII SEMESTER)

Course code	Course title	L	T	P	Credits
AE-4E2A	FUELS, ALTERNATE FUELS AND LUBRICANTS	3	0	0	3

Course Objectives:

This course will create an impact among students community regarding the importance of fuels and alternate fuels.

UNIT-1: MANUFACTURE OF FUELS AND LUBRICANTS

Structure of petroleum; refining process; fuels; thermal cracking; catalytic cracking; polymerization; alkylation; isomerization; blending; products of refining process; Manufacture of lubricating oil base stocks; manufacture of finished automotive lubricants

UNIT-2: THEORY OF LUBRICATION AND LUBRICANTS

Engine friction: introduction; total engine friction; effect of engine variables on friction; hydrodynamic lubrication; elasto-hydrodynamic lubrication; boundary lubrication; bearing lubrication; functions of the lubrication system; introduction to design of a lubricating system, Specific requirements for automotive lubricants; oxidation deterioration and degradation of lubricants; additives and additive mechanism; synthetic lubricants; classification of lubricating oils; properties of lubricating oils; tests on lubricants; Grease; classification; properties; test used in grease

UNIT-3: PROPERTIES AND TESTING OF FUELS

Thermo-chemistry of fuels; properties and testing of fuels; relative density; calorific value; distillation; vapor pressure; flash point; spontaneous ignition temperature; viscosity; pour point; flammability; ignitability; diesel index; API gravity; aniline point; cetane and octane nos; Additive: mechanism; requirements of an additive; petrol fuel additives and diesel fuel additives : specifications of fuels

UNIT-4: ALTERNATE FUELS

Need for alternate fuel; availability and properties of alternate fuels; general use of alcohols; LPG; hydrogen; ammonia; CNG and LPG; vegetable oils and biogas; merits and demerits of various alternate fuels; Introduction to alternate energy sources; like EV; hybrid; fuel cell and solar cars; Alcohols : properties as engine fuel; alcohols and gasoline blends; performance in SI engine; methanol and gasoline blends; combustion characteristics in CI engine; emission characteristics; DME; DEE properties; performance analysis; performance in SI and CI engines.

UNIT-5: NATURAL GAS; LPG; HYDROGEN, BIOGAS AND VEGETABLE OILS

Availability of CNG; properties; modification required to use in engines; performance and emission characteristics of CNG using in SI and CI engines; performance and emission of LPG; Hydrogen; storage and handling; performance and safety aspects. Various vegetable oils for engines; sun flower; soyabean; peanut; rape seed; palm oil; Mahua; jatropha and neem; Esterification; performance in engines; performance and emission characteristics; bio-diesel and its characteristics.

Emission control: Emission norms as per Bharat Standard up to BS – IV and procedures for confirmation on

Production, ways to control toxic emissions.

TEXT BOOK

Richard, L. Bechfold., “Alternative Fuels Guide Book”, SAE International Warrendale, 1997

REFERENCE BOOKS

1. Francis, W., “Fuels and Fuel Technology”, Vol;-I and II.
2. Landown, A. R., “Lubrication – A Practical Guide to Lubricant Selection”, Pergamon Press;1982;

Course outcomes:	
1.	Upon completion of this course, the students will be able to identify the different components in automobile engineering.
2.	Have clear understanding on different auxiliary and transmission systems usual.
3.	Understand the mechanism of the differential in aiding the vehicle to take a turn.

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School of Mechanical Engineering

B.Tech Automobile Engineering (VII SEMESTER)

Course code	Course title	L	T	P	Credits
AE-479A	STC WORKSHOP PRACTICE LAB	0	0	2	1

Course Objectives:
To make the student conversant with automobile safety electrical system and vehicle maintenance .

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 SPRAK 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

Course outcomes:	
1.	Student should able to understand basics of servicing of various automotive components system.
2.	Student should able to understand scheduled maintenance process.

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School of Mechanical Engineering

B.Tech Automobile Engineering (VIII SEMESTER)

Course code	Course title	L	T	P	Credits
ME-402A	MECHANICAL & AUTOMOBILE TECHNOLOGY-I	3	1	0	4

Course Objectives:

To gain proficiency in the development of Automation.

UNIT-1: INTRODUCTION

Machine and mechanism, kinetics and kinematics, Zeroth law, first law, second law and third law of thermodynamics, entropy, exergy, concept of jet propulsion technology, nuclear power plant and its elements, recent developments in automobiles, concept of acceleration system of a train, braking system, concept of power transmission engine to wheel when the train turns on the track and flywheel. Concept of 3-D printing.

UNIT-2: INTRODUCTION TO DESIGN AND COST ESTIMATION

General design consideration in machine parts. Mechanical properties of materials of construction, steps in machine design. Factor of safety, selection of materials. Introduction and function of cost estimation, estimation procedure, elements of cost, depreciation - methods of calculating depreciation, overhead expenses, distribution of overhead expenses, calculation of cost for machining and metal forming process and break even analyzer.

UNIT-3: PRODUCTION PLANNING AND CONTROL

Methods of production-Unit, Batch, mass. Sales forecasting and its use. Planning-Products, process parts, materials, Optimum Batch quantity for production and Inventory, Theory and Analysis of M/C capacity, Batch quantity, Loading and balancing-Scheduling M/C loading. Preplanning activities, Routing, Dispatching, Follow up activities. Concept of value engineering and technique.

Source and control of automobile air pollution, causes of automobile pollution and their remedies monitoring and analysis of auto exhaust emission, legislative action, judicial response. Introduction to energy conservation.

UNIT-4: METROLOGY AND QUALITY CONTROL

Measurement and Quality Control: Units of Measurement, C.G.S. System of Units, M.K.S. System of Units: ,International System (SI) of Units. Terminology in instrumentation: Precision, Accuracy, Calibration, Sensitivity, Readability, True, Actual size , Repeatability , Reproducibility ,Methods of measurement. Concept of quality control, Quality assurance elements of quality control, Statistical quality control, Acceptance sampling, control chart for variable and attributes, Uses of X, R, "P" and "C" chart - O.C. curve, Concept of Total Quality Management. Concept of value engineering and technique.

UNIT-5: AUTOMOBILE WIRING AND LIGHTING SYSTEM

Earth return and insulated return systems-6 volts, 12 volts and 24 volts systems, Positive and negative earthing, Fuse in circuit, Automobile cables-Specifications and colour code. Diagram of a typical wiring systems. Principle of auto illumination, Lighting requirement-Head lamp mounting and construction, sealed beam lamp, Asymmetrical head lights, dip and full beam type bulb, auxiliary type lights. Polarized head light, Flesher unit, Warning lights and panel lights. Fore head lamp systems. Other lamps-Pass lamps, Fog lamp, reversing lamps.Switching of lamps.Parking brake, Direction indicators. Electric horns, Revolution counter, Speedometer, Fuel gauge, Pressure gauge, Temperature gauge, Wind screen wipers, stereo system and speaker, introduction to remote sensing devices. Microprocessor control of automobile.

TEXT BOOKS:

Automobile Technology “R.B.Guptha- SatyaPrakashan-New Delhi”

REFERENCE BOOKS

1. MonoharMahajan, “Statistical Quality Control”, DhanpatRai& Sons, 2001
2. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004
3. Peter scalon, “Process planning, Design/Manufacture Interface”, Elsevier science technology Books, Dec 2002.

Course outcomes:	
1.	Completion of this course, the students can able to revise the syllabus what they studied so far.
2.	Students can able to choose appropriate manufacturing methods in order to reduce pollution.
3.	This course will leads to effective handling of machines and humans.

Lingaya’sVidyapeeth

School of Mechanical Engineering

B.Tech Automobile Engineering (VII SEMESTER)

Course code	Course title	L	T	P	Credits
AE 4E3A	MODERN MANUFACTURING SYSTEMS	3	0	0	3

Course Objectives:

To understand material removal by using various forms of energy and machining new materials and complex parts with high accuracy by using non-traditional machining.

UNIT - I

Introduction: Need of Non-Traditional Machining Processes – Classification Based on Energy, Mechanism, source of energy, transfer media and process – Process selection Based on Physical Parameters, shapes to be machined, process capability and economics – Overview of all processes.

UNIT - II

Mechanical Processes: Ultrasonic Machining: Principle- Transducer types – Concentrators – Abrasive Slurry – Process Parameters – Tool Feed Mechanism – Advantages and Limitations – Applications. Abrasive Jet Machining: Process- Principle – Process Variables – Material Removal Rate – Advantages and Limitations – Applications. Water Jet Machining: Principle – Process Variables – Advantages and Limitations – Practical Applications – Abrasive water jet machining process.

UNIT - III

Electrochemical and Chemical Metal Removal Processes: Electrochemical Machining, Electrochemical Grinding, Electrochemical Deburring, Electrochemical Honing, Chemical Machining. Applications

UNIT – IV

Thermo electrical energy techniques: Electric Discharge Machining: Mechanism of metal removal – Dielectric Fluid – Flushing methods – Electrode Materials – Spark Erosion Generators – Electrode Feed System – Material Removal Rate – Process Parameters – Tool Electrode Design – Tool wear Characteristics of Spark Eroded Surfaces- Advantages and Limitations – Practical Applications. Electrical Discharge Wire Cut and Grinding: Principle – Wire Feed System – Advantages and Limitations – Practical applications

UNIT - V: Thermal energy techniques: Plasma Arc Machining, Electron Beam Machining, Laser Beam Machining, Parameters Influencing Metal Removal, Benefits, Application, Advantages And Limitations, Recent Developments

TEXT BOOKS:

1. Manufacturing Engineering and Technology, Kalpakijian, Adisson Wesley
- 2.P.CPandey And H.S. Shan, “Modern Machining Process”, Tata McGraw – Hill Publishing Company Limited, New Delhi
3. Advanced Machining Processes, V.K.Jain, Allied Publications.

Course outcomes:

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|----|--|
| 1. | At the end of the course, the student will be able to understand the working principle of various unconventional machining processes |
|----|--|

Scheme for B.Tech. - M.Tech Integrated

B.Tech. - M.Tech Integrated				Semester			I
SN	Course Code	Course Name	Periods			Credits	
			L	T	P		
1	MA-101A	Applied Mathematics –I	3	0	0	3	
2	PHB-101A	Applied Physics	3	0	0	3	
3	CE-102 A	Basics of Civil Engineering	3	0	0	3	

4	CSB-101 A	Computer Programming	3	0	0	3
5	CHB-101 A	Applied Chemistry	3	0	0	3
6	ENA-101A	Communication Skills-I	3	0	0	3
7	CHB-151A	Applied Chemistry Lab	0	0	2	1
8	PHB-151A	Applied Physics Lab	0	0	2	1
9	ENA-151A	Communication Skills Lab –I	0	0	2	1
10	CSB-151A	Computer programming Lab	0	0	2	1
11	CE-152A	Basics of Civil Engineering Lab	0	0	2	1
12	ME-153A	Computer Based Engineering Graphics	0	0	4	2
Total			18	0	14	25

B.Tech. - M.Tech Integrated			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-102 A	Applied Mathematics –II	3	0	0	3
2	ME-102 A	Basics of Mechanical Engineering	3	0	0	3
3	EL-101A	Basics of Electrical Engineering	3	0	0	3
4	EC-101A	Basics of Electronics Engineering	3	0	0	3
5	CEA-101A	Environmental Science and Ecology	2	0	0	2
6	EN-102A	Communication Skills-II	2	0	0	2
7	ME-152 A	Workshop Practice	0	0	2	1
8	ME-154A	Basics of Mechanical Engineering Lab	0	0	2	1
9	EL-151A	Basics of Electrical Engineering Lab	0	0	2	1
10	EN-152A	Communication Skills Lab –II	0	0	2	1
11	EC-151A	Basics of Electronics Engineering Lab	0	0	2	1
12	PD-193A	Entrepreneurship and Professional Skills	0	1	0	1
13	PD-191A	Co-curricular Activities	0	1	0	1
Total			16	2	10	23

B.Tech. - M.Tech Integrated			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	EC-201	Electronics Engineering	4	0	0	4
2	ME-201	Computer Methods in Mechanical Engineering	2	0	0	2

3	ME-203	Thermodynamics	4	0	0	4
4	ME-205	Theory Of Mechanics-I	4	0	0	4
5	ME-207	Fluid Mechanics (FM)	4	0	0	4
6	ME-209	Measurement & Instrumentation (M&I)	3	0	0	3
7	ME-251	Computer Methods in Mechanical Engineering Lab	0	0	2	1
8	EC-251	Electronics Engineering Lab	0	0	2	1
9	ME-257	Fluid Mechanics Lab	0	0	2	1
10	ME-259	M&I Lab	0	0	2	1
11	PD-151N	Basic of Computer Fundamentals	0	1	0	1
12	PD-193	Entrepreneurship and Personal skills	0	1	0	1
Total			21	2	8	27

B.Tech. - M.Tech Integrated			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-202	Applied Numerical Methods	4	0	0	4
2	BA-225	Economics	3	0	0	3
3	ME-202	Manufacturing Technology	3	0	0	3
4	ME-204	Strength of Materials (SOM)	4	0	0	4
5	ME-206	Machine Drawing and CAD	1	0	0	1
6	ME-208	Engineering Materials	3	0	0	3
7	ME-252	Manufacturing Technology Lab	0	0	2	1
8	MA-252	Applied Numerical Methods Lab	0	0	2	1
9	ME-254	Strength of Materials Lab	0	0	2	1
10	ME-256	Machine Drawing and CAD Lab	0	0	6	3
11	ME-258	Engineering Materials Lab	0	0	2	1
12	PD-192	Personality Skills	0	1	0	1
Total			18	1	14	26

B.Tech. - M.Tech Integrated			Semester			V
SN	Course Code	Course Name	Periods			Credits
			L	T	P	

1	BA-249	Principles of Management	3	0	0	3
2	ME-301	Theory of Machine-II	4	0	0	4
3	ME-303	Industrial Engineering	3	0	0	3
4	ME-305	Machine Design-I	3	0	0	3
5	ME-307	Fluid Machines	4	0	0	4
6	ME-309	Heat Transfer	4	0	0	4
7	ME-351	Theory of Machines-II Lab	0	0	2	1
8	ME-355	Machine Design-I Lab	0	0	2	1
9	ME-357	Fluid Machines Lab	0	0	2	1
10	ME-359	Heat Transfer Lab	0	0	2	1
11	PD-293	Intra and Inter Personal Skills	0	1	0	1
Total			21	1	8	26

B.Tech. - M.Tech Integrated			Semester			VI
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-302	Energy Conversion-I	4	0	0	4
2	ME-304	Manufacturing Science	3	0	0	3
3	ME-306	Automatic Control	4	0	0	4
4	ME-308	Optimization Techniques	4	0	0	4
5	ME-310	Energy Conversion-II	4	0	0	4
6	ME-352	Energy Conversion-I Lab	0	0	2	1
7	ME-354	Manufacturing Science Lab	0	0	2	1
8	ME-360	Energy Conversion-II Lab	0	0	2	1
9	PD-358	Mechanical Engineering Aptitude Course	0	1	0	1
10	ME-402	Computer aided Design	3	0	0	3
11	ME-452	Computer aided Design Lab	0	0	2	1
Total			22	1	8	27

B.Tech. - M.Tech Integrated			Semester			VII
SN	Course Code	Course Name	Periods			Credits

			L	T	P	
1	ME-483	Internship-I	0	0	2	1
2	ME-484	Internship-II	0	0	28	14
Total			0	0	30	15

B.Tech. - M.Tech Integrated			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-311	Machine Design-II	3	0	0	3
2		Open Elective	3	0	0	3
3	ME-431	Automobile Engineering (AE)	3	0	0	3
4	ME-422	Flexible Manufacturing System	3	0	0	3
5	ME-361	Machine Design Lab	0	0	2	1
Total			12	0	2	13

B.Tech. - M.Tech Integrated			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-501	Numerical Techniques	4	0	0	4
2	ME-501	Advanced Mechanics Of Solid	4	0	0	4
3	ME-521	Finite Element Methods	4	0	0	4
4	ME-522	Properties and Selection of Engineering Materials	4	0	0	4
Total			12	0	0	12

B.Tech. - M.Tech Integrated			Semester			X
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-502	Computer Methods in Mechanical Design	4	0	0	4
2	ME-509	Vibration Engineering	4	0	0	4
3	ME-604	Design of Mechanisms and Manipulators	4	0	0	4
4		ELECTIVE	4	0	0	4
5	ME-668	Dissertation	0	0	46	23
6	ME-570	Mechanical Engineering Lab-1	0	0	2	1
Total			16	0	48	40

Elective			Semester			IX
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-514	Industrial Tribology	3	0	0	3
2	ME-515	Industrial Robotics	3	0	0	3
Total			6	0	0	6

M.Tech. Production

M.Tech. Production			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-501	Numerical Techniques	4	0	0	4
2	ME-501A	Advanced Mechanics Of Solid	4	0	0	4
3	ME-509A	Vibration Engineering	4	0	0	4
4	ME-510A	Instrumentation and Automatic Control	4	0	0	4
5	ME-555A	Simulation lab	0	0	4	2
Total			16	0	4	18

M.Tech. Production			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-503A	Metal Cutting Technology	4	0	0	4
2		ELECTIVE-I	4	0	0	4
3	ME-521A	Finite Element Methods	4	0	0	4
4	ME-522A	Properties and Selection of Engineering Materials	4	0	0	4
5	ME-570A	Mechanical Engineering Lab-1	0	0	4	2
Total			16	0	4	18

M.Tech. Production			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-605A	Design, Planning and Control of Production System	4	0	0	4
2	ME-613A	Automation in Manufacturing	4	0	0	4
3	ME-665A	Dissertation Phase-1	4	0	0	4
4	ME-579A	Mechanical Engineering Lab-2	0	0	4	2
5	ME-667A	Seminar	0	0	4	2
Total			12	0	8	16

M.Tech. Production			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-668A	Dissertation Phase-2	0	0	40	20
Total			0	0	40	20

Elective-I						
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-516A	Statistical Quality Control	4	0	0	4
2	ME-517A	Artificial Intelligence in Manufacturing	4	0	0	4
ELECTIVE-II						
4	ME-525A	Welding and Allied Processes	4	0	0	4
5	ME-526A	Foundry Technology	0	0	4	2
Total			12	0	4	14

M.Tech. Design

M.Tech. Design			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	MA-501	Numerical Techniques	4	0	0	4
2	ME-501A	Advanced Mechanics Of Solid	4	0	0	4
3	ME-509A	Vibration Engineering	4	0	0	4
4	ME-510A	Instrumentation and Automatic Control	4	0	0	4
5	ME-555A	Simulation lab	0	0	4	2
Total			16	0	4	18

M.Tech. Design			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-502A	Computer Methods in Mechanical Design	4	0	0	4
2		ELECTIVE-I	4	0	0	4
3	ME-521A	Finite Element Methods	4	0	0	4
4	ME-522A	Properties and Selection of Engineering Materials	4	0	0	4
5	ME-570A	Mechanical Engineering Lab-1	0	0	4	2
Total			16	0	4	18

M.Tech. Design			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1		ELECTIVE-II	4	0	0	4
2	ME-604A	Design of Mechanisms and Manipulators	4	0	0	4
3	ME-613A	Automation in Manufacturing	4	0	0	4
4	ME-665A	Dissertation Phase-1	4	0	0	4
5	ME-579A	Mechanical Engineering Lab-2	0	0	4	2
	ME-667A	Seminar	0	0	4	2
Total			16	0	8	20

M.Tech. Design			Semester			IV
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-668A	Dissertation Phase-2	0	0	40	20
Total			0	0	40	20

M.Tech. Design			Semester			III
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-514A	Industrial Tribology	4	0	0	4
2	ME-515A	Industrial Robotics	4	0	0	4
3		ELECTIVE-II	4	0	0	4

4	ME-523A	Machine Tool Design	4	0	0	4
5	ME-524A	Product Design	0	0	4	2
Total			16	0	4	18

Elective-I						
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	ME-514A	Industrial Tribology	4	0	0	4
2	ME-515A	Industrial Robotics	4	0	0	4
ELECTIVE-II						
4	ME-523A	Machine Tool Design	4	0	0	4
5	ME-524A	Product Design	0	0	4	2
Total			12	0	4	14

Scheme for Ph.D.

M.Tech. Design			Semester			
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1		Research Methodology (Common to all)	4	0	0	4
2		Related to the research work (Departmental Subject)	3	0	0	3
3		Related to the research work (Departmental Subject)	3	0	0	3
4		Literature Survey	2	0	0	2
Total			12	0	0	12

SCHEME FOR (B. PHARMA)

B. PHARMA			Semester			I
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP 101	Pharmaceutical Chemistry –I (Inorganic)	3	0	0	3
2	BP 102	Pharmaceutical Analysis –I	3	0	0	3
3	BP 103	Pharmaceutics-I (General Pharmacy)	3	0	0	3
4	BP 104	Anatomy, Physiology & Health Education-I	3	0	0	3
5	BP 105	Remedial Mathematics	3	0	0	3
6	BP 106	Remedial Biology	3	0	0	3
PRACTICAL						
1	BP-151	Pharmaceutical Chemistry –I (Inorganic) Practical	0	0	4	2
2	BP-152	Pharmaceutical Analysis Practical	0	0	4	2
3	BP-153	Pharmaceutics-I (General Pharmacy) Practical	0	0	4	2
4	BP-154	Anatomy Physiology and Health Education-I Practical	0	0	2	1
5	BP-156	Remedial Biology Practical	0	0	4	2
6	PD-191A	Hobby Club/ Co-Curricular Activities	0	1	0	1
Total			18	1	18	28

B. PHARMA			Semester			II
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP-107	Pharmaceutical Chemistry-II (Organic Chemistry)	3	0	0	3
2	BP-108	Pharmaceutical Chemistry –III (Physical Chemistry)	3	0	0	3
3	BP-109	Pharmaceutics –II (Dispensing Pharmacy)	3	0	0	3
4	BP-110	Anatomy Physiology and Health Education- II	3	0	0	3
5	BP-111	Pharmacognosy-I	3	0	0	3
6	EN-101	Communication Skills-I	3	0	0	3
PRACTICAL						
1	BP-157	Pharmaceutical Chemistry-II (Organic Chemistry) Practical	0	0	4	2
2	BP-158	Pharmaceutical Chemistry–III (Physical Chemistry)Practical	0	0	4	2
3	BP-159	Pharmaceutics –II(Dispensing Pharmacy) Practical	0	0	4	2
4	BP-160	Anatomy Physiology and Health Education- IIPractical	0	0	2	1
5	BP-161	Pharmacognosy-I Practical	0	0	2	1
6	PD-192A	Hobby Club/Co-Curricular Activities	0	1	0	1
Total			18	1	16	27

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
PRACTICAL						
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	0	1	0	1
PRACTICAL						
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			15	1	16	24

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
PRACTICAL						
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	0	1	0	1
PRACTICAL						
1	BP-356	Pharmacology-IIPractical	0	0	4	2
2	BP-357	**Pharmacognosy-IIIPractical	0	0	4	2
3	BP-358	Hospital Pharmacy Practical	0	0	4	2
4	BP-359	Pharmaceutical Engineering-IIIPractical	0	0	4	2
5	BP-360	Biochemistry Practical	0	0	4	2
Total			20	1	20	31

B. PHARMA			Semester			VII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP701T	Instrumental Methods of Analysis- Theory	3	1	0	4
2	BP702T	Industrial Pharmacy – Theory	3	1	0	4
3	BP703T	Pharmacy Practice – Theory	3	1	0	4
4	BP704T	Novel Drug Delivery System –Theory	3	1	0	4
5	BP705 P	Instrumental Methods of Analysis – Practical	0	0	4	2
6	BP706 PS	Practice School*	0	0	12	6
s		Total	12	4	16	24

B. PHARMA			Semester			VIII
SN	Course Code	Course Name	Periods			Credits
			L	T	P	
1	BP801T	Biostatistics and Research Methodology – Theory	3	1	0	4
2	BP802T	Social and Preventive Pharmacy-Theory	3	1	0	4
3	BP803ET	Pharmaceutical Marketing –Theory	3+3 =6	1+1 =2	0	8
4	BP804ET	Pharmaceutical Regulatory Science – Theory				
5	BP805ET	Pharmacovigilance – Theory				
6	BP806ET	Quality Control and Standardization of Herbals – Theory				
7	BP807ET	Computer Aided Drug Design –Theory				
8	BP808ET	Cell and Molecular Biology –Theory				
9	BP809ET	Cosmetic Science – Theory				
10	BP810ET	Experimental Pharmacology – Theory				
11	BP811ET	Advanced Instrumentation Techniques – Theory				
12	BP812PW	Project Work				
		Total	12	4	12	22

FIRST SEMESTER

BP 101 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.

PHARMACEUTICAL CHEMISTRY-I

BP 151 (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

Calcium Carbonate

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., Denny R.C., Barnes J.D., Thomas M, Jeffery G.H., Vogel's Textbook of Quantitative Chemical Analysis, Pearson Education Asia.
2. Conners 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, liverextract.

BOOKSRECOMMENDED:

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

ANATOMY, PHYSIOLOGY & HEALTH EDUCATION - I

Unit 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 lifecycle

- 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 Anagnostikos 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.
- Dandiya, P.C., Zafer, Z.Y.K., and Zafer, A. Health Education and Community Pharmacy, Vallabh Prakashan.

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.

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 specimen 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. Botany for Degree students Vol I & II by B.P. Pandey
4. Enger- Concepts biology

BP 107

SECOND SEMESTER

PHARMACEUTICAL CHEMISTRY-II (ORGANIC CHEMISTRY)

Unit I

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

α , β - 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.).

Vogel A.I., Elementary Practical Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education Ltd.).

BP 108

**PHARMACEUTICAL CHEMISTRY-III
(PHYSICAL CHEMISTRY)**

Unit I

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, 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-H₂O, NaCl-H₂O).

BP 158

**PHARMACEUTICAL CHEMISTRY-III
(PHYSICAL CHEMISTRY PRACTICAL)**

Suggested Practical's

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 coefficient.
 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.

BP109

PHARMACEUTICS –II

(DISPENSING PHARMACY)

UNIT I

a. **Pharmacy:** Principles of dispensing, form of prescription, handling of **Genesis and Evolution 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** 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 labeling 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 over coming 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 healthcare.

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 gastrointestinal 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 leucocyte 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., & Anagnostikos N.P., Principles of Anatomy and Physiology, Harper & Rave 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, Vallabh Prakashan,

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)

Practical's

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 PhysicalPharmacy”.

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 Diel's 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 (OrganicChemistry-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. Delgado 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'.

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 :

10. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.
11. 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.
12. Pharmacopoeia of India, Ministry of Health, Govt. of India.
13. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
14. Delgado J N and Remers W A R, Eds., Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.

15. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
16. Singh Harkishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
17. Nogrady, T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
18. Finar I L, Organic Chemistry, Vol I & II, ELBS/ Longman, London. 10. Thomas J..Perun," Computer –aided Drug Design methods applications'.

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 groundwater,
- 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.
Role of an individual in prevention of pollution. Case studies
3. 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

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 , MSaccess)
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".
- G.N.Rao, " Biostatistics & computer Applications"**

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.
- Harry G. Brittain, "Polymorphism 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, modification, 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 Anticholinesterase
- ii. Adrenergic drugs
- iii. Antispasmodic and antiulcer drugs
- iv. Neuromuscular blocking agents

i.

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 molar refractivity 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, Ministry 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, Complex metric 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 Practical

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 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 Interscience, 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 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 – IIPractical

Practical 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 B.M., "Cultivation & utilization of Medicinal plant, RRL, Jammu.
6. Harborne J B, Phytochemical method, Chapman & Hall International Edition, London.
- Mohammed Ali," Pharmacognosy & Phytochemistry"

BP-209

Pharmaceutical Jurisprudence & Ethics

Theory

3 hrs/week

1. Introduction
 - a. Pharmaceutical Legislations - A brief review.
 - b. Drugs & Pharmaceutical Industry - A brief review.
 - c. Pharmaceutical Education - A brief review.

An elaborate study of the following

2. An elaborate study of the following:

- a. Pharmaceutical Ethics
- b. Pharmacy Act 1948
- c. Drugs and Cosmetics Act 1940 and Rules 1945.
- d. Medicinal & Toilet Preparations (Excise Duties) Act 1955.
- e. 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 :

- ii. B.M., Mittal, Textbook of Forensic Pharmacy, National Book Centre, Dr. Sundari Mohan Avenue, Calcutta.
- iii. Relevant Acts & Rules Published by the Govt. of India.
- iv. N.K. Jain, A Textbook of Forensic Pharmacy, Vallabh Prakashan, N. Delhi.
- v. Singh, Harkishan "History of Pharmacy in India- Vol.-I, II & III" Vallabh Prakashan.

BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to

Explain the gross morphology, structure and functions of various organs of the human body.

Describe the various homeostatic mechanisms and their imbalances.

Identify the various tissues and organs of different systems of human body.

Perform the various experiments related to special senses and nervous system.

Appreciate coordinated working pattern of different organs of each system

Course Content:

Unit I

10 hours

Introduction to human body

Definition and scope of anatomy and physiology, levels of structural

organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

Cellular level of organization

Structure and functions of cell, transport across cell membrane, cell

division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

Tissue level of organization

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Unit II

10 hours

Integumentary system

Structure and functions of skin

Skeletal system

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system

Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

Joints

Structural and functional classification, types of joints movements and its articulation

Unit III

10 hours

Body fluids and blood

Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.

Lymphatic system

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Unit IV

08 hours

Peripheral nervous system:

Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.

Origin and functions of spinal and cranial nerves.

Special senses

Structure and functions of eye, ear, nose and tongue and their disorders.

Cardiovascular system

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

- Study of compound microscope.
- Microscopic study of epithelial and connective tissue
- Microscopic study of muscular and nervous tissue
- Identification of axial bones
- Identification of appendicular bones
- Introduction to hemocytometry.
- Enumeration of white blood cell (WBC) count
- Enumeration of total red blood corpuscles (RBC) count
- Determination of bleeding time
- Determination of clotting time
- Estimation of hemoglobin content
- Determination of blood group.
- Determination of erythrocyte sedimentation rate (ESR).
- Determination of heart rate and pulse rate.
- Recording of blood pressure.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterje ,Academic Publishers Kolkata

BP102T. PHARMACEUTICAL ANALYSIS (Theory)

45 Hours

Scope: This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

Objectives: Upon completion of the course student shall be able to understand the principles of volumetric and electro chemical analysis carryout various volumetric and electrochemical titrations develop analytical skills

Course Content:

UNIT-I

10 Hours

Pharmaceutical analysis- Definition and scope Different techniques of analysis Methods of expressing concentration Primary and secondary standards.

Preparation and standardization of various molar and normal solutions-Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate

(b)Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

(c)Pharmacopoeia, Sources of impurities in medicinal agents, limit tests.

UNIT-II

10 Hours

Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves

Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

UNIT-III

10 Hours

Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.

Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.

Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate. Basic Principles, methods and application of diazotisation titration

UNIT-IV

08 Hours

Redox titrations: Concepts of oxidation and reduction

Types of redox titrations (Principles and applications)

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

UNIT-V

07 Hours

Electrochemical methods of analysis

Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications.

Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.

Polarography - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

BP108P. PHARMACEUTICAL ANALYSIS (Practical)

4 Hours / Week

Limit Test of the following

- Chloride
- Sulphate
- Iron
- Arsenic

II Preparation and standardization of

- Sodium hydroxide
- Sulphuric acid
- Sodium thiosulfate
- Potassium permanganate
- Ceric ammonium sulphate

III Assay of the following compounds along with Standardization of Titrant

- Ammonium chloride by acid base titration
- Ferrous sulphate by Cerimetry
- Copper sulphate by Iodometry

- Calcium gluconate by complexometry
- Hydrogen peroxide by Permanganometry
- Sodium benzoate by non-aqueous titration
- Sodium Chloride by precipitation titration

IV Determination of Normality by electro-analytical methods

- Conductometric titration of strong acid against strong base
- Conductometric titration of strong acid and weak acid against strong base
- Potentiometric titration of strong acid against strong base

Recommended Books: (Latest Editions)

- A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
- A.I. Vogel, Text Book of Quantitative Inorganic analysis
- P. Gundu Rao, Inorganic Pharmaceutical Chemistry
- Bentley and Driver's Textbook of Pharmaceutical Chemistry
- John H. Kennedy, Analytical chemistry principles
- Indian Pharmacopoeia

BP103T. PHARMACEUTICS- I (Theory)

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Objectives: Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
 - Preparation of various conventional dosage forms

Course Content:

UNIT – I

10 Hours

Historical background and development of profession of pharmacy: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.

Dosage forms: Introduction to dosage forms, classification and definitions

Prescription: Definition, Parts of prescription, handling of Prescription and Errors in prescription.

Posology: Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

UNIT – II

10 Hours

Pharmaceutical calculations: Weights and measures–Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.

Powders: Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.

Liquid dosage forms: Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

UNIT – III

08 Hours

Monophasic liquids: Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.

Biphasic liquids:

Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.

Emulsions: Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

UNIT – IV

08 Hours

Suppositories: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.

Pharmaceutical incompatibilities: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

UNIT – V

07 Hours

Semisolid dosage forms: Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosage forms

BP109P. PHARMACEUTICS I (Practical)

3 Hours / week

1 . Syrups

Syrup IP'66

Compound syrup of Ferrous Phosphate BPC'68

Elixirs) Piperazine citrate elixir

Paracetamol pediatric elixir

3.Linctus

a) Terpin Hydrate Linctus IP'66

b) Iodine Throat Paint (Mandles Paint)

4. Solutions

- Strong solution of ammonium acetate
- Cresol with soap solution
- Lugol's solution

Suspensions

- Calamine lotion
- Magnesium Hydroxide mixture
- Aluminium Hydroxide gel

Emulsions a) Turpentine Liniment

Liquid paraffin emulsion

Powders and Granules

- ORS powder (WHO)
- Effervescent granules
- c) Dusting powder d) Divided powders

Suppositories

- Glycero gelatin suppository
- Cocoa butter suppository
- Zinc Oxide suppository

8. Semisolids

- Sulphur ointment
- Non staining-iodine ointment with methyl salicylate
- Carbopal gel

Gargles and Mouthwashes

- Iodine gargle
- Chlorhexidine mouthwash

Recommended Books: (Latest Editions)

- H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Wilkins, New Delhi.
- Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
- M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone, Edinburgh.
- Indian pharmacopoeia.
- British pharmacopoeia.
- Lachmann. Theory and Practice of Industrial Pharmacy, Lea & Febiger Publisher, The University of Michigan.
- Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.

- Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
- E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
- Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
- Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
 - Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

45 Hours

Scope: This subject deals with the monographs of inorganic drugs and pharmaceuticals

Objectives: Upon completion of course student shall be able to know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals understand the medicinal and pharmaceutical importance of inorganic compounds

Course Content:

UNIT I

10 Hours

Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate

General methods of preparation, assay for the compounds superscripted with **asterisk (*)**, properties and medicinal uses of inorganic compounds belonging to the following classes

UNIT II

10 Hours

Acids, Bases and 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 isotonicity.

Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.

Dental products: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

UNIT III

10 Hours

Gastrointestinal agents

Acidifiers: Ammonium chloride* and Dil. HCl

Antacid: Ideal properties of antacids, combinations of antacids, Sodium

Bicarbonate*, Aluminium hydroxide gel, Magnesium hydroxide mixture

Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite

Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations

UNIT IV

08 Hours

Miscellaneous compounds

Expectorants: Potassium iodide, Ammonium chloride*.

Emetics: Copper sulphate*, Sodium potassium tartarate

Haematinics: Ferrous sulphate*, Ferrous gluconate

Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodiumnitrite333

Astringents: Zinc Sulphate, Potash Alum

UNIT V

07 Hours

Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of α , β , γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I^{131} , Storage conditions, precautions & pharmaceutical application of radioactive substances.

BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)

4 Hours / Week

Limit tests for following ions

Limit test for Chlorides and Sulphates Modified limit test for Chlorides and Sulphates Limit test for Iron

- Limit test for Heavy metals
- Limit test for Lead
- Limit test for Arsenic

Identification test

Magnesium hydroxide Ferrous sulphate

Sodium bicarbonate Calcium gluconate

Copper sulphate

Test for purity

Swelling power of Bentonite

Neutralizing capacity of aluminum hydroxide gel

Determination of potassium iodate and iodine in potassium Iodide

IV Preparation of inorganic pharmaceuticals

Boric acid

Potash alum

Ferrous sulphate

Recommended Books (Latest Editions)

- A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition.
- A.I. Vogel, Text Book of Quantitative Inorganic analysis
 - P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
- M.L Schroff, Inorganic Pharmaceutical Chemistry
- Bentley and Driver's Textbook of Pharmaceutical Chemistry
- Anand & Chatwal, Inorganic Pharmaceutical Chemistry
- Indian Pharmacopoeia

BP105T.COMMUNICATION SKILLS (Theory)

30 Hours

Scope: This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Objectives:

Upon completion of the course the student shall be able to

Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation

Communicate effectively (Verbal and Non Verbal)

Effectively manage the team as a team player

Develop interview skills

Develop Leadership qualities and essentials

Course content

UNIT – I

07 Hours

Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

UNIT – II

07 Hours

Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication

Communication Styles: Introduction, The Communication Styles Matrix with example for each - Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

UNIT – III

07 Hours

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations

Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication

Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

UNIT – IV

05 Hours

Interview Skills: Purpose of an interview, Do's and Dont's of an interview

Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

UNIT – V

04 Hours

Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

BP111P.COMMUNICATION SKILLS (Practical)

2 Hours / week

The following learning modules are to be conducted using wordsworth® English language lab software

Basic communication covering the following topics

- Meeting People
- Asking Questions
- Making Friends
- What did you do?
- Do's and Dont's

Pronunciations covering the following topics

- Pronunciation (Consonant Sounds)
- Pronunciation and Nouns
- Pronunciation (Vowel Sounds)

Advanced Learning

- Listening Comprehension / Direct and Indirect Speech
- Figures of Speech
- Effective Communication
- Writing Skills
- Effective Writing
- Interview Handling Skills
- E-Mail etiquette
- Presentation Skills

Recommended Books: (Latest Edition)

- Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
- Communication skills, Sanjay Kumar, Pushpalata, 1st Edition, Oxford Press, 2011
- Organizational Behaviour, Stephen .P. Robbins, 1st Edition, Pearson, 2013
- Brilliant- Communication skills, Gill Hasson, 1st Edition, Pearson Life, 2011
- The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5th Edition, Pearson, 2013
- Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
- Communication skills for professionals, Konar nira, 2nd Edition, New arrivals – PHI, 2011
- Personality development and soft skills, Barun K Mitra, 1st Edition, Oxford Press, 2011
- Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
- Soft skills and professional communication, Francis Peters SJ, 1st Edition, Mc Graw Hill Education, 2011
- Effective communication, John Adair, 4th Edition, Pan Mac Millan, 2009
- Bringing out the best in people, Aubrey Daniels, 2nd Edition, Mc Graw Hill, 199

BP 106RBT.REMEDIAL BIOLOGY (Theory)

30 Hours

Scope: To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

Objectives: Upon completion of the course, the student shall be able to know the classification and salient features of five kingdoms of life understand the basic components of anatomy & physiology of plant know understand the basic components of anatomy & physiology animal with special reference to human

UNIT I

07 Hours

Living world:

- Definition and characters of living organisms
- Diversity in the living world
- Binomial nomenclature

Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,

Morphology of Flowering plant

Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledons.

UNIT II

07 Hours

Body fluids and circulation

- Composition of blood, blood groups, coagulation of blood
- Composition and functions of lymph
- Human circulatory system
- Structure of human heart and blood vessels
- Cardiac cycle, cardiac output and ECG

Digestion and Absorption

Human alimentary canal and digestive glands
Role of digestive enzymes
Digestion, absorption and assimilation of digested food

Breathing and respiration

Human respiratory system
Mechanism of breathing and its regulation
Exchange of gases, transport of gases and regulation of respiration

Respiratory volumes

UNIT III

07 Hours

Excretory products and their elimination

- Modes of excretion
- Human excretory system- structure and function
- Urine formation
- Rennin angiotensin system

Neural control and coordination

- Definition and classification of nervous system
- Structure of a neuron
- Generation and conduction of nerve impulse
- Structure of brain and spinal cord
- Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

Chemical coordination and regulation

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

Human reproduction

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

Plant growth and development

Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators

Cell - The unit of life

Structure and functions of cell and cell organelles. Cell division

Tissues

Definition, types of tissues, location and functions.

Text Books

Text book of Biology by S. B. Gokhale

A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

Reference Books

- A Text book of Biology by B.V. Sreenivasa Naidu
- A Text book of Biology by Naidu and Murthy
- Botany for Degree students By A.C.Dutta.
 - d.Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthakrishnan.

e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

BP112RBP.REMEDIAL BIOLOGY (Practical)

30 ours

Introduction to experiments in biology Study of Microscope Section cutting techniques Mounting and staining

Permanent slide preparation

Study of cell and its inclusions

Study of Stem, Root, Leaf, seed, fruit, flower and their modifications

Detailed study of frog by using computer models

Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower

Identification of bones

- Determination of blood group
- Determination of blood pressure
- Determination of tidal volume

Reference Books

- Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
- A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
- Biology practical manual according to National core curriculum .Biology forum of Karnataka. Prof .M.J.H.Shafi

BP 106RMT.REMEDIAL MATHEMATICS (Theory)

30 Hours

Scope: This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Objectives: Upon completion of the course the student shall be able to:- Know the theory and their application in Pharmacy

- Solve the different types of problems by applying theory
- Appreciate the important application of mathematics in Pharmacy

Course Content:

UNIT – I

06 Hours

Partial fraction

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

Logarithms

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

Function:

Real Valued function, Classification of real valued functions,

Limits and continuity :

Introduction , Limit of a function, Definition of limit of a function ($\square - \square\square\square$)

UNIT –II

06 Hours

Matrices and Determinant:

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving

Pharmacokinetic equations

UNIT – III

06 Hours

Calculus

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two

functions (product formula), Derivative of the quotient of two functions
(Quotient formula) – **Without Proof**, Derivative of x^n w.r.t. x , where n is any
rational number, Derivative of e^x , Derivative of $\log_e x$, Derivative of
 a^x , Derivative of trigonometric functions from first principles (**without Proof**), Successive
Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

UNIT – IV

06 Hours

Analytical Geometry

Introduction: Signs of the Coordinates, Distance formula,

Straight Line: Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration

Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT-V

06 Hours

Differential Equations : Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving**

Pharmacokinetic equations

Laplace Transform : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Recommended Books (Latest Edition)

- Differential Calculus by Shanthinarayan
- Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
- Integral Calculus by Shanthinaraya
- Higher Engineering Mathematics by Dr.B.S.Grewal

BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to:

Explain the gross morphology, structure and functions of various organs of the human body.

Describe the various homeostatic mechanisms and their imbalances. Identify the various tissues and organs of different systems of human body.

Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume. Appreciate coordinated working pattern of different organs of each system. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Course Content:

Unit I

10 hours

Nervous system

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

Unit II

06 hours

Digestive system

Anatomy of GI Tract with special reference to anatomy and functions of stomach,

(Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT

Energetic

Formation and role of ATP, Creatinine Phosphate and BMR

Unit III

Respiratory system

10 hours

Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration

Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods

Urinary system

Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

Unit IV

10 hours

Endocrine system

Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

Unit V

09 hours

Reproductive system

Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition

Introduction to genetics

Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

BP 207 P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

- To study the integumentary and special senses using specimen, models, etc.,
- To study the nervous system using specimen, models, etc.,
- To study the endocrine system using specimen, models, etc
- To demonstrate the general neurological examination
- To demonstrate the function of olfactory nerve
- To examine the different types of taste.
- To demonstrate the visual acuity
- To demonstrate the reflex activity
- Recording of body temperature
- To demonstrate positive and negative feedback mechanism

Determination of tidal volume and vital capacity. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens Recording of basal mass index. Study of family planning devices and pregnancy diagnosis test.

Demonstration of total blood count by cell analyser

Permanent slides of vital organs and gonads.

Recommended Books (Latest Editions)

- Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
- Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
- Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI US
- Text book of Medical Physiology- Arthur C, Guyton and John.E. Hall. Miamisburg, OH, U.S.A
- Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
- Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
- Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi
- Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)

45 Hours

Scope: This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

Objectives: Upon completion of the course the student shall be able to write the structure, name and the type of isomerism of the organic compound write the reaction, name the reaction and orientation of reactions account for reactivity/stability of compounds, identify/confirm the identification of organic compound

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT-I

07 Hours

Classification, nomenclature and isomerism

Classification of Organic Compound Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds) Structural isomerisms in organic compounds

UNIT-II 10 Hours

Alkanes*, Alkenes* and Conjugated dienes*

SP³ hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP² hybridization in alkenes

E₁ and E₂ reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E₁ versus E₂ reactions, Factors affecting E₁ and E₂ reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation.

Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement

UNIT-III

10 Hours

Alkyl halides SN₁ and SN₂ reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocation SN₁ versus SN₂ reactions, Factors affecting SN₁ and SN₂ reactions

Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform

Alcohols*- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV 10 Hours

Carbonyl compounds* (Aldehydes and ketones)

Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

UNIT-V

08 Hours

Carboxylic acids*

Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid

Aliphatic amines* - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY -I (Practical)

• **Hours / week**

Systematic qualitative analysis of unknown organic compounds like Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and insaturation, etc. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test Solubility test Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilines. Melting point/Boiling point of organic compounds Identification of the unknown compound from the literature using melting point/ boiling point. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point. Minimum 5 unknown organic compounds to be analysed systematically. Preparation of suitable solid derivatives from organic compound Construction of molecular models

Recommended Books (Latest Editions)

- Organic Chemistry by Morrison and Boyd
- Organic Chemistry by I.L. Finar, Volume-I
- Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
- Organic Chemistry by P.L.Soni
- Practical Organic Chemistry by Mann and Saunders.
- Vogel's text book of Practical Organic Chemistry
- Advanced Practical organic chemistry by N.K.Vishnoi.
- Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
- Reaction and reaction mechanism by Ahluwalia/Chatwal

BP203 T. BIOCHEMISTRY (Theory)

45 Hours

Scope: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Objectives: Upon completion of course student shall be able to understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. Understand the metabolism of nutrient molecules in physiological and pathological conditions. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Course Content:

UNIT I

08 Hour

Biomolecules Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

Bioenergetics Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP

UNIT II

10 Hours

Carbohydrate metabolism

Glycolysis – Pathway, energetics and significance Citric acid cycle Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus

Biological oxidation

Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate level phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers

UNIT III

10 Hours

Lipid metabolism

β -Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

Amino acid metabolism

General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alcaptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice

UNIT IV

10 Hours

Nucleic acid metabolism and genetic information transfer

Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors

UNIT V

07 Hours

Enzymes

Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes –Structure and biochemical functions

BP 209 P. BIOCHEMISTRY (Practical)

4 Hours / Week

- Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
- Identification tests for Proteins (albumin and Casein)
- Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
- Qualitative analysis of urine for abnormal constituents
- Determination of blood creatinine
- Determination of blood sugar
- Determination of serum total cholesterol
- Preparation of buffer solution and measurement of pH
- Study of enzymatic hydrolysis of starch
- Determination of Salivary amylase activity
- Study the effect of Temperature on Salivary amylase activity.
- Study the effect of substrate concentration on salivary amylase activity

Recommended Books (Latest Editions)

- Principles of Biochemistry by Lehninger.
- Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
- Biochemistry by Stryer.
- Biochemistry by D. Satyanarayan and U.Chakrapani
- Textbook of Biochemistry by Rama Rao.
- Textbook of Biochemistry by Deb.
- Outlines of Biochemistry by Conn and Stumpf
- Practical Biochemistry by R.C. Gupta and S. Bhargavan.
- Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
- Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
- Practical Biochemistry by Harold Varley.

BP 204T.PATHOPHYSIOLOGY (THEORY)

45Hours

Scope: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Objectives: Upon completion of the subject student shall be able to– Describe the etiology and pathogenesis of the selected disease states; Name the signs and symptoms of the diseases; and Mention the complications of the diseases.

Course content:

Unit I

10Hours

Basic principles of Cell injury and Adaptation:

Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance

Basic mechanism involved in the process of inflammation and repair Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis

Unit II

10Hours

Cardiovascular System:

Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)

Respiratory system: Asthma, Chronic obstructive airways diseases.

Renal system: Acute and chronic renal failure .

Unit II

10Hours

Haematological Diseases:

Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia

Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones

Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.

Gastrointestinal system: Peptic Ulcer

Unit IV

8 Hours

Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.

Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout

Principles of cancer: classification, etiology and pathogenesis of cancer

Diseases of bones and joints: Rheumatoid Arthritis, Osteoporosis, Gout

Principles of Cancer: Classification, etiology and pathogenesis of Cancer

Unit V

7 Hours

Infectious diseases: Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections

Sexually transmitted diseases: AIDS, Syphilis, Gonorrhea

Recommended Books (Latest Editions)

- Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
- Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
- Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
- Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
- William and Wilkins, Baltimore; 1991 [1990 printing].
- Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
- Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.
- Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey;
 - Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
- V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
- Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

Recommended Journals

- The Journal of Pathology. ISSN: 1096-9896 (Online)
- The American Journal of Pathology. ISSN: 0002-9440
- Pathology. 1465-3931 (Online)
- International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
- Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory)

30 Hrs (2 Hrs/Week)

Scope: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Objectives: Upon completion of the course the student shall be able to know the various types of application of computers in pharmacy know the various types of databases know the various applications of databases in pharmacy

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division

Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

UNIT –II

Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products

Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT – III

Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

UNIT – IV

06 hours

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT-V

06 hours

Computers as data analysis in Preclinical development: Chromatographic data analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)

Design a questionnaire using a word processing package to gather information about a particular disease.

Create a HTML web page to show personal information. Retrieve the information of a drug and its adverse effects using online tools Creating mailing labels Using Label Wizard , generating label in MS WORD

Create a database in MS Access to store the patient information with the required fields Using access Design a form in MS Access to view, add, delete and modify the patient record in the database

- Generating report and printing the report from patient database
- Creating invoice table using – MS Access
- Drug information storage and retrieval using MS Access
- Creating and working with queries in MS Access
- Exporting Tables, Queries, Forms and Reports to web pages
- Exporting Tables, Queries, Forms and Reports to XML pages

Recommended books (Latest edition):

- Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
 - Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
 - Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
- Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002

BP 206 T. ENVIRONMENTAL SCIENCES (Theory)

30 hours

Scope: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Objectives: Upon completion of the course the student shall be able to: Create the awareness about environmental problems among learners. Impart basic knowledge about the environment and its allied problems. Develop an attitude of concern for the environment. Motivate learner to participate in environment protection and environment improvement. Acquire skills to help the concerned individuals in identifying and solving environmental problems. Strive to attain harmony with Nature.

Course content:

Unit-I

10hours

The Multidisciplinary nature of environmental studies Natural Resource Renewable and non-renewable resources: Natural resources and associated problems

- a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources;
f) Land resources: Role of an individual in conservation of natural resources.

Unit-II

10hours

- Ecosystems
- Concept of an ecosystem.
- Structure and function of an ecosystem.

Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- III

10hours

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Recommended Books (Latest edition):

- Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down of Earth, Centre for Science and Environment
-

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, thixotrophy, 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)

Practical's

- a. Determination of particle size, Particle size distribution and surface area using various methods of particle size analysis.
- b. Determination of derived properties of powders like density, porosity, compressibility, angle of repose etc.
- c. Determination of surface/ interfacial tension, HLB value and critical micellar concentration of surfactants.
- d. Study of rheological properties of various types of systems using different Viscometers.
- e. Studies of different types of colloids and their properties.
- f. Preparation of various types of suspensions and determination of their sedimentation parameters.
- g. Preparation and stability studies of emulsions.
- h. Studies of different types of complexes and determination of their stability constants.
- i. Determination of half-life, rate constant and order of reaction.
- j. To study the influence of various factors on the rate of reaction.
- k. Accelerated stability testing, shelf-life determination and expiration dating of pharmaceuticals.
- l. Preparation of pharmaceutical buffers and determination of buffer capacity.
- m. Experiments involving tonicity adjustments.

BOOKS RECOMMENDED:

1. Martin A, Bustamante P. & Chun A.H.C- Physical Pharmacy, Lea & Febiger, Philadelphia.
2. Shotten E & Ridgway 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
3. Organic Chemistry, The ELBS/ Longman, London.
4. Pharmacopoeia of India, Ministry of Health, Govt. of India.
5. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.

6. Delgado J N and Remers W A R, Eds., Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
7. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
8. Singh Harkishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, a. Delhi.
9. Nogrady, T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New a. York, Oxford.
10. Finar I L, Organic Chemistry, Vol I & II, ELBS/ Longman, London. 10. Thomas J..Perun," Computer –aided Drug Design methods applications'.

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.
 - i. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III,
2. 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, & Anagnodokos NP, Principles of Anatomy & Physiology, Harper & Rave 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.

- i. Robbins SL, Kumar V, Basic Pathology, WBSaunders.

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.

9) Forest resources: Use and over-exploitation, deforestation, casestudies.

10) Timber extraction, mining, dams and their effects on forest and tribalpeople.

11) Water resources : Use and over-utilization of surface and groundwater,

12) Floods, drought, conflicts over water, dams-benefits andproblems.

13) Mineral resources: Use and exploitation, environmental effects of extractingand using mineral resources, casestudies.

14) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, casestudies.

15) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Casestudies.

16) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion anddesertification.

c. Role of an individual in conservation of naturalresources.

d. Equitable use of resources for sustainablelifestyles

Unit – 2: Ecosystems

Concept of an ecosystem.

1. Structure and function of anecosystem.

2. Producers, consumers and decomposers.

3. Energy flow in theecosystem.

4. Ecologicalsuccession.

5. Food chains, food webs and ecological pyramids.

6. Introduction, types, characteristic features, structure and function of thefollowing ecosystems:- a. Forest ecosystem.

e. Grasslandecosystem.

f. Desertecosystem.

g. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans,estuaries).

Unit – 3: Biodiversity and its conservation

1. Introduction: – Definition: genetic, species and ecosystemdiversity.

2. Biogeographical classification of India

3. Value of biodiversity : consumptive use, productive use, social, ethical,aesthetic and optionvalues

4. Biodiversity at global, National and local levels.

5. India as a mega-diversitynation
6. Hot-spots of biodiversity.
7. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlifeconflicts.
8. Endangered and endemic species of India.
9. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit – 4: Environmental Pollution

Definition

4. Causes, effects and control measures of :

- a. Airpollution.
 - b. Waterpollution.
 - c. Soil pollution.
 - d. Marinepollution.
 - e. Noisepollution.
 - f. Thermal pollution & Nuclearhazards.
5. Solid waste management:- Causes, effects and control measures of urban and Industrialwastes.

Role of an individual in prevention of pollution. Casestudies

6. Disaster management:- Floods, earthquakes, cyclones andlandslides.

Unit – 5: Human Population and the Environment

Population growth, variation among nations.

8. Population explosion – Family Welfare Programmes.
9. Environment and humanhealth.
10. HumanRights.
11. ValueEducation.
12. HIV/AIDS.
13. Women and ChildWelfare.
14. Role of Information Technology in Environment and humanhealth.

BOOKS:

5. Principles of Environmental Studies, C. Manoharachary, P. Jyaranama Reddy,Pharma Book Syndicate,Hyderabad.
6. Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standards Vol. I &II. R.K.Trivedy, Pharma Book Syndiacte,Hyderabad
7. Relevant Acts & Rules published by Govt. of India with latestamendments.
8. Reddy, M.Anji , ‘ Text Book of Environmental Sciences &Technology’.

BP204 Computers & its Applications
Theory

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 , MSaccess)
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:

5. Sinha, R.K., Computer Fundamentals, BPB Publications.

6. Raja Raman, V, Computer Programming in 'C', PHIPublication.
7. Hunt N and Shelley J. "Computers and Common Sense" Prentice Hall ofIndia.
8. N.K.Tiwari," Computer fundamentals with PharmacyApplications".
G.N.Rao, " Biostatistics& computerApplications"

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-IVPractical

Practical

3 hrs /week

3. Preparation of cold cream, vanishing cream, cleansing lotion and creams. Moisturising creams, Skin tonics, Hair creams, Hair Conditioners, Shampoos, Shaving creams andsticks. Tooth powder, Tooth pastes, After shave lotion and other cosmeticpreparations.
4. Preparation, evaluation and packing of liquid orals like solutions, suspensions and emulsions, ointments, suppositories, eye drops, eye ointmentsetc.

SUGGESTED PRACTICALS:

Preparation, evaluation, and packing of :

I- Liquid Orals

f) Solutions : Strong Sodium salicylate oral solution BP Chloral hydrate oral solutionBP

g) Suspensions : Magnesium sulphate oral suspension BP Milk of magnesiaIP

Aluminium hydroxide gel IP

h) Emulsions : Liquid paraffin oral emulsionBP

IV –Semi-Solids

i) Ointments Salicylic acid ointment BP

Whitfield ointmentBP

Compound benzoic acid ointment

V -Suppositories

j) Suppositories : Glycerin suppositories BP Lactic acid suppositoriesBP

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 dandruffshampoo
- 27) Depilatory cream
- 28)Bleachcream
- 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 IndustrialPharmacy, Lea &
4. Febiger, Philadelphia, U.S.A.
5. H.C. Ansel, Introduction to Pharmaceutical Dosage Forms, Lea & Febiger,Philadelphia, U.S.A.
6. 5 R.L. Juliano, Drug Delivery Systems, Oxford University Press, Oxford.
7. Harrys Cosmetology
8. Balsam and Sagarin, Cosmetics: Science andTechnology.
9. Thomssen E.G. Modern Cosmetics, Universal PublishingCorporation.
10. Mittal B.M. & Saha R.N.-a handbook of cosmetics, VallabhPrakashan.
11. Harry G.Brittain," Polymorphin in PharmaceuticalsSolids".

BP206

Pharmaceutical Chemistry-V (MedicinalChemistry)

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 fl 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, modification, uses, structure activity relationship including physicochemical properties of the following classes of drugs:

UNIT III: Drugs acting at Synaptic and neuro-effector junction sites:

vi. Cholinergics and Anticholinesterases

vii. Adrenergic drugs

viii. Antispasmodic and antiulcer drugs

ix. Neuromuscular blocking agents

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

6. Exercises based on QSAR: Hansch & Free-Wilson methods.
7. Synthesis of selected drugs from the course content.
8. Spectral analysis of the drug synthesized.
9. Establishing the pharmacopoeial standards of the drug synthesized.
10. Determination of partition coefficient, dissociation constant and molar refractivity 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, Ministry 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, Complex metric 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 Practical

Practicals

3hrs/week

Non-aqueous Titrations : Preparation and standardization of perchloric acid and sodium/potassium methoxide solutions, Estimation of some pharmacopoeial products. Miscellaneous Determinations : Exercise involving Diazotization, Kjeldahl, Karlfisher.

Exercise based on acid base titration in aqueous and non-aqueous media, oxidation reduction titration using potentiometric technique, determination of acid dissociation constants and plotting of titration curves using pH meter.

Exercises involving conductometric titrations.

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 Interscience, 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 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:

- c. Preparation of extracts.
- d. 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

Practical

Practical 3hrs /week

5. Identification of crude drugs mentioned in theory.
6. Study of fibres and pharmaceutical aids.
7. Microscopic studies of seven-selected crude drugs and their powders mentioned under the category of volatile oils in theory and their chemical tests,
8. General chemical tests for alkaloids, glycosides, steroids, flavonoids and tannins.

SUGGESTED PRACTICALS

- a. Morphology of Mentha, Lemongrass, Nutmeg and chenopodium.
- b. Morphology of Turmeric, Ginger, Cannabis, Eucalyptus.
- c. Morphology and microscopy of Coriander and Cinnamon.
- d. Morphology and microscopy of Dill and Caraway.
- e. Morphology and microscopy of Cardamom and Fennel.
- f. Morphology and microscopy of Clove and to study its transverse section.

- g. Study of Cotton, Silk and Wool along with their chemical Tests.
- h. To study the morphology and chemical tests of Talc, Diatomite, and Kaolin.
- i. Morphology and microscopy of Bentonite, Gelatin and natural colours (Saffron).
- j. To perform the chemical tests of Balsam (Tolu and Peru) and Asafoetida.
- k. Preparation of reagents for the chemical tests of Alkaloids and to perform the chemical tests on any Alkaloid containing drug.
- l. Test for identification of Glycosides (Saponin and Anthraquinone).
- m. Test for identification of Tannins.
- n. Tests for identification of steroids.
- o. 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 B.M., "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

3. Introduction

- d. Pharmaceutical Legislations - A brief review.
- e. Drugs & Pharmaceutical Industry - A brief review.
- f. Pharmaceutical Education - A brief review.

An elaborate study of the following

4. An elaborate study of the following:

- g. Pharmaceutical Ethics
- h. Pharmacy Act 1948
- i. Drugs and Cosmetics Act 1940 and Rules 1945.
- j. Medicinal & Toilet Preparations (Excise Duties) Act 1955.
- k. Narcotic Drugs & Psychotropic Substances Act 1985 & Rules
- l. Drugs Price Control Order.

3. A brief study of the following with special reference to the main provisions.

- a. Poisons Act1919
 - b. Drugs and Magic Remedies (Objectionable Advertisements) Act1954
 - c. Medical Termination of Pregnancy Act 1970 & Rules1975.
 - d. Prevention of Cruelty to Animals Act1960.
 - e. States Shops & Establishments Act &Rules.
 - f. Insecticides Act1968.
6. a. AICTE Act1987
- b. Factories Act 1948.
- c. Minimum WagesAct1948. d Patents Act 1970.
7. 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. SundariMohan Avenue,Calcutta.
2. Relevant Acts & Rules Published by the Govt. ofIndia.
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" VallabhPrakashan.



LINGAYA'S
SCHEME FOR (D. PHARMA) (Yearly)

D. PHARMA (Year - I)			Semester			I-II
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	2
2	DP 152	Pharmaceutical Chemistry Practical	0	0	4	2

3	DP 153	Pharmacognosy Practical	0	0	4	2
4	DP 154	Biochemistry and Clinical Pathology Practical	0	0	4	2
5	DP 155	Human Anatomy and Physiology Practical	0	0	2	1
Total			18	1	18	28

D. PHARMA (Year - II)			Semester			III-IV
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	0	1	0	1
PRACTICAL						
1	DP 251	Pharmaceutics-II Practical	0	0	4	2
2	DP 252	Pharmaceutical Chemistry-II Practical	0	0	4	2
3	DP 253	Pharmacology Practical	0	0	4	2
4	DP 256	Hospital and Clinical Pharmacy Practical	0	0	4	2
Total			19	0	16	27