LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

ACADEMIC YEAR: 2022-23

School: School of Computer Science & Information Technology	**Batch: 2022-2025**
Department: Department of Computer Applications	**Year: 1st**
Course: BSC(CS)	**Semester: I**

SN	**Category**	**Course Code**	**Course Name**	**Periods**			**Credits**	**Evaluation Scheme**					**Subject Total Marks**
								Theory			**Practical**		
				L	**T**	**P**		**ABQ**	**MSE**	**ESE**	**IP**	**EXP**	
1	PCC	BCS-101	Computer Programming	4	0	0	4	15	25	60	-	-	100
2	PCC	BCS-103	Internet and Web Development	4	0	0	4	15	25	60	-	-	100
3	GE	EC-105	Analog Electronics	3	0	0	3	15	25	60	-	-	100
4	SEC	BS-117	Computational Mathematics-I	3	1	0	4	15	25	60	-	-	100
5	AECC	HSS-107	English & Communication Skills	3	0	0	3	15	25	60	-	-	100
6	GE	EC-107	Basic Circuit Theory	3	1	0	4	15	25	60	-	-	100
7	PCC	BCS-151	Computer Programming Lab	0	0	2	1				60	40	100
8	PCC	BCS-153	Internet and Web Development Lab	0	0	2	1				60	40	100
9	GE	EC-155	Analog Electronics Lab	0	0	2	1				60	40	100
			Total---->	**20**	**2**	**6**	**25**						

Abbreviations:

PCC:	Programme Core Courses	L:	Lecture
AECC:	Ability Enhancement Compulsory course	T:	Tutorial
GE:	Generic Elective	P:	Practical
SEC:	Skill Enhancement Course	ABQ:	Assignment Based Quiz
BCS:	Bachelor of Computer Science	MSE:	Mid Semester Examination
EC:	Electronics & Communication	ESE:	End Semester Examination
HSS:	Humanities & Social Sciences	IP:	Internal Practical
BS:	Basic Sciences	EXP:	Internal Practical

LINGAYA’S VIDYAPEETH
SCHEME OF STUDIES
ACADEMIC YEAR: 2022-23

School: School of Computer Science & Information Technology	**Batch: 2022-2025**
Department: Department of Computer Applications	**Year: 1st**
Course: Bachelor of Science (B.SC(CS))	**Semester: II**

SN	**Category**	**Course Code**	**Course Name**	**Periods**			**Credits**	**Evaluation Scheme**					**Subject Total Marks**
								Theory			**Practical**		
				L	**T**	**P**		**ABQ**	**MSE**	**ESE**	**IP**	**EXP**	
1	PCC	BCS-102	Data Structures using C	4	0	0	4	15	25	60	-	-	100
2	PCC	BCS-104	Object Oriented Programming using C++	4	0	0	4	15	25	60	-	-	100
3	PCC	BCS-106	Discrete structure	4	0	0	4	15	25	60	-	-	100
4	GE	EC-106	Digital Logic Design	4	0	0	4	15	25	60	-	-	100
5	SEC	BS-118	Computational Mathematics-II	3	1	0	4	15	25	60	-	-	100
6	AECC	CE-108	Environmental Science and Ecology	2	0	0	2	15	25	60	-	-	100
7	PCC	BCS-152	Data Structures Using C Lab	0	0	2	1				60	40	100
8	PCC	BCS-154	Object Oriented Programming using C++ Lab	0	0	2	1				60	40	100
9	PCC	BCS-160	Qualitative analysis using SPSS	0	0	2	1				60	40	100
			Total---->	**21**	**1**	**6**	**25**						

Abbreviations:

PCC:	Programme Core Courses	L:	Lecture
GE:	Generic Elective	T:	Tutorial
SEC:	Skill Enhancement Course	P:	Practical
BCS:	Bachelor of computer Science	ABQ:	Assignment Based Quiz
EC:	Electronics & Communication	MSE:	Mid Semester Examination
BS:	Basic Science	ESE:	End Semester Examination
CE	Civil Engineering	IP:	Internal Practical
AECC:	Ability Enhancement Course	EXP:	External Practical

LINGAYA’S VIDYAPEETH

SCHEME OF STUDIES

ACADEMIC YEAR: 2023-24

School: School of Computer Science & Information Technology	**Batch: 2022-2025**
Department: Department of Computer Applications	**Year: 2nd**
Course: Bachelor of Science (B.SC(CS))	**Semester: III**

SN	**Category**	**Course Code**	**Course Name**	**Periods**			**Credits**	**Evaluation Scheme**					**Subject Total Marks**
								Theory			**Practical**		
				L	**T**	**P**		**ABQ**	**MSE**	**ESE**	**IP**	**EXP**	
1	PCC	BCS-201	Operating Systems & Unix	4	0	0	4	15	25	60	-	-	100
2	PCC	BCS-203	Computer Architecture & Organization	4	0	0	4	15	25	60	-	-	100
3	PCC	BCS-205	Computer Graphics	4	0	0	4	15	25	60	-	-	100
4	PCC	BCS-207	Computer Networks	4	0	0	4	15	25	60	-	-	100
5	PCC	BCS-209	Core Java	4	0	0	4	15	25	60	-	-	100
6	PCC	BCS-211	Design and Analysis of Algorithm	4	0	0	4	15	25	60	-	-	100
7	PCC	BCS-255	Computer Graphics Lab	0	0	2	1				60	40	100
8	PCC	BCS-259	Core java Lab	0	0	2	1				60	40	100
9	AECC	PEP-201	Exploring self	1	0	2	2						100
			Total---->	**25**	**0**	**6**	**28**						

Abbreviations:

PCC:	Programme Core Courses	ABQ:	Assignment Based Quiz
AECC:	Ability Enhancement Compulsory Course	MSE:	Mid Semester Examination
BCS	Bachelor of Computer Science	ESE:	End Semester Examination
PEP:	Personality Enhancement Program	IP:	Internal Practical
L:	Lecture	EXP:	Internal Practical
T:	Tutorial		
P:	Practical		

LINGAYA’S VIDYAPEETH

SCHEME OF STUDIES

ACADEMIC YEAR: 2023-24

School: School of Computer Science & Information Technology	**Batch: 2022-2025**
Department: Department of Computer Applications	**Year: 2nd**
Course: Bachelor of Science (B.SC(CS))	**Semester: IV**

SN	**Category**	**Course Code**	**Course Name**	**Periods**			**Credits**	**Evaluation Scheme**					**Subject Total Marks**
								Theory			**Practical**		
				L	**T**	**P**		**ABQ**	**MSE**	**ESE**	**IP**	**EXP**	
1	PCC	BCS-202	Automata Theory	4	0	0	4	15	25	60	-	-	100
2	PCC	BCS-204	Database Management System	4	0	0	4	15	25	60	-	-	100
3	PCC	BCS-206	Programming Using C#	4	0	0	4	15	25	60	-	-	100
4	GE	BCS-208	Numerical Methods	3	1	0	4	15	25	60	-	-	100
5	PCC	BCS-210	Management Information System	4	0	0	4	15	25	60	-	-	100
6	PCC	BCS-212	Software Engineering	3	1	0	4	15	25	60	-	-	100
7	PCC	BCS-254	Database Management System Lab	0	0	2	1				60	40	100
8	PCC	BCS-256	Programming Using C# Lab	0	0	2	1				60	40	100
			Total---->	**22**	**2**	**4**	**26**						

Abbreviations:

PCC:	Programme Core Courses	ABQ:	Assignment Based Quiz
GE:	Generic Elective	MSE:	Mid Semester Examination
BCS:	Bachelor of Computer Science	ESE:	End Semester Examination
BS:	Basic Sciences	IP:	Internal Practical
L:	Lecture	EXP:	Internal Practical
T:	Tutorial		
P:	Practical		

LINGAYA’S VIDYAPEETH

SCHEME OF STUDIES

ACADEMIC YEAR: 2024-25

School: School of Computer Science & Information Technology	**Batch: 2022-2025**
Department: Department of Computer Applications	**Year: 3rd**
Course: Bachelor of Science (B.SC(CS))	**Semester: V**

SN	**Category**	**Course Code**	**Course Name**	**Periods**			**Credits**	**Evaluation Scheme**					**Subject Total Marks**
								Theory			**Practical**		
				L	**T**	**P**		**ABQ**	**MSE**	**ESE**	**IP**	**EXP**	
1	PCC	BCS-301	Software Testing & Quality Assurance	4	0	0	4	15	25	60	-	-	100
2	PCC	BCS-303	Python Programming	4	0	0	4	15	25	60	-	-	100
3	PCC	BCS-305	Statistical Analysis using R	4	0	0	4	15	25	60	-	-	100
4	PCC	BCS-307	Introduction to E-commerce	4	0	0	4	15	25	60	-	-	100
5	DSE		**Elective – I**	3	0	0	3	15	25	60	-	-	100
6	PCC	BCS-353	Python Programming Lab	0	0	2	1				60	40	100
7	PCC	BCS-355	Statistical Analysis using R Lab	0	0	2	1				60	40	100
8	PROJ	BCS-371	Minor project	0	0	8	4					100	100
9	AECC	PEP-301	Leadership & Management Skills	2	0	0	2						100
			Total----->	**21**	**0**	**12**	**27**						

Abbreviations:

PCC:	Programme Core Courses	ABQ:	Assignment Based Quiz
DSE:	Discipline Specific Elective	MSE:	Mid Semester Examination
AECC:	Ability Enhancement Course	ESE:	End Semester Examination
BCS:	Bachelor of Computer Science	IP:	Internal Practical
PEP:	Personality Enhancement Program	EXP:	External Practical
L:	Lecture		
T:	Tutorial		
P:	Practical		

LINGAYA’S VIDYAPEETH

SCHEME OF STUDIES

ACADEMIC YEAR: 2024-25

School: School of Computer Science & Information Technology	**Batch: 2022-2025**
Department: Department of Computer Applications	**Year: 3rd**
Course: Bachelor of Science (B.SC(CS))	**Semester: VI**

SN	**Cate-gory**	**Course Code**	**Course Name**	**Periods**			**Credits**	**Evaluation Scheme**					**Subject Total Marks**
								Theory			**Practical**		
				L	**T**	**P**		**ABQ**	**MSE**	**ESE**	**IP**	**EXP**	
1	PCC	BCS-302	Software Project Management	4	0	0	4	15	25	60	-	-	100
2	PCC	BCS-304	Artificial Intelligence	4	0	0	4	15	25	60	-	-	100
3	PCC	BCS-306	Cryptography & Data Compression	4	0	0	4	15	25	60	-	-	100
4	PCC	BCS-308	Android Programming	4	0	0	4	15	25	60	-	-	100
5	DSE		**Elective – II**	3	0	0	3	15	25	60	-	-	100
6	PCC	BCS-354	Artificial Intelligence Lab	0	0	2	1				60	40	100
7	PCC	BCS-358	Android Programming Lab	0	0	2	1				60	40	100
8	PROJ	BCS-372	Major Project	0	0	10	5					100	100
			Total---->	**19**	**0**	**14**	**26**						

Abbreviations:

PCC:	Programme Core Courses	ABQ:	Assignment Based Quiz
DSE:	Discipline Specific Elective Course	MSE:	Mid Semester Examination
PROJ:	Project	ESE:	End Semester Examination
BCS:	Bachelor of Computer Science	IP:	Internal Practical
L:	Lecture	EXP:	External Practical
T:	Tutorial		
P:	Practical		

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SCHEME OF STUDIES

Elective I Courses		
S. No	**Course Code**	**Course Name**
1	BCS-309A	Network Security Management
2	BCS-309B	Compiler Design
3	BCS-309C	Cyber Security and Cyber Laws
Elective II Courses		
S. No	**Course Code**	**Course Name**
1	BCS-310A	Big Data Analysis
2	BCS-310B	Cloud Computing
3	BCS-310C	Linear Programming

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BCS-101	COMPUTER PROGRAMMING	L-T-P	Cr
		4-0-0	4

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.

COURSE OUTCOMES

The student after undergoing this course will be able:
CO1: To know the different programming languages
CO2: To learn the basic concepts of C programming language
CO3: To learn the concepts of different control statements
CO4: To know about different data types and the ways of handling
CO5: To store the data in a file type and how to maintain it

UNIT I

COMPUTER FUNDAMENTALS AND OVERVIEW OF C PROGRAMMING: Computer Fundamentals: Algorithm, Flow charts and their symbols. Types of programming languages (Machine Language, Assembly Languages, High level Languages), Introduction to Compiler, Assembler, and Interpreter, Introduction to C, History of C Structure of C program, C character set, Identifier and Keywords, format specifiers, Data types, constants, variables, Declaration, expressions, Types of operators, Input and output functions in C, header files, Structure of C program

UNIT II

CONTROL STATEMENTS: Control Statements & loops: Sequencing, Selection: if, If-Else, Nesting and switch statements, Iteration: for loop, while loop, do while loop, break, continue and break statements, Recursion.

UNIT III

ARRAYS AND STRING HANDLING: Introduction to array, Declaring, Referencing and initializing arrays, array subscript, Types of Array, using for loop for sequential access, Using array element as a function argument, String basics, string library functions, assignment and substring, concatenation, string comparison.

UNIT IV

FUNCTION AND POINTERS: Defining a function, accessing a function, function prototypes, passing arguments to a function, call by value and call by reference, Types of storage classes, Scope of variable: Global, local, static variables, Pointer variables, Declaring & initializing pointers, operations on pointers, pointer expressions, pointers and arrays, pointer and functions, C's dynamic allocation functions.

UNIT V

STRUCTURE, UNION AND FILE PROCESSING: Declaration and Initialization of structure, accessing members of a structure, Union, Pre-processor directives, file processing: Introduction, 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, structures read and write in files

TEXT BOOK

1. Computer Fundamentals, P.K Sinha, 5th Edition, BPB Publications.
2. Yashwant kanitkar," Let Us C", by BPB Publication.

REFERENCE BOOKS

1. Dennis, M. Ritchie and Brian, W. Kernigham, "The C Programming Language, Prentice Hall of India, 2nd Edition, 1988
2. Hanly Jeri R, & E. B. Koffman , "Problem Solving and Program Design in C", Pearson Publication, 5th Edition, 2008.
3. Byron, C. Gottfried, "Theory and Problem of Programming with C", Tata McGraw Hill
4. E.Balagurusamy "C – programming" Tata McGray Hill.
5. Schildt, Herbert "The Complete Reference C", 4th Edition, Tata McGraw Hill, 2004

BCS-103	INTERNET AND WEB DEVELOPMENT	L-T-P	Cr
		4-0-0	4

OBJECTIVE

It aims to introduce students with Internet Structure and with the basic protocols which provides knowledge of a proficiency in basic techniques for the development of Web-based applications.

Pre-Requisites:

Knowledge of Web, and basics of Computer and Internet.

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To know about the web and web hosting

CO2: To create their own website using HTML

CO3: To learn to make the dynamic website using CSS

CO4: To understand the client side programming using Javascript

CO5: To aware about the search engine and its optimization

UNIT I

INTRODUCTION TO WEB AND HOSTING: The idea of hypertext and hyper media; how the browser works: MIME types, plug-ins and helper applications; W3C,Hosting and Domains: Choosing a domain name, Selecting a hosting company ,Blog hosting services and how they could work for your website; Hosting management tools through the browser such as cPanel.

UNIT II

HYPERTEXT MARKUP LANGUAGE: The anatomy of an HTML document; marking up for structure and style: ordered and unordered lists, Structuring content with HTML using natural divisions , Marquee, Anchor Tag, Email Link; embedding images and controlling appearance, table creation: Frames and Nesting, iframes, forms, Semantic elements of HTML5, HTML5 Form elements, Media tags in HTML5, HTML5 Data Storage, Basic of XML, XHTML and XSLT.

UNIT III

POWER OF CSS: Introduction to Cascading Style Sheet: Selector, Declaration and declaration block. Types of CSS: Inline, Internal and Internal style specifications within HTML. Types of Selector; Building & Applying Class Selectors; ID Selector using Div Tags; CSS Properties: Table, List, Fonts, Link, Margins, Background Colors.

UNIT IV

CLIENT SIDE PROGRAMMING: Introduction to JavaScript syntax: output, Comments, variables, functions, operators, conditions, switch, loop; JavaScript object model: Window, Location and History object model; HTML DOM: Introduction to DOM: methods, event handling, JavaScript Functions, Forms validation and regular expressions.

UNIT V

SEARCH ENGINE OPTIMIZATION: What is Search Engine Optimization? Natural vs. paid search and a look at how Google and other search engines work. Maximizing natural search with page titles, meta tags and page content; importance of inbound links in search rankings. Search engine marketing.

Textbook:

1. Uttam K. Roy, “Web Technology”, Oxford Publication.
2. Achyut S Godbole and Atul Kahate, “Web Technologies”, McGrow Hill Publication.

References Books:

1. Musciano Chuck, “HTML & XHTML: The Definitive Guide”, Bill Kennedy, 4th Edition, 2000.
2. Holzner Steven, “XHTML Black Book”, Paraglyph Press, 2000.
3. Guy W.Lecky-Thompson, “Web Programmin”, Cengage Learning, 2008.
4. Kamal Raj, “Internet and Web Technologies”, Tata McGraw Hill, 2002

Web References:

1. http://W3schools.com.
2. http://www.uniweb.be/
3. http://www.sagaciousindia.com/

EC-105	ANALOG ELECTRONICS	L T P	Cr
		3 0 0	3

OBJECTIVES:

This is a fundamental course, basic knowledge of which is required by all the Electronics and Computer Science Students.

This course focuses:

1. To familiarize the student with the principal of operation, analysis and design of junction diode .BJT and FET transistors and amplifier circuits.
2. To understand diode as a rectifier.
3. To study basic principal of filter of circuits and various types

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1. Understand and Analyse the different types of diodes, operation and its characteristics

CO2. Design and analyse the DC bias circuitry of BJT and FET

CO3. Design biasing circuits using diodes and transistors.

CO4. To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.

UNIT-I P-N Junction diode: Qualitative Theory of P-N Junction, P-N Junction as a diode , diode equation , volt-ampere characteristics temperature dependence of V-I characteristic , ideal versus practical –resistance levels(static and dynamic), transition and diffusion capacitances, diode equivalent circuits, load line analysis ,breakdown mechanisms in semiconductor diodes , Zener diode characteristics. Special purpose electronic devices: Principal of operation and Characteristics of Tunnel Diode with the help of energy band diagrams, Varactar Diode, SCR and photo diode

UNIT-II RECTIFIERS, FILTERS: P-N Junction as a rectifier ,Half wave rectifier, , full wave rectifier, Bridge rectifier , Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, - section filter and comparison of various filter circuits, Voltage regulation using Zener diode.

UNIT-III BIPOLAR JUNCTION TRANSISTOR: The Junction transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations. α and β Parameters and the relation between them, BJT Specifications. BJT Hybrid Model, h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of Ai, Ri ,Av,and Ro,

UNIT-IV **Field Effect Transistors:** Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET.

FET Amplifiers: JFET small signal model, Fixed bias configuration, Self-bias configuration, Voltage divider configuration, Common Gate configuration. Source- Follower Configuration, Cascade configuration

UNIT-V Power Amplifiers: Definition and amplifier types, Series fed class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation and circuits, Amplifier distortion, Class C and Class D amplifiers.

BOOKS:

1. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGraw Hill.
2. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications.
3. Electronic Devices and Circuits, S.Salivahanan,N.Suresh kumar, McGraw Hill.
4. Electronic Devices and Circuits,Balbir kumar ,shail b.jain, PHI Privated Limted, Delhi.

13 REFERENCE BOOKS:

1. Electronic Devices and Circuits,K.Lal Kishore B.S Publications
2. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.
3. Electronic Devices and Circuits,A.P Godse, U.A Bakshi , Technical Publications
4. Electronic Devices and Circuits K.S. Srinivasan Anurdha Agencies

BS-117	COMPUTATIONAL MATHEMATICS-I	L T P	Cr
		3 1 0	4

OBJECTIVE

The objective of this subject is to understand the major problems of differential and integral calculus and to appreciate how calculus allows us to solve important practical problems in an optimal way.

PRE-REQUISITES: Knowledge of Basic Mathematics

COURSE OUTCOMES

CO1: Calculate limits, derivatives and indefinite integrals of various algebraic and trigonometric functions of a single variable.

CO2: Use the fact that the derivative is the slop of the tangent line to the curve at a given Point.

CO3: Use the properties of limits and the derivative to analyze graphs of various functions of a single variable

CO4: Apply derivative tests in optimization problems appearing in social sciences, physical sciences, life Sciences and a host of other disciplines.

Unit-:I LIMIT & CONTINUITY*: The* real line and its geometrical representation; *e-δ* treatment of limit and continuity; Properties of limit and classification of discontinuities; Properties of continuous functions.

Unit-II: 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-III: 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 IV: APPLICATIONS OF DIFFERENTIATION & PARTIAL DIFFERENTIATION: Asymptotes; Concavity, convexity and points of inflection; Curvature; Extrema; elementry curves, tangent and normal in parametric form; Polar Coordinates. Limits and continuity of functions of two variables; Partial derivatives; Taylor's theorem and Maclaurin's Theorem for function of two variable.

Unit V: MULTIPLE INTEGRATIONS: Double and triple integrals; Change of order in double integrals. Application of Integration: length of a curve; Arc length as a parameter; Evoute & Envelope; Volumes and surface areas of solids of revolution.

TEXT BOOK:

1. Grewal, B.S., "Higher Engineering Mathematics", 41st Edition,2010,Khanna Publishers.
2. Kreyszig, E., "Advance Engineering Mathematics", 10th Edition, 2011,Wiley India Publishers, New Delhi

REFERENCE BOOKS

1. Weir, M. D., Hass, J. and Giordano, F. R., “Thomas Calculus”, 11th Edition, 2012, Pearson Education.
2. Jain, R.K. and Iyengar, S.R.K., “ Advance Engineering Mathematics” ,3rd Edition,2002, Narosa Publishing House New Delhi.
3. H. Anton, I. Bivens and S. Davis, *Calculus*, 7th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
4. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005

HSS-107	ENGLISH & COMMUNICATION SKILLS	L-T-P	Cr.
		3-0-0	3

OBJECTIVE

To make students understand the concepts related to language development communication skills.

COURSE OUTCOMES

The students undergoing the course will be able:

CO1: To know the basic structure of speech
CO2: To learn about oral communication and role of speech organs in it
CO3: To get knowledge about the writing skills
CO4: To be skillful in writing different applications as well as letters
CO5: To know all about comprehension

UNIT I

REMEDIAL ENGLIGH: Parts of Speech; Tenses and their application; Verbs and their various forms.

UNIT II

ORAL COMMUNICATION: Introduction to oral communication; Importance of pronunciation; Phonetics; Importance of phonetics; Basic introduction to speech organs, articulation and phonetic symbols.

UNIT III

WRITING SKILLS: Introduction to various types of writings including general writing, technical writing, picture composition, Slogan making; Movie review etc.

UNIT IV

LETTER WRITING: Types of letter writing; Structure & layout; Leave application; Letter of enquiry & response with respect to educational & official matters; Informal letter expressing or discussing social or educational issues.

UNIT V

COMPREHENSION: Listening comprehension & reading comprehension; Listening to recorded speeches, TV news and other audio materials to test listening comprehension; comprehension of unseen passages through reading.

TEXT BOOK:

1. 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.

EC-107	BASICS OF CIRCUIT THEORY	L T P	Cr
		3 0 0	3

COURSE OBJECTIVES

1. To apply circuit theorems to simplify and find solutions to electrical circuits.
2. To solve simple circuits using ohm's law, Kirchhoff's laws and the properties of the elements.
3. To build up basic problem solving skills through organizing available information and applying circuit laws.
4. To Build up strong problem solving skills by effectively formulate a circuit problem into a mathematical problem using circuit laws and theorems.
5. To Simplify circuits using series and parallel equivalents and using Thevenin and Norton equivalents
6. To understand application of resistors capacitors, inductors and transient circuit response.

PRE- REQUISITES

Basic Knowledge of Physics.

COURSE OUTCOMES

At the end of the course the student should be able to

CO1. Simplify and identify solutions to Electronics & electrical circuits.

CO2. Implement the techniques to solve simple circuits using ohm's law, Kirchhoff's laws and the properties of the elements

CO3. Categorize series and parallel equivalents and using Thevenin and Norton equivalents

CO4. Recognize resistors capacitors, inductors and transient circuit responses

Unit-I

Resistors: Introduction to linear and non-linear components (active and passive) – Types of resistors (wire wound, carbon composition, film type, Cermet) – Resistor colour coding – power rating of resistors – Series and Parallel combination of resistors.

Capacitors: Capacitance-Factors controlling capacitance-Types of capacitors: Fixed Capacitors, Variable Capacitors – Non electrolytic and electrolytic capacitors. Voltage rating of capacitors – capacitors in series and parallel – Energy stored in capacitors

Inductors : Inductors (air core, iron core, ferrite core) , comparison of different cores , Inductance of an Inductor , Mutual Inductance , Coefficient of coupling, Variable Inductors, Inductors in Series and Parallel without M Reactance and Impedance offered by a coil, Q factor

Unit-II

Ohm's law – Kirchoff's current law – Kirchoff's voltage law – voltage division technique - concepts of series circuit – current division technique – concepts of parallel circuits – internal resistance of sources – method of solving a circuit by Kirchoff's laws – loop analysis – nodal analysis – simple problems

Unit-III

Network reduction: voltage and current division, source transformation, star delta conversion. Theorems: Thevenins, Norton, Superposition, Maximum power transfer theorem, Reciprocity, Millman's theorem.

Unit-IV

Three phase circuits: A.C. circuits, Average and RMS value, Phasor Diagram, Power, Power Factor and Energy. Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & unbalanced, phasor diagram of voltages and currents, power measurement in three phase circuits.

Unit-V

Resonance and coupled circuits: Series and parallel resonance, their frequency response, Quality factor and Bandwidth, Self and mutual inductance, Coefficient of coupling, Tuned circuits, Single tuned circuits.

BCS-151	COMPUTER PROGRAMMING LAB	L-T-P	Cr.
		0-0-2	1

OBJECTIVE
To implement different aspects of C Language using different control statements and loops as well as different storage structures like arrays, strings and files.

COURSE OUTCOMES
The student after undergoing this course will be able:
CO1: To implement the different control statements like sequential, conditional & loops
CO2: To learn the basic concepts of C programming language
CO3: To learn the concepts of different control statements
CO4: To know about different data types and the ways of handling
CO5: To store the data in a file type and how to maintain it

List of Experiments
BASIC

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 illustrate mixed data types.
6. Write a program to find factorial of a number.
7. Write a program to print table of any number.
8. Write a program to enter the elements in a one-dimensional array.
9. Write a program to find the sum and average of five numbers.
10. Write a program to enter the marks of 50 students and calculate the average.
11. Write a program to calculate the length of string.
12. Write a program to concatenate 2 strings.
13. Write a program to reverse the string.
14. Write a program without using predefined functions to check whether the string is palindrome or not.
15. Write a program using function to find the largest of three numbers.
16. Write a program using function to swap two numbers using call by value.
17. Write a program using function to swap two numbers using call by reference.
18. Write a program using function to sum the digits of a number.
19. Write a program to illustrate the concept of chain of pointers.
20. Write a program to read an employee record using structure and print it.

MODERATE

1. Write a program to swap two numbers
2. Write a program to calculate area and circumference of circle.
3. Write a program to add digits of a four-digit number.
4. Write a program to find greatest of two numbers.
5. Write a program to sort the array elements.

6. Write a program to add 2 matrices.
7. Write a program to count the numbers of characters in a string.
8. Write a program to calculate factorial of a number using recursive function.
9. Write a program to calculate the area and perimeter of circle using pointers.

ADVANCE

1. Write a program to swap two numbers without using third variable.
2. Write a program to evaluate a polynomial expression.
3. Write a program to make a basic calculator.
4. Write a program to print Fibonacci up to the given limit.
5. Write a program to multiply 2 matrices.
6. Write a program that converts lower case characters to upper case.
7. Write a program to prepare salary chart of employee using array of structures.

PROJECT

1. Write a program to implement TIC-TAC-TOE game.

BCS-153	**INTERNET AND WEB DEVELOPMENT LAB**	**L-T-P**	**Cr**
		0-0-2	**1**

OBJECTIVE:
It aims to make students to make them skillful in creating and handling web based applications like websites etc.

COURSE OUTCOMES
The students undergoing this course will be able:
CO1: To know and use different HTML tags
CO2: To create different lists in a webpage or website
CO3: To create their own website
CO4: To learn to make the dynamic website using CSS
CO5: To understand the client side programming using Javascript

List of Practicals

Basic

1. Write a Program to print “HELLO WORLD” in HTML.
2. Design a web page using
   2.2 Ordered List
   2.3 Unordered Lists
   2.4 Nested Lists
3. Design a web-page using frames and linking.
4. Design a page using basic tags of HTML 5.0.
5. Write a Program to print if the no is even or odd using JavaScript.
6. WAP in JavaScript to print the pattern
   ```
   12345
   1234
   123
   12
   1
   ```
7. WAP to Accept an Array of 10 numbers and display the sum of elements.
8. WAP to find greatest of all elements of an array.
9. WAP to Calculate factorial of a number.
10. WAP to print the table of 10.

MODERATE

1. Design a web page using: Physical and Logical tags of HTML.
2. Code to create a bookmark.
3. Input a number and find the difference of the sum of factors and non-factors.
4. WAP in PHP code for calculating S.I.
5. WAP to print the sum of diagonal elements.

ADVANCE

1. Design a web page to show the use of image as a hyperlink.
2. Design a web-page showing the use of forms using HTML 4.01 and HTML 5 Tags.

3. Design a web-page using style sheets (External, Internal and Inline).
4. Design a web-page to show different validation checking using Java Script.
5. Write a program to implement group selector using CSS.

PROJECT

1. Create a web site for a college.

EC-155	**ANALOG ELECTRONICS LAB**	**L T P**	**Cr**
		0 0 2	**1**

List of Experiments

1. Colour coding of resistors, Capacitor and Inductor.
2. Study of CRO and Function generator.
3 Plotting of PN diode & Zener Characteristics.
4. Implementation of Rectifier Circuits
5. Implementation of Filters
6. Study of Clipper and clamper circuits
7. Plotting of BJT Characteristics.
8. Plotting of JFET Characteristics.
9. Hartley and Colpitts oscillator
10. Implementation of Class B push –Pull amplifier

BCS-102	**DATA STRUCTURES USING C**	**L-T-P**	**Cr**
		4-0-0	**4**

OBJECTIVE

To relay the theoretical and fundamental knowledge of most commonly used Data Structures.

PRE-REQUISITES

Knowledge of C programming language.

COURSE OUTCOMES

CO1: Understand the concept of data structures, algorithms, time and space complexity.
CO2: Understand basic data structures such as arrays and linked lists.
CO3: Describe the data structures such as stacks and queues.
CO4: Solve problems involving graphs and trees.
CO5: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

UNIT I

INTRODUCTION TO DATA STRUCTURES: Definition of data structure, data structure operations. Algorithms : Complexity, Time Space tradeoff, Complexity of Algorithms, Asymptotic Notations for Complexity of Algorithms, Variables.

UNIT II

ARRAYS AND LINKED LISTS: Introduction, Linear arrays, Representation of linear arrays in memory, Address calculation of using row and column major ordering, Traversing linear arrays, Inserting and Deleting, Multidimensional arrays, Linked Lists, Representation of Linear Lists in memory, Traversing a Linked List, Searching a linked List, Insertion into a linked list, Deletion from linked list, Circular linked lists, Doubly linked lists, Header linked lists, Memory allocation: Garbage collection, overflow and underflow.

UNIT III

STACK AND QUEUES: Stacks: Definition, Array representation of stacks, Linked representation of stacks, Polish notation, Evaluation of a Postfix Expression, Transforming Infix Expressions into Postfix Expressions, Queues: Definition, Array representation of Queues, Linked representation of Queues, Circular queues, Priority Queue, Double Ended Queue.

UNIT IV

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, AVL trees, Balanced trees. Definition of Undirected and Directed Graphs; The Array based implementation of graphs; Adjacency matrix; path matrix implementation; The Linked List representation of graphs; Graph Traversal – Breadth first Traversal; Depth first Traversal.

UNIT V

SORTING AND SEARCHING ALGORITHMS: Introduction; Sorting by exchange; selection; insertions; bubble sort; Merge sort; Quick sort, Heap sort; Searching Algorithms: Straight Sequential Search; Binary Search (recursive & non–recursive Algorithms).

TEXT BOOKS

1.Aho, A.V, Hopcroft, J. E., Ullman, T. D., "Data Structures and Algorithms", Original Edition, Addison-Wesley, Low Priced Edition, 1999

2. Seymour Lipchutz, "Theory and Problems of Data Structures", Tata Mc Grew

REFERENCE BOOKS

1. M. Tenenbaum, Langsam, Moshe J. Augentem, "Data Structures using C", Prentice Hall of India
2. Ellis, Horowitz, SartajSahni, "Fundamentals of Data Structures", Addison-Wesley Pub, 1983
3. Mark Allen Weiss, "Data Structures and Algorithms Analysis in C",Pearson Education, 2000

BCS-104	OBJECT ORIENTED PROGRAMMING USING C++	L-T-P	Cr
		4-0-0	4

OBJECTIVE

To 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.

Pre-requisite:

C is a basic programming language whereas C++ is pure object oriented language. An added advantage of learning the basics of C first is that every part of what you are probably going to learn in C++ would already be covered by you while learning C.

COURSE OUTCOMES

CO1: Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects.

CO2: Understand dynamic memory management techniques using pointers, constructors, destructors, etc

CO3: Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.

CO4: Demonstrate the use of various OOPs concepts with the help of programs.

CO5: Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.

UNIT I

OBJECT ORIENTED CONCEPTS: Introduction to objects and object oriented programming; Difference between procedural oriented and objected oriented paradigm ,features of objected oriented programming: encapsulation (information hiding); Abstraction, Inheritance, Polymorphism, dynamic binding, access modifiers: introduction to C++, simple C++ programs, function overloading, Inline function, reference type, default arguments, concept of namespace

UNIT II

CLASSES AND DATA ABSTRACTION: Introduction; structure definitions; accessing members of structures; class scope and accessing class members; controlling access to a class; method; or variable (public; protected; private; separating interface from implementation; controlling access function and utility functions; initializing class objects: constructors; default, parameterized and copy constructor; using destructors; classes : const(constant) object and const member functions; object as member of classes; friend function and friend classes; using this pointer; dynamic memory allocation with new and delete; static class members;

UNIT III

INHERITANCE, POLYMORPHISM AND VIRTUAL FUNCTIONS: Introduction; inheritance: base classes and derived classes; protected members; single, multiple, multilevel, hierarchical, inheritance; overriding base–class members in a derived class; public; protected and private inheritance; using constructors and destructors in derived classes. casting base-class pointers to derived-class pointers;, virtual function & dynamic binding

UNIT IV

OPERATOR OVERLOADING & TEMPLATES: 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. Concept of Templates & generic programming, Function Templates, class templates

UNIT V

FILES, I/O STREAMS& EXCEPTION HANDLING: Files and streams; stream input/output classes and objects file modes, opening a file, creating & writing to a sequential access file; reading data from a sequential access file; updating sequential access files; unformatted I/O (with read and write);,reading & writing objects, file pointers and related functions, stream manipulators. Basics of C++ exception handling: try; throw; catch; throwing an exception; catching an exception.

TEXTBOOK

Balagurusamy, E., "Object Oriented Programming with C++", Prentice Hall of India, 2008.

Stroustrup, B., "The C++ Programming Language (4th Edition)", Addison-Wesley ISBN 978-0321563842. May 2013.

Yashavant, Y., "Let Us C++", BPB Publication, March 2020.

REFERENCE BOOKS

1. Kamthane, "Object Oriented Programming with ANSI and Turbo C++", Pearson Education
2. Lafore, Robert, "Object Oriented Programming in Turbo C++", The WAITE Group Press, 1994
3. Schildt, Herbert "C++: The Complete Reference", Tata McGraw Hill, 3rd Ed, 2008
4. Bhave, "Object Oriented Programming with C++", Pearson Education

BCS-106	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

COURSE OUTCOMES

CO1: Perform operations on various discrete structures such as sets, functions, relations, and sequences.

CO2: Ability to solve problems using Counting techniques, Permutation and Combination, Recursion and generating functions.

CO3: Apply algorithms and use of graphs and trees as tools to visualize and simplify Problems.

CO4: Apply algorithms and use of graphs and trees as tools to visualize and simplify Problems.

CO5: Understand the various properties of algebraic systems like Rings, Monoids and Groups.

UNIT I

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

UNIT II

BOOLEAN OPERATIONS: Basic operations: AND (Λ), OR (V), NOT (~), truth value of a Compound statement, propositions, tautologies, contradictions.

UNIT III

COUNTING: Permutations with and without repetition, combination. Probabilities, Events, Sample Space, Conditional Probability, Additional and Multiplicative Probability.

UNIT IV

ALGEBRIC STRUCTURES: Definition and examples of a monoid, semi group, groups and Rings; homomorphism, isomorphism and auto Orphism; subgroups and normal subgroups; cyclic groups, integral domain and fields; co-sets; Lagrange's theorem

UNIT V

GRAPHS: Introduction to graphs, directed and undirected graphs; homomorphic and isomorphic Graphs; sub graphs; 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, Spanning tree

TEXT BOOK

1. Liu C. L., "Elements of Discrete Mathematics", McGraw Hill, 1989
2. Trembley and Manohar, "Discrete Mathematical Structures with Applications to Computers" McGraw Hill, 1995

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., “Schaums Outline series: Theory and problems of Probability”, McGraw Hill Singapore,1986.
6. Kolman B. and Busby R. C., “Discrete Mathematical Structures”, Prentice Hall of India, 1996

EC-106	DIGITAL LOGIC	L T P	Cr
		3 0 0	3

COURSE OBJECTIVES

1. To teach various number systems, binary codes and their applications
2. To familiarize the students the importance of error detection and error correction codes.
3. To inculcate concepts of K-MAP to simplify a Boolean expression
4. To facilitate students in designing a logic circuit

PRE- REQUISITES

Basic knowledge of computers and electronics.

COURSE OUTCOMES

At the end of the course students will be able to:

CO1: Use number systems and complements

CO2: Identify the importance of canonical forms in the minimization or other optimization of Boolean formulas in general and digital circuits.

CO3: Minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh map or Tabulation method).

CO4: Analyse the design procedures of Combinational and Sequential circuits.

CO5: Design the finite state machine using algorithmic state machine charts and perform simple projects with a few flip-flops.

Unit I

Digital systems and binary numbers: Digital systems, binary numbers, number base conversions, octal and hexadecimal numbers, complements, signed binary numbers, binary codes, error detection and error correction codes. Boolean algebra and logic gates**:** Basic definitions, axiomatic definition of Boolean algebra, basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, digital logic gates.

Unit-II

Simplification of Boolean Functions and Combinational Circuit: The k-map method, four-variable map, five-variable map, product of sums simplification, don’t-care conditions, NAND and NOR implementation, determination and selection of Prime Implicates, combinational circuits: Design procedure, Binary Adder, Binary Subtractor, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, and Demultiplexers.

Unit-III

Sequential Circuit: Introduction to Sequential Circuits, Storage Elements: Latches, Flip-Flops, RS-Latch, Using NAND and NOR Gates, Truth Tables, RS,JK,T and D Flip flop, Truth and Excitation Tables, Conversion of flip flops.

Unit-IV

Registers and Counters Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter.

Unit- V

Data Conversion Circuits – D/A and A/D Converters, Simple Resistive Divider Network for D/A Conversion, Binary Ladder Network for D/A Conversion. Types of D/A Converter, Multiplying D/A Converters , Bipolar-Output D/A Converters, Companding D/A Converters, Types of A/D Converter Simultaneous or Flash A/D Converters , Half-Flash A/D Converter, Counter-Type A/D Converter

TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti (2008), Digital Design, 4th edition, Pearson Education Inc, India.
2. Donald D. Givone (2002), Digital Principles and Design, Tata McGraw Hill, India

REFERENCE BOOKS:

1. Zvi. Kohavi (2004), Switching and Finite Automata Theory, Tata McGraw Hill, India.
2. C. V. S. Rao (2009), Switching and Logic Design, 3rd Edition, Pearson Education, India.
3. Roth (2004), Fundamentals of Logic Design, 5th Edition, Thomson, India.

BS-118	COMPUTATIONAL MATHEMATICS-II	L T P	Cr
		3 1 0	4

OBJECTIVE

The objective of this course is to familiarize the students with arithmetic mean, harmonic mean, geometric mean, median and mode. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

PRE-REQUISITES: Knowledge of Computational Mathematics-I

COURSE OUTCOMES

CO1: To understand the concept of central tendency

CO2: To solve linear programming problem

CO3: To understand and use the Theory and approaches of probability

CO4: To introduce the concept of game theory

Unit 1: Measures of Central Tendency: Concept and properties of mathematical averages including arithmetic mean, geometric mean and harmonic mean, Mode and Median (and other partition values - quartiles, deciles, and percentiles) with graphic presentation.

Unit 2: Measures of Dispersion: Range, Quartile deviation, mean deviation, standard deviation, and their coefficients; Properties of standard deviation/variance, Moments: Calculation and significance;.

Unit 3: Theory and approaches of probability: Theory and approaches of probability, Probability Theorems: Addition and Multiplication (Proof not required). Conditional probability and Bayes' Theorem (Proof not required), Binomial distribution: Probability distribution function, Poisson distribution: Probability function (including Poisson approximation to binomial distribution)

Unit 4: Linear Programming Problem: Introduction to Linear Programming Problem, Some definitions, mathematical formulation Linear Programming Problem, Graphical method of solving of Linear Programming Problem. Corner Point method.

Unit 5: Game Theory: Two-person-zero sum games, Games of pure strategies and games of mixed strategies, Rule of dominance, Graphic solutions to games, Applications in computer science.

Recommended Books:

1. G.M. Clarke and D Cooke, A Basic Course in Statistics, Arnold, (2004).

2. W. Filler, An introduction to Probability theory and its applications, John Wiley, (1968)

3. A.M. Goon, M.K. Das and B. Dasgupta, Fundamentals of Statistics, World Press, (1997)

4. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, S. Chand and sons, 2002.

5. E.N. Barron, Game Theory: An Introduction, Wiley Student Addition, 2009

6. S. Tijs, INtroduction to Game Theory, Hindustan Book Agency

CE-108	ENVIRONMENTAL SCIENCE & ECOLOGY	L T P	CR
		2-0-0	2

OBJECTIVES

- The aim of the course is to make everyone aware of environment 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 the mankind.

COURSE OUTCOMES

CO1: Conceptualize the processes and various factors involved in the formation of environment.

CO2: Recognize the importance of environment and the sustainable of natural resources.

CO3: Analyze interaction between social and environmental processes.

CO4: Use scientific reasoning to identify and understand environment problems and evaluate potential solutions.

CO5: Visualize the impacts of human activities on environment and role of society in these impacts.

UNIT I

THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: Definition, scope and importance, Need for public awareness, Environment Impact Assessment.

UNIT II

NATURAL RESOURCES

RENEWABLE AND NON-RENEWABLE RESOURCES:

A. Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources: World food problems, changes caused by agriculture and
- overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water
- logging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non-renewable energy
- sources, use of alternate energy sources, case studies.
- Land resources: Land as a resource, land degradation, man induced landslides,
- soil erosion and desertification.

B. Role of an individual in conservation of natural resources.

C. Equitable use of resources for sustainable lifestyles.

UNIT III: ECOSYSTEMS

A. Concept of an ecosystem

B. Structure and function of an ecosystem
C. Producers, consumers and decomposers
D. Energy flow in the ecosystem
E. Ecological succession
F. Food chains, food webs and ecological pyramids
G. Introduction, types, characteristic features, structure and function of the following ecosystem:
   - Forest ecosystem
   - Grassland ecosystem
   - Desert ecosystem
   - Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries).

UNIT IV
BIODIVERSITY AND ITS CONSERVATIONS

A. Introduction – Definition: genetic, species and ecosystem diversity
B. Biogeographical classification of India
C. Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values.
D. Biodiversity at global, national and local levels
E. India as a mega-diversity nation
F. Hot-spots of biodiversity
G. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
H. Endangered and endemic species of India
I. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT V: ENVIRONMENTAL POLLUTION

A. Definition
B. Causes, effects and control measures of:
   - Air pollution
   - Water pollution
   - Soil pollution
   - Marine pollution
   - Noise pollution
   - Thermal pollution
   - Nuclear pollution
C. Solid waste management: Causes, effects and control measures of urban and industrial wastes.
D. Role of an individual in prevention of pollution
E. Pollution case studies
F. Disaster management: floods, earthquake, cyclone and landslides

BCS-152	**DATA STRUCTURES USING C LAB**	**L-T-P**	**Cr**
		0-0-2	**1**

OBJECTIVE

To relay the practical fundamental knowledge of most commonly used Data Structures.

PRE-REQUISITES

Knowledge of C programming language.

COURSE OUTCOMES

CO1 Be able to design and analyze the time and space efficiency of the data structure
CO2 Be capable to identity the appropriate data structure for given problem
CO3 Have practical knowledge on the applications of data structures

LIST OF EXPERIMENTS/EXERCISES

BASIC

1. Write code in C to find the maximum between N numbers, where N varies from 10, 100, 1000, and 10000. Calculate its time complexity as well
2. Write a program to find the average of n (n < 10) numbers using arrays
3. Write a program to find the sum of two matrices of order 2*2 using multidimensional arrays.
4. Design, develop and execute a program in C to implement a singly linked list where each node consists of integers. The program should support the following functions.
    a. Create a singly linked list
    b. Insert a new node
    c. Delete a node if it is found, otherwise display appropriate message
    d. Display the nodes of singly linked list
5. Write a program for static implementation of Stack

INTERMEDIATE

6. Write a program for static implementation of Queue using array
7. Design, develop and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The operators are +(add), -(subtract), *(multiply), /(divide)
8. Write a program to implement a binary search tree. (Insertion and Deletion in Binary Search Tree)
9. Write a program which simulates the various tree traversal algorithms.
10. Write a program to search an element in an array using linear search.

11. Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method
12. Write a program to implement bubble sort
13. Write a program to implement selection sort
14. Write a program to implement insertion sort

ADVANCED

15. Arrange a list of numbers in ascending order using Quick Sort. Take input from the user
16. Arrange a list of numbers in ascending order using Merge Sort. Take input from the user

PROJECT

Create a phone directory application using a doubly linked list.

TEXT BOOKS

1.Aho, A.V, Hopcroft, J. E., Ullman, T. D., “Data Structures and Algorithms”, Original Edition, Addison-Wesley, Low Priced Edition, 1999
2. Seymour Lipchutz, “Theory and Problems of Data Structures”, Tata Mc Grew

REFERENCE BOOKS

1. M. Tenenbaum, Langsam, Moshe J. Augentem, “Data Structures using C”, Prentice Hall of India
2. Ellis, Horowitz, SartajSahni, “Fundamentals of Data Structures”, Addison-Wesley Pub, 1983
3. Mark Allen Weiss, “Data Structures and Algorithms Analysis in C”,Pearson Education, 2000

BCS-154	OBJECT ORIENTED PROGRAMMING USING C++ LAB	L-T-P	Cr
		0-0-2	1

COURSE OUTCOMES

CO1: Develop solutions for a range of problems using objects and classes.

CO2: Programs to demonstrate the implementation of constructors, destructors and operator overloading.

CO3: Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.

CO4: Understand generic programming, templates, file handling.

LIST OF EXPERIMENTS/EXERCISES

BASIC

1. Write a program to perform basic arithmetic operations
2. Write a program to implement if statement
3. Write a program to implement if else ladder
4. Write a program to implement Switch Statement
5. Write a program to implement for loop
6. Write a program to implement nested for loop
7. Write a program to implement while loop
8. Write a program to implement nested while loop
9. Write a program to implement do-while loop
10. Write a program to implement do-while nested loop
11. Write a program to implement break statement
12. Write a program to implement continue statement

MODERATE

13. Write a program to implement function overloading
14. Write a program to implement the concept of class and object
15. Write a program to implement the concept of static data member
16. Write a program using the concept of constructor & destructor
17. Write a program to implement operator overloading
18. Write a program to implement access modifiers

19. Write a program to Implement single inheritance
20. Write a program to Implement Multiple inheritance

ADVANCED

21. Write a program to implement the concept of Friend Function
22. Write a program to Implement Virtual Function
23. Write a program to create, read & write sequential file
24. Write a program to create, read & write random access file
25. Write a program to implement function template
26. Write a program to overload function template
27. Write a program to implement class template
28. Write a program to implement exception handling

Projects to Enhance Your C++ skills

1. Login and Registration System
2. Car Rental System
3. Student Report Management System
4. Bookshop inventory system
5. Tic Tac Toe Game C++ Projects.

REFERENCE BOOK

1. Barkakati, Nabajyoti, “Object Oriented Programming in C++”, Prentice Hall of India, 2001.
2. Schildt, Herbert, “C++: The Complete Reference”, Tata McGraw Hill, 4th Edition, 2003

BCS-160	QUANTATIVE ANALYSIS USING SPSS	L-T-P	Cr
		0-0-2	1

Objectives

The primary objective of this lab is to learn basic data analysis with SPSS. You'll learn how to enter data, define variables, and perform variable manipulation and transformation. After creating the data set, you will learn how to use SPSS to analyze your data.

Specifically, the objectives of this practical are to learn:

- SPSS file types.
- Survey coding and data entry.
- Selected SPSS procedures; and
- Data analysis and interpretation with SPSS.

LIST OF EXPERIMENTS/EXERCISES

Basic Level

1. Coding and Data Entry in SPSS.
2. Cross tabulation, Frequency tables and Graph generation in SPSS.
3. Calculate mean, median and mode of the individual, discrete and continuous series dataset.
4. Calculate Variance and Standard Deviation of the individual, discrete and continuous series dataset.
5. Calculate the Skewness, and Kurtosis of the individual, discrete and continuous series dataset.
6. Calculate Mean Deviation from Mean using the individual, discrete and continuous series dataset.
7. Calculate Mean Deviation from Median using the individual, discrete and continuous series dataset.
8. Calculate Mean Deviation from Mode using the individual, discrete and continuous series dataset.
9. Understand and implement the concept of Z-Score and Normal Distribution Curve.
10. Calculate the Quartile, Percentile and Decile of the individual, discrete and continuous series dataset.
11. Calculate the Quartile Deviation using the individual, discrete and continuous series dataset.

Moderate Level

12. Perform and Interpret Chi Square goodness of fit test.
13. Perform and Interpret Chi-Square test for Independence.
14. Perform and Interpret Single Sample T-test.
15. Perform and Interpret Independent Sample T- Test.
16. Perform and Interpret Paired Sample T test.
17. Perform and Interpret Pearson Correlation Coefficient (r).
18. Perform and Interpret Linear Regression.

Projects to Enhance Your Data Analysis skills using Quantitative Methods

1. Develop a regression model for stock market prediction.
2. Whether forecasting analysis using Linear Regression

3. Compare salaries of Batsmen with the runs they score per game.

REFERENCE BOOK

1. Field, Andy, “Discovering Statistics Using IBM SPSS Statistics(4th Edition)”, University of Sussex, UK.
2. Schmidt, Walker, “IBM SPSS: Comprehensive Beginners Guide to Learn Statistics using IBM SPSS from A-Z”, Independently Published (April 2019).

BCS-201	OPERATING SYSTEMS & UNIX	L T P	Cr
		4-0-0	4

OBJECTIVE

To provide the knowledge of internals, different types and purpose of operating systems.

PRE-REQUISITES

Knowledge of computer organization and architecture, programming skills

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To get familiar with the basic concepts of operating system.
CO2: To know about the multiprocessing, synchronization & deadlocks.
CO3: To learn the strategy to manage the memory available.
CO4: To learn the concepts of files, their accession and disk scheduling.
CO5: To know about features of different operating system.

UNIT I

PROCESS MANAGEMENT: Functionalities and Objectives of OS, historical evolution of operating systems, types of operating system, O/S service system calls, system programs, Process States, Process Control Block, Processor Scheduling, CPU scheduling, scheduling criteria, scheduling algorithms

UNIT II

PROCESS-SYNCHRONIZATION & DEADLOCKS: Critical Section; Mutual exclusion, Process cooperation, Deadlocks: deadlock prevention; avoidance and detection; deadlock recovery; dining philosophers problem; semaphores.

UNIT III

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;.

UNIT IV

FILE SYSTEM: Different types of files and their access methods; directory structures; various allocation methods; disk scheduling and management. I/O Hardware; Device Controllers; Interrupt Handlers; Device Drivers; Application I/O Interface; Kernel; Transforming I/O requests; Performance Issues.

UNIT V

UNIX: Unix history, Unix features, Unix directories, Different Commands, Basic utilities, Files of Unix, Unix tools and file security, Shell Commands, Study of latest operating system.

TEXT BOOKS

1. Dhamdhere D. M., ―Operating System‖, 2nd Edition, Tata McGraw Hill, 1999.
2. Silberchatz et al, ―Operating System Concepts‖, 5th edition, Addison-Wesley.

REFERENCE BOOKS

1. Tanenbaum A., Modern Operating Systems‖, Prentice-Hall, 1992
2. Stallings William, Operating Systems Internals and Design Principles, 4th edition, Prentice-Hall, 2001
3. Kernighan Brian and Pike Rob, The Unix Programming Environment‖, Prentice Hall of India, 1984
4. Bach Maurich, ―Design of the Unix Operating System ‖, Prentice Hall of India, 1986
5. Muster John, ―Introduction to UNIX and LINUX‖, Tata McGraw Hill, 2003
6. Ritchie Colin, ―Operating System Incorporating Unix & Windows‖, Tata McGraw Hill, 1974
7. Madnick Stuart and Donovan John, ―Operating Systems‖, Tata McGraw Hill, 2001

BCS-203	COMPUTER ARCHITECTURE & ORGANIZATION	L T P	Cr
		4-0-0	4

OBJECTIVE

To provide basic knowledge of internals of microprocessor, 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

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To learn the basic architecture of the computer
CO2: To learn about the different addresses and instructions passed for
CO3: To know about the different types of architecture & instruction cycle
CO4: To get knowledge about the different types of memories and their hierarchies
CO5: To know about the parallel processing

UNIT I

GENERAL COMPUTER ARCHITECTURE: k-map, number system, FF, Boolean algebra, design of logic gates. Functions and block diagram of computer, store program control concept, Flynn‘s classification of computers (SISD, MISD, MIMD); multilevel viewpoint of a machine: digital logic, operating systems, high level language; structured I/O; performance metrics; MIPS, MFLOPS, GFLOPS and TFLOPS.

UNIT II

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).

UNIT III

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.

UNIT IV

MEMORY HIERARCHY & I/O TECHNIQUES: Need for a memory hierarchy (Locality of Reference Principle, memory hierarchy in practice: cache,virtual memory, Paralleel Bus Architectures, main memory and secondary memory, memory parameters: access/ cycle time, cost per bit); main memory (semi-conductor RAM & ROM organization, memory expansion, static & dynamic memory types); cache memory: associative &direct mapped cache organizations. .Internal memory, High speed memory.

UNIT V

ADVANCED COMPUTER ARCHITECTURE: Parallel processing architectures, 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), Introduction to Graphics Processing Units, Clusters and warehouse scale computers-Introduction to Multiprocessor network topologies.

TEXT BOOK

1. Carpinelli, ―Computer Organization & Architecture‖ Tata McGraw Hill, 2001
2. Mano M Morris, ―Computer System Architecture‖, 3rd Edition, Prentice Hall of India Publication, 2001 / Pearson Education Asia, 2003

REFERENCE BOOKS

1. Stallings. W, ―Computer Organization &Architecture: Designing For Performance‖, 6th Edition, Prentice Hall of India, 2002/ Pearson Education Asia, 2003
2. Rajaraman V. and Radhakrishnan T, ―Introduction to Digital Computer Design‖, 4th Edition, Prentice Hall of India 2004.
3. Stalling William, ―Computer Organization and Architecture‖, 7th Edition, Prentice Hall of India, 2005.
4. Inside the Machine: An Illustrated introduction to Microprocessor and Computer Architecture by Jon Stokes

BCS-205	COMPUTER GRAPHICS	L T P	Cr
		4 0 0	4

OBJECTIVES

- Write programs Using C/C++/ OpenGL graphics environment.
- Use polygonal and other modelling methods to describe scenes.
- Understand and be able to apply geometric transformations.
- Create basic animations.

PRE-REQUISITES

Knowledge of computer programming

COURSE OUTCOMES

Students after undergoing this course will be able to:

CO1: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

CO2: Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.

CO3: Use of geometric transformations on graphics objects and their application in composite form.

CO4: Extract scene with different clipping methods and its transformation to graphics display device.

CO5: Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.

Unit 1

Introduction to Computer Graphics: An Introduction Graphics System: Computer Graphics and Its Types, Application of computer graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Graphics Monitors and Work Stations, Input Devices, Hard Copy Devices, Graphics Software.

Unit 2

Algorithms: Output Primitives and Attributes of Output Primitives: Output Primitive Points and Lines, Line Drawing Algorithms, Circle Generating Algorithms, Scan-Line Polygon Fill Algorithm, Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm, Cell Array, Character Generation, Attributes of Output Primitives: Line Attributes, Color and Grayscale Levels, Area fill Attributes, Character Attributes, Bundled Attributes, Antialiasing.

Unit 3

Two and Three Dimensional Transformation: Two-dimensional Geometric Transformations: Basic Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing. Two-Dimension Viewing: The viewing Pipeline, Window to view port coordinate transformation, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping, Text Clipping, Exterior Clipping Three-Dimensional Concepts: Three-Dimensional Display Methods, 3D Transformations, Parallel Projection and Perspective Projection.

Unit 4

Multimedia in Computer Graphics: Multimedia: Introduction to Multimedia: Classification of Multimedia, Multimedia Software, Components of Multimedia – Audio : Analog to Digital conversion, sound card fundamentals, Audio play backing and recording Video, Text :

Hypertext, Hyper media and Hyper Graphics, Graphics and Animation : Classification of Animation. Authoring Process and Tools.
Case Study: graphics software MatLab, Use of MatLab in graphics application, Features of MatLab, Generalize application by using MatLab.

<u>Unit 5</u>

Hypermedia: Multimedia authoring and user interface – Hypermedia messaging -Mobile messaging − Hypermedia message component − Creating hypermedia message − Integrated multimedia message standards − Integrated document management − Distributed multimedia systems.
CASE STUDY: BLENDER GRAPHICS Blender Fundamentals – Drawing Basic Shapes – Modelling – Shading & Textures.

Text Books:

1. Donald Hearn & M. Pauline Baker, "Computer Graphics with OpenGL", Third Edition, 2004, Pearson Education, Inc. New Delhi.
2. Ze-NianLi and Mark S. Drew, "Fundamentals of Multimedia", First Edition, 2004, PHI Learning Pvt. Ltd., New Delhi.

Reference Books:

1. Plastock : Theory & Problem of Computer Gaphics, Schaum Series.
2. Foley & Van Dam : Fundamentals of Interactive Computer Graphics, Addison- Wesley.
3. Newman : Principles of Interactive Computer Graphics, McGraw Hill.
4. Tosijasu, L.K. : Computer Graphics, Springer-Verleg.
5. S. Gokul : Multimedia Magic, BPB Publication.
6. Bufford : Multimedia Systems, Addison Wesley.
7. Jeffcoate : Multimedia in Practice, Prectice-Hall.
8. Any other book(s) covering the contents of the paper in more depth.

Note : Latest and additional good books may be suggested and added from time

BCS-209	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 concepts.

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To understand the various features of object-oriented programming and features of OOP specific to Java programming.

CO2: To know about the basics of Java programming language.

CO3: To learn how to create a package as well as handling of exceptions.

CO4: To learn about the multithreading as well as synchronization of threads to avoid deadlocks.

CO5: To learn basics of graphics programming as well as file handling.

UNIT I

INTRODUCTION TO JAVA, DATA TYPE, VARIABLES, ARRAY:

Basic Concepts of OOP and its Benefits; Application of OOP; Features of Java; Different 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, Array operations.

UNIT II

STRINGS, OPERATORS, EXPRESSION, CONTROL STATEMENTS:

String handling: String class, Different string operations- String comparison, Searching and modifying a string using string buffer class, Vector & Wrapper classes.

Different types of operators: arithmetic, bitwise, logical, relational, boolean, assignment, conditional, special; Operator precedence and associatively; using parentheses; Solving an expression.

Control statements: if, if-else, nested if-else, switch; Iteration statements: while, do-while, for, nested loops; Jump Statements: break, continue.

UNIT III

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.

UNIT IV

MULTITHREADING, EXCEPTION HANDLING & APPLET PROGRAMMING:

Multithreading: The Java Thread Model, Creating a Thread: extending Thread class and implementing Runnable interface, life cycle of a thread, using Thread methods, Thread exception Thread priority, Synchronization.

Exception: Exception handling mechanism, multiple catch statements, 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.

UNIT V

GRAPHICS PROGRAMMING & FILE HANDLING: Graphics class: Lines & Rectangle, Circles & Ellipses, Arcs, Polygons, Line Graphs, and 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

1. Herbert Schildt , “The Complete Reference Java 2 fifth edition, McGraw Hill.
2. Balaguruswamy , E., ““Programming with Java”, Tata Mcgraw Hill.

REFERENCE BOOKS

1. Horetmann Cay and Cornell Gary, “Core Java Volume – I”, Pearson Education.
2. Horetmann Cay and Cornell Gary, “Core JavaTM 2, Volume II – Advanced Features”, 7th Edition, Pearson Publisher.
3. Kathy Sierra and Bert Bates, “Head First Java” by O’REILLY publications.

BCS-211	DESIGN & ANALYSIS OF ALGORITHMS	L T P	Cr
		4 0 0	4

OBJECTIVE

The main **objective** of this course is to study paradigms and approaches used to **analyse** and **design algorithms** and to appreciate the impact of algorithm design in practice.

PRE-REQUISITES

Knowledge of fundamentals of basic computer programming and data structure for implementing algorithms.

COURSE OUTCOMES

CO1: Define the basic concepts of algorithms and analyze the performance of algorithms.
CO2: Discuss various algorithm design techniques for developing algorithms.
CO3: Discuss various searching, sorting and graph traversal algorithms.
CO4: Understand NP completeness and identify different NP complete problems.
CO5: Discuss various advanced topics on algorithms.

UNIT I

MATHEMATICAL PRELIMINARIES: Role of algorithm in computing; mathematical preliminaries; review of growth functions; solution of difference equations; analysis in terms of space and time complexity, master theorem, recursion relation.

UNIT II

SORTING: Insertion sort; merge sort; heap sort; quick sort; radix sort, bucket sort, bubble sort, selection sort, and binary search.

UNIT III

ADVANCED DATA STRUCTURES: Stack; queue; linked list; binary search trees; red black trees, TSP, knapsack problem.

UNIT IV

DYNAMIC PROGRAMMING AND GREEDY ALGORITHM: Matrix multiplications; longest common subsequence, Huffman coding; task scheduling problem.

UNIT V

ELEMENTARY GRAPH ALGORITHM AND MINIMUM SPANNING TREE: Representation of graph; breadth-first search; depth first search; topological sort; strongly connected components, Growing a minimum spanning tree; Kruskal & Prims algorithms.

TEXT BOOK

1. Cormen Thomas H., Leiserson Charles E. and Rivest Ronald L., “Introduction to Algorithms”, Tata McGraw Hill, 1990.
2. Robert Sedgewick , Kevin Wayne.“Algorithms” ,4th edition, Addison Wesley(publisher)

REFERENCE BOOKS

1. V. Aho, J. E. Hopcroft, J. D. Ullman, “The Design and Analysis of Computer Algorithms”, Addition Wesley, 1998.
2. Ellis Horowitz and Sartaz Sahani, “Computer Algorithms”, Galgotia Publications, 1999.
3. E. Knuth, “The Art of Computer Programming”, 2nd Ed., Addison Wesley, 1998

BCS-207	COMPUTER NETWORKS	L T P	Cr
		3-0-0	3

OBJECTIVE

To have a fundamental understanding of the design, performance and state of the art of wireless communication systems, Topics covered include state of the art wireless standards and research and thus changes substantially form one offering of this course to the next

PRE-REQUISITES

Knowledge of computers hardware and software

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To know different types of networks and basic architecture of network
CO2: To learn about different network models
CO3: To know deeply about the local area network
CO4: To know deeply about the wide area network
CO5: To aware about application layer of network models

UNIT I

OSI REFERENCE MODEL AND NETWORK ARCHITECTURE: Introduction to Computer Networks; Example networks ARPANET; Internet; Private Networks; Network Topologies: Bus-; Star-; Ring-; Hybrid-; Tree -; Complete -; Irregular –Topology, Types of Networks: Local Area Networks; Metropolitan Area Networks; Wide Area Networks; Layering architecture of networks; OSI model; Functions of each layer; Services and Protocols of each layer.

UNIT II

TCP/IP: Introduction; History of TCP/IP; Layers of TCP/IP; Protocols; Internet Protocol; Transmission Control Protocol; User Datagram Protocol; IP Addressing; IP address classes; Subnet Addressing; Internet Control Protocols; ARP; RARP; ICMP; Application Layer; Domain Name System; Email – SMTP; POP; IMAP; FTP; NNTP; HTTP; Overview of IP version 6.

UNIT III

LOCAL AREA NETWORKS: Introduction to LANs; Features of LANs; Components of LANs; Usage of LANs; LAN Standards; IEEE 802 standards; Channel Access Methods; Aloha; CSMA; CSMA/CD; Token Passing; Ethernet; Layer 2 & 3 switching; Fast Ethernet and Gigabit Ethernet; Token Ring; LAN interconnecting devices: Hubs; Switches; Bridges; Routers; Gateways.

UNIT IV

WIDE AREA NETWORKS: Introduction of WANs; Routing; Congestion Control; Quality of Service, WAN Technologies; Synchronous Digital Hierarchy (SDH)/ Synchronous Optical Network (SONET); Asynchronous Transfer Mode (ATM); Frame Relay.

UNIT V

APPLICATION LAYER: Remote Logging, Electronic Mail, SMTP, POP, IMAP FTP, WWW, HTTP, SNMP, Network Security: Services, Message Confidentiality, Authentication, Integrity, Firewalls.

TEXT BOOK

1. Forouzan Behrouz A., “Data Communications and Networking”, Tata McGraw Hill 2006.

REFERENCE BOOKS

1. Tanennbaum Andrew S, “Computer Networks”, 4th Edition, Pearson Education/Prentice Hall of India, 2003.
2. Stallings William, “Data and Computer Communication”, 5th Edition, Prentice Hall of India, 1999

BCS-255	COMPUTER GRAPHICS LAB	L T P	Cr
		0 0 2	1

COURSE OUTCOMES
CO1: Understand the basic concepts of computer graphics.
CO2: Design scan conversion problems using C++ programming.
CO3: Apply clipping and filling techniques for modifying an object.
CO4: Understand the concepts of different type of geometric transformation of objects in 2D and 3D.
CO5: Understand the practical implementation of modelling, rendering, viewing of objects in 2D.

List of Experiments.

Basic

Program:1 Write a Program to draw basic graphics construction like line, circle, arc, ellipse and rectangle.
Program:2 Write a Program to draw animation using increasing circles filled with different colors and patterns.
Program:3 Program to draw India Gate using computer graphics in C.
Program 4:-Implement Brenham's line drawing algorithm for all types of slope.
Program 5:- Create and rotate a triangle about the origin and a fixed point.
Program 6: Draw a color cube and spin it using OpenGL transformation matrices.
Program 7: Draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing.

Intermediate

Program 1:- Clip a lines using Cohen-Sutherland algorithm.
Program 2:- To draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the surfaces of the solid object used in the scene.
Program 3:- Design, develop and implement recursively subdivide a tetrahedron to form 3D sierpinskigasket. The number of recursive steps is to be specified by the user.
Program 4:- Develop a menu driven program to animate a flag using Bezier Curve algorithm.
Program 5:- Develop a menu driven program to fill the polygon using scan line algorithm.

Advance

Program 1: Write a Program to print your name in Hindi script on console output in C.
Program 2: Write a Program control a ball using arrow keys.
Program 3: Write a Program to implement Digital Clock.
Program 4: Write a Program to implement bouncing ball using sine wave form.
Program 5: Write a Program to implement Bouncing Ball in vertical direction.
Program 6: Write a program of Translation, Rotation, and Scaling using Composite Transformation.

REFERENCE BOOKS

1. Pradeep Bhatia, "Computer Graphics", 2nd Edition, I K Publishers, 2009.
2. Computer Graphics by Donald Hearn and M. Pauline Baker, 2nd Edition, Prentice Hall of India, 1999
3. Procedural Elements for Computer Graphics, David F. Rogers, Tata McGraw Hill, Second Edition, 2001

BCS-259	CORE JAVA LAB	L T P	Cr
		0-0-2	1

OBJECTIVE

To relay the practical knowledge of Java programming language

PRE-REQUISITES

Basic Knowledge of programming language and object oriented programming concepts.

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To learn about operators used in Java Programming.
CO2: To know about loops implemented in Java programming language.
CO3: To implement the arrays and strings.
CO4: To learn about the inheritance, packages & exception handling.
CO5: To learn about the graphics and file handling.

LIST OF EXPERIMENTS

The following programs on different topic are to be done in this lab.

1. **Sample Program**
   (a) Write a Java program to print "Hello Java".

2. **Operators and Expressions**
   (a) Write a java program to find the area of a rectangle.
   (b) To write a java program to find the result of the following expressions
      (i) (a<<2) +(b>>2)
      (ii) (b>0)
      (iii)(a+b*100)/10
      (iv)a & b Assume a=10, b=5

3. **Decision making statements**
   (a) Write a java program to read two integers and print the larger number followed by the words "is larger". If the numbers are equal print the message "These numbers are equal".
   (b) Write a java program to read an integer and find whether the number is odd or even.
   (c) Write a java program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by 7.

4. **Looping Statements**
   (a) Write a Java program to find the sum of digits of a given number.
   (b) Write a java program to find the first 15 terms of Fibonacci sequence.
   (c) 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.

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 using interface.

8. Package & Multithreading

(a) Write a program to create your own package and use that package in another program to print “Hello package”.

9. Exception Handling & File handling

(a) Write a java program to implement multiple try/catch statements.

10. Database Connectivity

(a) Write a program to copy the content of one file into another.

11. Mini Project:

(a) Make a mini project using the concept of java programming.

TEXT BOOK

1. 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.

PEP 201	EXPLORING SELF	L-T-P	Cr.
		1 -0- 2	2

PRE- REQUISITES

Min. B1 level of English Language and Knowledge of Word processing using MS Word, basic IT skills

COURSE OUTCOMES

On completion of this course, the students will be able to:

CO1: Introspect & develop a planned approach towards profession and life in general.
CO2: Effectively set goals/target, self-motivate and practice creative thinking
CO3: Apply professional skills in order to function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
CO4: Demonstrate right attitudinal and behavioral aspects for overall success in personal and professional life.

Unit I

MEANING OF PERSONALITY

- Definition & Determinants
- Personality Traits
- Theories of Personality & Importance of Personality Development.
- Perception – Definition, Perceptual Process

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Unit-II

SELF -AWARENESS & SELF - ESTEEM

- Meaning, Benefits of Self- Awareness, Developing Self- Awareness.
- Self-Assessment, Self-Appraisal & Self-Development, Identifying Strength & Limitations; Habits, Will-Power and Drives
- Developing Self-Esteem and Building Self Confidence, Significance of Self-Discipline

Unit-III

Self-Assessment & Monitoring

- Meaning, High self- monitor versus low self- monitor
- Advantages and Disadvantages of self-monitor
- Self–monitoring and job performance.

SWOT Analysis:

- Meaning, Importance, Application, Components.

Transactional Analysis

- Meaning – EGO States
- Types of Transactions
- Johari Window- Life Positions.

Emotional Intelligence

- Meaning – Components of Emotional Intelligence
- Significance of managing Emotional intelligence

How to develop Emotional Quotient

Unit- IV

ATTITUDE

- Meaning & Formation of attitude
- Types of attitudes
- Measurement of Attitudes
- Barriers to attitude change – Methods to attitude change
- Carl Jung's contribution to personality development theory

ASSERTIVENESS

- Meaning – Assertiveness in Communication
- Assertiveness Techniques
- Benefits of being Assertive
- Improving Assertiveness

BCS-202	AUTOMATA THEORY	L T P	Cr
		4 0 0	4

COURSE 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.

PRE-REQUISITES

The students are expected to have a strong background in the fundamentals of discrete mathematics (symbolic logic, set, induction, number theory, summation, series, combinatorics, graph, recursion, basic proof techniques, etc.), algorithms and data structures.

COURSE OUTCOME:

After completing this course, the students will be able to:
CO1: Understand the relation between types of languages and types of finite automata
CO2: An ability to design grammars and automata for different language classes.
CO3: Understanding the Context free languages and grammars, and also Normalizing CFG.
CO4: Understand the concept of Pushdown automata and its application.
CO5: To understand basic properties of Turing machines and computing with Turing machines.

UNIT I: FINITE AUTOMATA AND REGULAR EXPRESSIONS:

Finite state systems; basic definitions non-deterministic finite automata (NDFA), deterministic finite automata (DFA), equivalence of DFA and NDFA finite automata with e-moves;, limitations of FSM, Moore and Mealy Machines; Equivalence of Moore and Mealy Machines., Minimization of Finite Automata.

UNIT II: 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.

UNIT III: CONTEXT FREES GRAMMARS & GREIBACH NORMAL FORM:

Definition, Context free and context sensitive grammar; ambiguity regular grammar; reduced forms; Chomsky Normal Form (CNF), Greibach Normal Form (GNF).

UNIT IV: PUSHDOWN AUTOMATA:

Introduction to pushdown machines; design of PDA; conversion of PDA to CFG and vice versa, application of pushdown machines.

UNIT V: TURING MACHINES:

Basic concepts of Turing machines, Deterministic and non-deterministic Turing machines; design of Turing machines; halting problem of Turing machines.

TEXT BOOK

1. Hopcroft, Ullman O. D. and Mothwani R., “Introduction to Automata Theory, Language & Computations”, Addison Wesley, 2001
2. Mishra K. L. P. and Chandrasekaran N., “Theory of Computer Science - Automata, Languages and Computations”, Prentice Hall of India, 2000

REFERENCE BOOKS

1. Linz Peter, “Introduction to Formal Languages & Automata”, Narosa Publications, 2001
2. Greenlaw Ramond and Hoover H. James, “Fundamentals of the Theory of Computation - Principles and Practice”, Harcourt India Pvt. Ltd., 1998
3. Lewis H. R. and Papaditriou C. H., “Elements of Theory of Computation”, Prentice Hall of India, 1998
4. Martin John C., “Introduction to Languages and Theory of Computations”, Tata McGraw Hill, 2003

BCS-204	DATABASE MANAGEMENT SYSTEM	L-T-P	Cr
		4-0-0	4

OBJECTIVE

To provide knowledge about various organizations and management information systems, keeping in view the aspects of shareability, availability, evolvability and integrity.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To know the basics of database & its architecture
CO2: To aware about the existing data models, entities as well as constraints
CO3: To learn about the different anomalies of the data and ways to normalize it
CO4: To know about the storage of data in the files & organization of files
CO5: To learn about the transactions and its ways done on the database

UNIT I

INTRODUCTION: Purpose of database system; characteristics of database approach; advantages of using DBMS; database concept and architecture; data abstraction, data models; instances and schema; data independence; schema architecture; database languages; database manager; database administrator; database users.

UNIT II

DATA MODELING: Introduction to Hierarchical model, Network model. Relational model, E-R Model, Entity sets attributes and keys; relationships (ER); database modelling using entity; type role and structural constraints; Concept of Keys: Primary, secondary, candidate, super key ; weak and strong entity types; entity-relationship diagram-basic concepts; Enforcing Data Integrity Constraints; Introduction on views; Codd's Rules.

UNIT III

NORMALIZATION& SQL and Relational Algebra& Calculas: Database design process; relational database design; relation schema; anomalies in a database; functional dependencies; 1NF, 2NF, 3NF and BCNF. ; Decomposition of DBMS: Lossless and Lossy, Reduction of an E-R schema to Tables; Introduction to SQL; basic queries in SQL; advanced queries in SQL; functions in SQL; basic data retrieval; updates in SQLs, views in SQL. Relational Algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

UNIT IV

FILE ORGANIZATION: indexing and hashing; overview of file organization techniques; secondary storage devices; operations in files; heap files and sorted files; ; Indexing and Hashing- Basic concepts; Static Hashing; Dynamic Hashing; ordered indices; single level ordered index; multi-level index.

UNIT V

TRANSACTION PROCESSING & QUERY PROCESSING: Desirable properties of transactions; implementation of atomicity and durability; schedules and recoverability; serializability of schedules; concurrency control. Deadlock handling - detection and resolution.

TEXT BOOK

1. Silberschatz A., Korth H. F. and Sudarshan S., “Database System Concepts”, 3rd edition, McGraw-Hill, International Edition, 1997.
2. S. Chand, Rajiv Chopra, “DBMS(A practical approach)”, Revised edition, Pearson.

REFERENCE BOOKS

1. Date C. J., “An Introduction to Database Systems”, 7th edition, Addison- Wesley, Low Priced Edition, 2000.
2. Desai Bipin, “Introduction to Database Management System”, Galgotia Publications, 1991.
3. Elmasri R. and Navathe S. B., “Fundamentals of Database Systems”, 3rd edition, Addison-Wesley, Low Priced Edition, 2000.

BCS-206	PROGRAMMING USING C#	L-T-P	Cr
		4-0-0	4

OBJECTIVE

To equip students with C# programming Concepts

PRE-REQUISITES

Knowledge of C programming language.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To know the basics of Dot net programming language
CO2: To learn about the basics of C# programming
CO3: To learn about objects and classes in C# programming language
CO4: To know about the exception handling and delegates in C# programming
CO5: To learn about different database connectivity like ADO etc.

UNIT I

PHILOSOPHY OF .NET AND ITS MAJOR COMPONENTS: Origin of .NET technology; .NET platform; benefits and limitations of .NET; building blocks of .NET framework; .NET programming languages; .NET types and namespaces; Understanding CLR, CTS and CLS; developing C# Applications using Visual Studio .Net

UNIT II

UNDERSTANDING C#: Data Types, Variables & Constants, Operators in C#, Arithmetic Operators, Prefix and Postfix notation, Assignment Operators, Relational Operators, Other Operators, Operators precedence, Flow Control and Conditional Statements if-else statement, switch statement, Loops in C#, for loop, do-while loop, Array in C#, foreach Loop, Comparison among C++; Java and C#; benefits of C#; object-oriented programming using C#

UNIT III

OBJECTS AND CLASSES: Concept of a class, Objects, Fields, Methods, Instantiating the class, Accessing the members of a class, Access modifiers, Properties, Static members of the class, Constructors, Desturctors, Implementing inheritance in C#, The base keyword, Protected Access Modifier, sealed keyword, Polymorphism, using the reference of the base type for referencing the objects of the child class, Overriding the methods, the new keywords, Type casting, is and as keywords.

UNIT IV

EXCEPTION HANDLING AND DELEGATES: Exceptions in C# and .Net, Handling Exceptions using the try-catch-finally blocks, Delegates Basics, Delegates in the .Net Framework, Passing delegates to methods, Multicast Delegates.

UNIT V

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, Features provided by ASP .NET; web forms and their components.

TEXT BOOKS

1. Balaguruswammy, E, “Programming in C#”, Tata McGraw Hill
2. Gunnerson Eric, “A programmer’s Introduction to C#”, IDG Books

REFERENCE BOOKS

1. Jain, V K, “The Complete Guide to C# Programming”, IDG Books India.
2. Pappas & Murray, “C# Essentials”, Prentice Hall of India
3. Wakefield, “C# and .NET Web Developers Guide”, IDG Books India.

BCS-208	NUMERICAL METHOD	L-T-P	Credits
		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 Advance and guide of various engineering subject. Knowledge of the concepts of Numerical methods will play a vital role in the field of Research.

COURSE OUTCOMES

Students undergoing this course will be able to:

CO1: It is used for solving a system of equations

CO2: To know how to find the roots of transcendental equations.

CO3: To learn how to interpolate the given set of values

CO4: To understand the curve fitting for various polynomials

CO5: To learn numerical solution of differential equations

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

1. Grewal, B. S., "Numerical methods in Engineering and Science",9th Edition, 2010, Khanna publishers.
2. Numerical Methods by E. Balagurusamy T.M.H.

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.

BCS-210	MANAGEMENT INFORMATION SYSTEM	L T P	CR
		4 0 0	4

OBJECTIVE

This module aims to provide students with a background on the use and advantages of information systems in organizations with a focus on managerial aspects of MIS to promote an awareness of the economic, social, and ethical implications of such systems on society and IT professionals.

COURSE OUTCOMES

CO1: To Understand the concepts related to Business.
CO2: To Demonstrate the roles, skills and functions of information systems
CO3: To understand the Competing with Information Technology
CO4: To Using Information Technology for strategic Advantage
CO5: To Know the e-business Systems & IT in business

UNIT I

FOUNDATIONS OF INFORMATION SYSTEMS (IS) IN BUSINESS :-The real world of information system and information system,The fundamental Roles of IS in Business,The role of e-business in business,Types of Information Systems:-Operations support systems,Management support systems;Other classifications of IS,Managerial Challenges of Information Technology (IT)Success and Failure with IT,Developing IS solutions,Challenges and Ethics of IT,Challenges of IT careers,The IS function

UNIT II

COMPETING WITH INFORMATION TECHNOLOGY :-Fundamentals of Strategic AdvantageStrategic IT,Competitive Forces and strategies,Strategic Uses of Information Technology ,Building a customer-focused business,The value chain and strategic IS,Value chain examples

UNIT III

USING INFORMATION TECHNOLOGY FOR STRATEGIC ADVANTAGE :-Strategic Uses of IT,Reengineering Business Processes,The role of IT,Becoming an Agile company,Creating a virtual company, Building a knowledge-creating company, Knowledge management systems

UNIT IV

MANAGING DATA RESOURCES :-Date resource management;Types of databases: operational, distributed, external, hypermedia databases;Data warehousing and data mining;The database management approach;Database management system, database interrogation, database maintenance, application development;

UNIT V

E-BUSINESS SYSTEMS :Introduction,Cross-functional enterprise applications,Enterprise application integration,Transaction processing systems,The transaction processing cycle,Enterprise collaboration systems: tools for enterprise collaboration,Functional business systems

INTRODUCTION, IT IN BUSINESS

Marketing systems: interactive marketing, targeted marketing, sales force automation
Manufacturing systems: computer-integrated manufacturing
Human resource systems: HRM and Internet, HRM and corporate Intranets
Accounting Systems: online Accounting systems

TEXT BOOK

1. Phalguni Gupta, Surya Prakash, Umarani Jayaraman, IT Infrastructure and its Management, Tata McGraw Hill Education Private Limited, ISBN-13: 978-0070699793, 2009.

2. Simon Adams, ITIL V3 Foundation Handbook Updated Edition, Stationery Office Books (TSO) Publisher, 2009.

REFERENCES

1. Ivanka Menken, ITIL V3 Foundation Certification Exam Preparation Course in a Book for Passing the ITIL V3 Foundation Exam, Second Edition (The Art of Service), 2009.

2. Van Haren, Passing the ITIL Foundation, Van Haren Publishing, 2011.

BCS-212	SOFTWARE ENGINEERING	L T P	Cr
		4-0-0	4

OBJECTIVE

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

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To learn the basic concepts of software engineering
CO2: To know about the requirements and process to engineer the software
CO3: To learn how to design a software & what are its strategies
CO4: To know about different metrics used for software evaluation
CO5: To aware about the coding, testing & maintenance of software

UNIT I

INTRODUCTION: Introduction to Software Engineering, Definition of Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Applications, Software Myths. Software Development Life Cycle Model: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT II

SOFTWARE REQUIREMENT SPECIFICATIONS: Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Control Flow Model, SRS Document, IEEE Standards for SRS, Data Dictionary.

UNIT III

SOFTWARE DESIGN: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Top-Down and Bottom-Up Design.

UNIT VI

SOFTWARE MEASUREMENT & MATRICES: Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management. , Quality Assurance, Quality Control, Software Quality Attributes, Software Quality Assurance (SQA): Verification and Validation

UNIT V

CODING & SOFTWARE TESTING & MAINTENANCE: Top-Down and Bottom –Up programming, structured programming, Code Inspection, Compliance with Design and Coding Standards. Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression

Testing, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Alpha and Beta Testing of Products. Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering.

TEXT BOOK:

1. Pressman Roger S., “Software Engineering – A Practitioner’s Approach”, 6th Edition, McGraw Hill, 2004.
2. K.K Agarwat, “Software Engineering”, 3rd Edition, New Age International Publishers, 2008

REFERENCE BOOKS

1. Aggarwal KK, Singh, Yogesh, “Software Engineering”, New Age International, 2000.
2. Jalote Pankaj,”An Integrated Approach to Software Engineering”, 3rd edition, Narosa, 2005.
3. Sommerville Ian, Pearson Education, “Software Engineering”, 5th edition, Addison Wesley, 1999

BCS-254	DATABASE MANAGEMENT SYSTEM LAB	L-T-P	Cr
		0-0-2	1

OBJECTIVE

To provide knowledge about implementation of practical aspects of database i.e. creation of tables and applying queries using SQL queries

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To know the basics of structured query language

CO2: To aware about applying different queries on database structured in the form of tables

CO3: To learn about the different SQL queries performed using operators as well as constraints

CO4: To create views from created table to further organize the data

CO5: To learn about the basic operations of relational algebra

LIST OF EXPERIMENTS/EXERCISES

Basic

1. Introduction to SQL.
2. Write a query for:
    - I. Creation of table.
    - II. Insertion of data into table.
    - III. Displaying the data of table.
    - IV. Deletion of data from table.
    - V. Updating the data in a table.
    - VI. Modifying the structure of a table.

3. Write a query to implement: Key constraints: primary key constraints, foreign key constraints, not null constraints and unique constraints; use of check constraints.
4. Write a query to implement: Binary operations in Relational Algebra: Union, Intersection, Set Difference, Join, Cartesian product.
5. Write a query to implement: Grouping of data into tables and listing records in ascending order or descending order.
6. Write a query to implement: Creation of sequences and explain use of sequences.
7. Write a query to implement: Access permissions in SQL.

Moderate

1. Finding unique names of all salesmen, deletion of the structure of a table, use of delete command with conditions, updating records of a table with conditions, altering structure of a table and changing size of existing column in the table.
2. Write a query to implement: Arithmetic operators, logical operators and pattern matching operator.
3. Write a query to implement: Aggregate and mathematical functions: count, count(*), Avg, max, min, sum, lower, upper, power , sqrt.

4. Write a query to implement: Creating views from single and multiple tables, drop views and creating index on the table and drop them.
5. Create queries using Triggers and Procedures.

Advance

1. Consider the insurance database given below. The primary keys are made bold and the data types are specified.
   PERSON(driver_id:string , name:string , address:string)
   CAR(regno:string , model:string , year:int)
   ACCIDENT(report_number:int , accd_date:date , location:string)
   OWNS(driver_id:string , regno:string)
   PARTICIPATED(driver_id:string , regno:string , report_number:int , damage_amount:int)
   1)Create the above tables by properly specifying the primary keys and foreign keys.
   2)Enter at least five tuples for each relation.
   3)Demonstrate how you:
   a.Update the damage amount for the car with specific regno in the accident with report number 12 to 25000.
   b.Add a new accident to the database.
   4)Find the total number of people who owned cars that were involved in accidents in the year 2008.
   5)Find the number of accidents in which cars belonging to a specific model were involved.
2. Consider the following relations for a order processing database application in a company.
   CUSTOMER(custno:int , cname:string , city:string)
   ORDER(orderno:int , odate:date , custno:int , ord_amt:int)
   ORDER_ITEM(orderno:int , itemno:int , quantity:int)
   ITEM(itemno:int , unitprice:int)
   SHIPMENT(orderno:int , warehouseno:int , ship_date:date)
   WAREHOUSE(warehouseno:int , city:string)
   1)Create the above tables by properly specifying the primary keys and foreign keys.
   2)Enter at least five tuples for each relation.
   3)Produce a listing: custname , No_of_orders , Avg_order_amount , where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
   4)List the orderno for orders that were shipped from all the warehouses that the company has in a specific city.
   5)Demonstrate the deletion of an item from the ITEM table and demonstrate a method of handling the rows in the ORDER_ITEM table that contains this particular item.
3. Consider the following database of student enrollment in courses and books adopted for that course.
   STUDENT(regno:string , name:string , major:string , bdate:date)
   COURSE(courseno:int , cname:string , dept:string)
   ENROLL(regno:string , courseno:int , sem:int , marks:int)
   BOOK_ADOPTION(courseno:int , sem:int , book_isbn:int)
   TEXT(book_isbn:int , book_title:string , publisher:string , author:string)

1)Create the above tables by properly specifying the primary keys and foreign keys.
2)Enter atleast five tuples for each relation.
3)Demonstrate how you add a new text book to the database and make this book to be adopted by some department.
4)Produce a list of text books (includes courseno , book_isbn , book_title) in the alphabetical order for courses offered by the 'CS' department that use more than two books.
5)List any department that has all its books published by a specific publisher.

4. The following are maintained by abook dealer.
AUTHOR(author_id:int , name:string , city:string , country:string)
PUBLISHER(publisher_id:int , name:string , city:string , country:string)
CATALOG(book_id:int , title:string , author_id:int , publisher_id:int , category_id:int , year:int , price:int)
CATEGORY(category_id:int , description:string)
ORDER_DETAILS(order_no:int , book_id:int , quantity:int)
1)Create the above tables by properly specifying the primary keys and foreign keys.
2)Enter at least five tuples for each relation.
3)Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
4)Find the author of the book that has maximum sales.
5)Demonstrate how you increase the price of books published by a specific publisher by 10%.

5. Consider the following database for a banking enterprise.
BRANCH(branch_name:string , branch_city:string , assets:real)
ACCOUNT(accno:int , branch_name:string , balance:real)
DEPOSITOR(customer_name:string , accno:int)
CUSTOMER(customer_name:string , customer_street:string , customer_city:string)
LOAN(loan_number:int , branch_name:string , amount:real)
BORROWER(customer_name:string , loan_number:int)
1)Create the above tables by properly specifying the primary keys and foreign keys.
2)Enter at least five tuples for each relation.
3)Find all the customers who have at least two accounts at the main branch.
4)Find all the customers who have an account at all the branches located in a specific city.
5)Demonstrate how you delete all account tuples at every branch located in a specific city.

Project

1. Create a Database for a college which implements all keys, views, procedures and triggers in it.

BCS -256	PROGRAMMING USING C# LAB	L-T-P	Cr
		0-0-2	2

OBJECTIVE

To train the students with C# programming Concepts using implementation

PRE-REQUISITES

Knowledge of C programming language.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To know the basics of Dot net programming language
CO2: To implement operators used in C# Programming
CO3: To learn about constructors to be implemented
CO4: To know about the different functions & file operations in C# programming
CO5: To learn about different database connectivity like ADO etc.

LIST OF EXPERIMENTS

BASIC

1. Write a program in C# to calculate Hypotenuse of triangle using dynamic initialization of variables
2. Write a program in C# to get input from the user and perform calculations
3. Write a program in C# to calculate the coordinates for the quadrant using if-else
4. Write a program in C# to check whether the alphabet is a vowel or not using switch case
5. To develop a C# application to print the students list using classes and objects

INTERMEDIATE

6. Write a program in C# illustrating the use of sequence, conditional and iteration construct.
7. Write a program in C# illustrating various operators like logical, arithmetical, relational, etc.
8. Write a program in C# illustrating overloading of various operators.
9. Write a program in C# illustrating use of friend, inline and Static Member functions, default arguments.
10. Write a program in C# illustrating use of destructors and various types of constructor.
11. Write a program in C# illustrating various forms of inheritance.
12. Write a program in C# illustrating use of virtual functions, Virtual base class, delegates.
13. Write a program in C# illustrating file operations.

ADVANCED

14. Write a program in C# illustrating simple web applications using ASP.net
15. Write a program in C# illustrating use of Active X Controls.

PROJECT

Develop an e-commerce application using C# language.

TEXT BOOKS

1. Balaguruswammy, E, "Programming in C#", Tata McGraw Hill
2. Gunnerson Eric, "A programmer's Introduction to C#", IDG Books

REFERENCE BOOKS

1. Jain, V K, "The Complete Guide to C# Programming", IDG Books India.
2. Pappas & Murray, "C# Essentials", Prentice Hall of India
3. Wakefield, "C# and .NET Web Developers Guide", IDG Books India.

BCS -301	SOFTWARE TESTING AND QUALITY ASSURANCE	L-T-P	Cr
		4-0-0	4

OBJECTIVE

To relay the fundamental knowledge of software, various types of testing and quality assurance.

PRE-REQUISITES

Knowledge of fundamentals of software, software development and software project management.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To understand the basics concepts of software testing
CO2: To learn how the two basic types of testing works
CO3: To learn the concept of performance testing
CO4: To understand the basics of software quality assurance
CO5: To learn how to manage the quality of a product using various models.

UNIT I

BASICS OF SOFTWARE AND TESTING: Principles of Testing, Software Development Life Cycle Models (SDLC), Phases of Software Project, Quality, Quality Assurance and Quality Control, Testing, Verification and Validation, Life Cycle Models.

UNIT II

TESTING TECHNIQUES: White Box Testing, Static Testing, Structural Testing, Challenges in White Box Testing, Black Box Testing, Integration Testing, Top-Down Integration, Bottom-Up Integration, System and Acceptance Testing, Functional versus Non-functional Testing, Functional System Testing, Non-Functional System Testing, Acceptance Testing.

UNIT III

PERFORMANCE TESTING: Factors, Methodology, Tools, Process for performance testing, Regression Testing, Types, Testing of Object-oriented Systems, Usability and Accessibility Testing, approach, Quality factors, Aesthetics Testing, Accessibility Testing, Tools for Usability.

UNIT IV

SOFTWARE QUALITY CONCEPTS: Software quality factors, software quality metrics, relationship between quality factors and quality metrics, quality management system, Concepts of Quality Control, Quality Assurance, Quality Management - Total Quality Management; Cost of Quality; QC tools, Business Process Re-engineering - Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.

UNIT V

QUALITY ASSURANCE AND STANDARDS: Basic software quality parameters and its metrics, Software Configuration Change and types of errors, Quality management models: ISO, SPICE, IEEE, CMM

TEXT BOOKS

1. Desikan S, Ramesh G, “Software Testing”, Pearson Education, 2008.
2. Mathur A.P, “Fundamentals of Software Testing”, Pearson Education, 2008.

REFERENCE BOOKS

1. Brian Marick, “The Craft of Software Testing”, Pearson Education, 2008.
2. Rajani & Oak, “Software Testing : Methodology, Tools and Processes” Tata McGraw-Hill, 2007.

BCS-303	PYTHON PROGRAMMING	L-T-P	Cr
		4-0-0	4

OBJECTIVE

To build programming logic and thereby developing skills in problem solving using Python programming language; To be able to do testing and debugging of code written in Python Emphasize the concepts and constructs rather than on language features.

PRE-REQUISITES

The students are expected to have basic knowledge of programming and DBMS.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: To learn and understand Python programming basics and paradigm.

CO2: To learn and understand python looping, control statements and string manipulations.

CO3: To learn basic concepts of list, tuple and dictionary data structures.

CO4: To learn and know the concepts of Structure and Functions.

CO5: To learn and know the concepts of file handling, exception handling.

UNIT I:

Introduction to Python: History, Features & Benefits of Python, Structure of a Python Program, Identifiers and Keywords, Concept of Variable, Memory Allocation for Variable, Data Types in Python, Conversion Functions, Operators (Arithmetic Operator, Relational, Logical or Boolean Operator, Assignment, Bitwise Operator, Membership Operator).Input and Output Function, Control Statements (Looping- while Loop, for Loop, Loop Control, Conditional Statement-if...else), Difference between break, continue and pass.

UNIT II:

Data Structures & Function: String, Lists, Tuples, Sets, Dictionary Data Structure, Built-in Library Function, Method and Operation on these Data Structure. Defining Function, Type of Function Arguments (Required Arguments, Keyword Arguments, Default Arguments, Variable-Length Arguments), Scope of a Variable, Global Vs Local Variable, Python Modules & Packages, Import Statement, dir(), globals(), locals() and reload() Functions.

UNIT III:

Python Object Oriented Programming: Introduction to Object Oriented Programming, Concept of Abstraction, Encapsulation, Class, Object and Instances. Creating Classes, _init_() Method, Creating Instance Object, Class Attributes, Access Specifiers in Python, Instance Method Vs Class Method. Inheritance & Polymorphism, Overriding and Overloading Methods.

UNIT IV:

Python File Handling, Exception Handling: Opening & Closing Files, File Access Modes, File Object Attributes, Reading and Writing Files, Manipulating File Pointer using seek and tell. Programming using File Operations. Exception Handling in Python.

UNIT V:

Python MySQL: Mysql/Oracle Database Connection using Python. Creating Database Tables, SELECT, INSERT, UPDATE, And DELETE Operation, Performing Commit, Rollback Operation.

TEXT BOOKS

1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India.
2. T. Budd, Exploring Python, TMH, 1st Ed, 2011

REFERENCE BOOKS

1. Python Tutorial/Documentation www.python.or 2010
2. Allen Downey, Jeffrey Elkner, Chris Meyers ,How to think like a computer scientist :Learning with Python,Freelyavailableonline.2012
3. http://docs.python.org/3/tutorial/index.html
4. http://interactivepython.org/courselib/static/pythonds

BCS-305	Statistical Analysis Using R	L T P	Cr
		4 0 0	**4**

OBJECTIVES

- The chief aim to apply statistical analysis and technologies on data to find trends and solve problems.
- Students will be able to understand basic theoretical and applied principles of statistics needed to enter the job force.
- Students will be able to communicate key statistical concepts to non-statisticians.
- Students will gain proficiency in using statistical software for data analysis.

PRE-REQUISITES

Fundamental Knowledge of R programming and Statistics.

COURSE OUTCOMES

Students after undergoing this course will be able to:

CO1: Understand the basics of R Programming and Apply OOP concepts in R programming.

CO2: Explain the use of data structure and loop functions. Analyse data and generate reports based on the data.

CO3: Organize, manage and present data. Analyse statistical data graphically using frequency distributions and cumulative frequency distributions.

CO4: Extract the scene with different visualization in R Programming methods and perform different types of testing used in statistics on data.

CO5: Explore the different types of models used in statistics with r programming.

Unit I

Introduction to R Programming: Introduction, how to run R, R Sessions, and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

Unit II

Control Statements' Programming Structures, Control Statements, Loops, – Looping Over Non vector Sets,- If-Else, Arithmetic, and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

Unit III

Linear algebra, metrics and Distributions: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product, Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and Writer Files.

Unit IV

Type of testing in statistics: Creating Graphs, Graphics, The Workhorse of R Base Graphics, the plot() Function, Customizing Graphs, Saving Graphs to Files.

Probability Distributions, Normal Distribution, Poisson Distributions, Binomial Distribution, Other Distribution, Correlation and Covariance, Basic Statistics, T-Tests,-ANOVA.

Unit V

Models used in Statistics: Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, Poisson Regression, other Generalized Linear Models, Survival Analysis, Nonlinear Models, Splines, Decision, Random Forests.

Textbooks:

1) Hadley Wickham “R for Data Science: Import, Tidy, Transform, Visualize, and Model Data” 1st edition O′Reilly
2) Tilman M. Davies “The Book of R: A First Course in Programming and Statistics” 1st edition. Starch Press

Reference books:

1) Andrie de Vries “R For Dummies” 2nd edition John Wiley & Sons
2) Andy Field “Discovering Statistics Using R” 1st edition SAGE Publications Ltd
3) Norman Matloff “The Art of R Programming: A Tour of Statistical Software Design.”1st edition Starch Press

BCS-307	INTRODUCTION TO E-COMMERCE	L T P	Cr
		3-0-0	3

OBJECTIVE

This course emphasizes the major concepts and activities of e-commerce. It presents an e-commerce framework. Various topics are covered including electronic payment systems, order fulfillment, electronic customer relationship management, e-auctions, business to business e-commerce, selling and buying in private e-markets, e-supply chains, collaborative commerce, intrabusiness ecommerce, corporate portals, mobile commerce and pervasive computing.

PRE-REQUISITES

Knowledge of internet and web development, data mining, computer networks, software engineering.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To learn the basic concepts of e-commerce
CO2: To aware about the infrastructure required in e-commerce
CO3: To know about the payment system operated electronically
CO4: To aware about e- commerce law
CO5: To learn about e-commerce

UNIT I

INTRODUCTION TO E-COMMERCE: Benefits; impact of e-commerce; classification of e-commerce; application of e-commerce technology; business models; framework of e-commerce.; business to business; business to customer; customer to customer; advantages and disadvantages of e-commerce; electronic commerce environment and opportunities: back ground – the electronic commerce environment – electronic market place technologies.

UNIT II

NETWORK INFRASTRUCTURE OF E-COMMERCE: Network infrastructure to e-commerce & internet; LAN; Ethernet (IEEE 802.3); WAN; internet; TCP/IP reference model; domain names; internet industry structure; FTP applications; protocols required for ecommerce;

HTTP; CGI 3; firewalls; securing web service; secure payment system transaction security (SET); cryptology; digital signatures

UNIT III

ELECTRONIC PAYMENT SYSTEM & EDI: Introduction to electronic cash and electronic payment schemes – internet monitory payment; different models; framework; prepaid and post-paid payment model and security requirements – payment and purchase order process – online electronic cash. Search tools: directories; search engines; Meta search engines. EDI & E-content: Business Trade Cycle; EDI; EDI Fact, Electronic content.

UNIT IV

Legal Issues Related to E-Commerce, Ethical Issues Related to E-Commerce , Cyber Laws 7:laws of the internet & the world wide web,information technology (it) act-2000

UNIT V

M-COMMERCE, ADVERTISING & CRM: Introduction to mobile commerce; framework; applications; design methodology and advantages; future trends in m-commerce. Supply chain management in e-commerce. Internet Advertising; Models of Internet advertising; sponsoring content; Corporate Website; Weaknesses in Internet advertising; web auctions. E-retailing; Role of retailing in E-commerce; E-marketing and advertising. CRM in e-commerce.
CASE STUDY: Discussion on a corporate web site, E-commerce legal issues & cyber laws.

TEXT BOOK

1. Chaffey, Dave, "E-business and E-commerce Management", Pearson Education,
2. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
3. Efraim Turban, Jae Lee, David King, H.Michael Chung, "Electronic Commerce–A ManagerialPerspective", Addison-Wesley.

REFERENCE BOOKS

1. Kalakota, Ravi, Whinston Andrew B . , "E-Commerce-A Manager's guide", Addison Wesley.
2. David Whetley; E-commerce concepts.

BCS-353	PYTHON PROGRAMMING LAB	L T P	Cr
		0 0 2	1

COURSE OUTCOMES

CO1: Define basic concepts of python programming if statement, loops.
CO2: Define and demonstrate the use of built-in data structures “lists” and “dictionary”.
CO3: Design and implement a program to solve a real-world problem
CO4: Design and implement GUI application and how to handle exceptions and files.

LIST OF PROGRAMS

Program 1: Programs using if else structure

a) Find the Largest Among Three Numbers

b) Python Program to Check Leap Year

c) Python Program to Take in the Marks of 5 Subjects and Display the Grade

Program 2: Programs using for and while loop

a) Python Program to check whether given number is Prime Number or not.

b) Python Program to Find the Sum of Digits in a Number.

c) Python Program to convert binary number to decimal number.

Program 3: Program using List and String data structure

a) Write Python Program to input a list of integers, (1) display the no of elements in the list (2) display minimum and maximum element in the list (3) display sum of square of all the element in the list (4) (5) add a new element at end and display the list (6) add a new element at given index and display list (7) display the occurrence of given element in the list (8) remove the given element in the list (9) add element from a new list from given list (10) sort the given list & reverse the given list (11) also perform slicing, concatenation and multiplication operation.

b) A fruit seller sells different type of fruits. Type of fruits and corresponding rates are stored in two different lists. Customer can order any type of fruit (one or more type) in any quantity. If total bill of customer is greater than 500, customer is given 10% discount. If any of the fruits required by the customer is not available in the store, then consider the bill amount to be -1. Write a Python program to calculate and display the bill amount.

c) Accept two strings 'string1' and 'string2' as input from the user. Generate a resultant string-1, such that it is a concatenated string of all upper case alphabets from both the strings in the order they appear. Generate a resultant string-2 that contain character which are in both string1 and 2. Print the actual resultant string-1 and resultant string-2.

Program 4: Programs using concept of list, tuple & dictionary

a) Write a Python program that take a string as input and store the character and occurrence of each character in a dictionary. Create two lists from dictionary first having each character in sorted order of their frequency and second having corresponding frequency.

b) A furniture seller sells different type of furniture, Type of Furniture and rates are stored in a dictionary. Customer can order any type of furniture (one or more type) in any quantity. If total bill of customer is greater than 10,000, customer is given 5% discount. 8% GST is charged on total bill. If any of the furniture required by the customer is not available in the store, then consider the bill amount to be -1. Write a Python program to calculate and display the bill amount.

c) Students name and their corresponding marks are stored in a dictionary. Write a Python program to perform following (1) Display name and marks of each student (2) Display the names of top two scorer (3) display the class average for this course (4) check if the marks for given student is stored in dictionary or not, if not add the name and marks in the dictionary else display his/her marks (5) delete the name and marks of a given student in the dictionary (6) add name and marks from another dictionary and display combined dictionary.

Program 5: Program using Function in Python:

a) Write Python functions using the concept of Keyword & default arguments and write a program to use them.

b) Write python functions to use the concept of variable length argument & global variable.

Program 6: Program using concept of Class, object, class variable, class method:

a) Create a class Account with name, account no and balance as attribute and no_of_accounts as class variable. Account no should be generated automatically (starting from 1) using the class variable no_of_account. Add the methods for displaying the account information, depositing given amount, withdrawing given amount and initializer method to initialize the object. Create objects of Account class and call different method to test the class.

b) Create a class Employee with name , empid ,salary as attribute and no_of_ employee and annual_incr (% annual increment) as class variable. empid should be generated automatically (starting from 1) using the class variable, no_of_employee. Add the instance methods for displaying the employee information, annually increasing the salary with help of class variable annual_incr , class method to change the value of annual_incr and initializer method to initialize the object. Create objects of employee class and call different method to test the class (program using class method).

Program 7: Program using the concept of Inheritance

a) Create a class Polygon to represent a polygon having no of sides and a list having magnitude of each side as attribute. Add the inputSides() to input sides and displaySides() to display sides as methods. Derive a class Triangle from Polygon and add an additional method displayArea() to display area. Create object of Triangle and call different methods to test the class.

b) Create a class Person having name, age, as attributes, **__init__**() method to initialize the object and display() to display person information. Derive a class Student from Person having roll no, University name, branch as additional attributes and **__init__**(), display() to display student information and change_Branch() method. Create object of Student type and call different methods to test the class.

c) Write a program to show the concept of multiple inheritance in python.

Program 8: Program using the concept of Polymorphism, Operator Overloading

a) In a retail outlet there are two modes of bill Payment (1) Cash : Calculation includes VAT(10%) Total Amount = Purchase amount + VAT (2) Credit card: Calculation includes processing charge and VAT Total Amount = Purchase amount + VAT (10%) + Processing charge (2%) The act of bill payment is same but the formula used for calculation of total amount differs as per the mode of payment. Can the Payment maker simply call a method and that method dynamically selects the formula for the total amount? Demonstrate this Polymorphic behaviour with code.

b) Write a program to create a class to represent length in feet and inch. Overload the "+" operator to add the two object of length type.

Program 9: Program on file handling in Python

a) Write a python program to write few lines on a file, read it back and create a dictionary having each word in file as keys in dictionary and occurrence of these word as values and print the dictionary.

b) A file student.txt store student information. Information about each student is written on separate line in the form: roll-no student-name (student-name may consist of any number of words).Write a Python program that takes student roll no as input and print the student name. If roll no is not present in the file it display : “roll no not present in the file”.

Program 10: Program on Exception handling

a) Write a function divide (arg1, arg2) to divide arg1 by arg2. Use the exception handling mechanism to handle all type of possible exceptions that may occur. Take the value of arg1 and arg2(of any type) from user as input and call the function divide to print the result of division or suitable message if any type of exception occurs(use also else and finally block).

b) Write a program to open a file in read only mode read data from file and then try to write data on file. Use the exception handling mechanism to handle all type of possible exception.

BCS-355	Statistical Analysis Using R LAB	L T P	Cr
		0 0 2	1

COURSE OUTCOMES:

CO1: Understand the basic concepts of R Programming.
CO2: apply the concepts of control statements, looping and class.
CO3: graphically using frequency distributions and cumulative frequency distributions on data.
CO4: Understanding the type of testing used in statistics**.**
CO5: Understand the practical implementation of model.

1.
Basic

1.Reading Excel data sheet in R.
2. Reading XML dataset in R
3.Write an R script, to create R objects for calculator application and save in a specified location in disk.
4.Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars & cars datasets.
5Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset.
6. Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.

Intermediate

1.Find the data distributions using box and scatter plot.
2.Find the outliers using plot. c. Plot the histogram, bar chart and pie chart on sample data.
3.Find the correlation matrix.
4.Perform the Inverse Probability Cumulative Density Analysis on t-Distribution in R Programming – qt() Function.
5.Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.

Advance

1. Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. Require (foreign), require (MASS).
2. Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.
3. Write a program using any machine learning model to perform Cross-Validation in R programming.
4. Perform Linear Regression Analysis in R Programming – lm() Function.
5. Write a program using K-NN Classifier in R Programming.

PEP 301	Leadership & Management Skills	L-T-P	Cr.
		1 -0- 2	2

PRE- REQUISITES

K12 level of English Language and Knowledge of Word processing using MS Word, basic IT skills

COURSE OBJECTIVES

The Course is designed to**:**

- Help students to develop essential skills to influence and motivate others
- Inculcate emotional and social intelligence and integrative thinking for effective Leadership
- Create and maintain an effective and motivated team to work for the society
- Nurture a creative and entrepreneurial mindset
- Make students understand the personal values and apply ethical principles in professional and social contexts.

COURSE OUTCOMES

Upon completion of the course students will be able to:

CO1: Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision

CO2: Learn and demonstrate a set of practical skills such as time management, self-management, handling conflicts, team leadership, etc.

CO3: Understand the basics of entrepreneurship and develop business plans

CO4: Apply the design thinking approach for leadership

CO5: Appreciate the importance of ethics and moral values for making of a balancedpersonality.

Unit I

LEADERSHIP SKILLS

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?

- Whom do you consider as an ideal leader?

b. Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

c. Basic Leadership Skills

- Motivation
- Team work
- Negotiation
- Networking

Unit-II

MANAGERIAL SKILLS

a. Basic Managerial Skills

- Planning for effective management
- How to organise teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate
- Conflict management

b. Self-Management Skills

- Understanding self-concept
- Developing self-awareness
- Self-examination
- Self-regulation

Unit-III

ENTERPRENEURIAL SKILLS

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurships

- Traits and competencies of entrepreneur

b. Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

Unit- IV
INNOVATIVE LEADERSHIP AND DESIGN THINKING

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

b. Design Thinking

- What is design thinking?
- Key elements of design thinking:
    - Discovery
    - Interpretation
    - Ideation
    - Experimentation
    - Evolution.
- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

Unit- V
ETHICS AND INTEGRITY

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

b. Ethics and conduct

- Importance of ethics
- Ethical decision making

- Personal and professional moral codes of conduct
- Creating a harmonious life

PEDAGOGY

Pedagogy for the modules is as follows:

1. Leadership Skills - Lectures (augmented with videos); role-plays for leadership models;team building games
2. Managerial Skills - Lectures (augmented with videos), case studies (AMUL, TESLA, Toyota, DMRC, Tata Group, Google, The Mumbai Dabbawala), SWOT analysis, Johariwindow
3. Entrepreneurial Skills - Lectures (augmented with videos), case studies and practicingbusiness plans
4. Innovative Leadership and Design Thinking- Concept discussion through lecture andvideos followed by role-plays and exercises for each set of intelligence, activities using5 steps – discovery, interpretation, ideation, experimentation, and evolution (Ref.: Workbook of Design Thinking by IDEO)
5. Ethics and Integrity- Experiential learning through stories suggested list (Ahilya Bai, Holkar, Abdul Kalam, Raja Harishchandra, Mahatma Gandhi, Abraham Lincoln), audio visual augmented role plays and storytelling (leaders from varied fields like academics, corporate, social, sports, art, etc.)

TEXT BOOKS AND REFERENCE BOOKS:

1. Ashokan, M. S. (2015). *Karmayogi: A Bbiography of E. Sreedharan*. Penguin, UK.
2. Brown, T. (2012). *Change by Design.* Harper Business
3. Elkington, J., & Hartigan, P. (2008). *The Power of Unreasonable People: How Social EntrepreneursCreate Markets that Change the World*. Harvard Business Press.
4. Goleman D. (1995). *Emotional Intelligence*. Bloomsbury Publishing India Private Limited
5. Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India

6. Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us All.*

7. William Collins

8. Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited

9. Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New York:American Management Association

10. McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From AStreet-Smart Executive*. RHUS

11. O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried toDo Well by Doing Good.* Harpercollins

12. Sinek S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Penguin

13. Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). *International Handbook ofIntelligence*. Cambridge University Press.

E-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15 from https://www.forbes.com/sites/kimberlyfries/2018/02/08/8-essentialqualities-that-define-great- leadership/#452ecc963b63.
- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - ."A Leader Should Know How to Manage Failure" https://www.youtube.com/watch?v=laGZaS4sdeU
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, *85*(6): 60.
- NPTEL Course on Leadership - https://nptel.ac.in/courses/122105021/9

BCS-302	SOFTWARE PROJECT MANAGEMENT	L T P	Cr
		3 0 0	3

OBJECTIVE

To provide the foundation required for becoming a good software project manager by means of planning, evaluation and estimation, risk management, allocation and monitoring of resources, controlling software quality PRE-REQUISITES Knowledge of software engineering and the basic principles of management

COURSE OUTCOMES

The students after undergoing this course will be able to:
CO1: Identify the different project contexts and suggest an appropriate management strategy.
CO2: Practice the role of professional ethics in successful software development.
CO3: Identify and describe the key phases of project management.
CO4: Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
CO5: Methods to Maintain the Software Quality Assurance

UNIT I

INTRODUCTION: Definition of a Software Project (SP), SP vs. other types of projects activities covered by SPM; categorizing SPs; project as a system; management control, requirement specification; information and control in organization
STEPWISE PROJECT PLANNING: Introduction, selecting a project; identifying project scope and objectives; identifying project infrastructure, analyzing project characteristics; identifying project products and activities; estimate efforts each activity; identifying activity risk; allocate resources; review/ publicize plan

UNIT II

PROJECT EVALUATION AND ESTIMATION: Cost benefit analysis; cash flow forecasting; cost benefit evaluation techniques; risk evaluation; Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods: rapid application development, water fall, V-process-, spiral- models; Prototyping;

ACTIVITY PLANNING: Objectives of activity planning; project schedule; projects and activities; sequencing and scheduling activities, network planning model; representation of lagged activities; adding the time dimension, backward and forward pass; identifying critical path; activity throat, shortening project; precedence networks;

UNIT III

RESOURCE ALLOCATION AND MONITORING THE CONTROL: Introduction, the nature of resources, identifying resource requirements; scheduling resources creating critical paths; counting the cost; being specific; publishing the resource schedule; cost schedules, the scheduling sequence; Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control

UNIT IV

MANAGING CONTRACTS AND PEOPLE:, Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises

UNIT V

SOFTWARE QUALITY: Introduction; the place of software quality in project planning; the importance of software quality; defining software quality, ISO 9126; Practical software quality measures; product versus process quality management; 46 external standards; techniques to help enhance software quality; Study of any software project management software: viz Project 2005 or equivalent.

TEXT BOOKS

Bob Hughes and Mike Cotterell, ―Software Project Manag em ent‖, 2nd Edition, Tata McGraw Hill, 1999

Pressman Roger S., ―Software Engineering – A Practitioner‘s Approach‖, 5th Edition, McGraw Hill, 2001

REFERENCE BOOKS

1. Futrell, ―Software Quality & Project Manag em ent‖, Pearson Education, 2002.
2. Jalote Pankaj, Software Project Management, Pearson Education, 2002.
3. Gopalaswam y Ramesh, ―Managing Global Software Projects‖, Tata McGraw Hill, 2001
4. Walker Royce, ―Software Project Manag em ent‖, Addison Wesley, 1998

BCS-304	ARTIFICIAL INTELLIGENCE	L T P	Cr
		4-0-0	4

COURSE OBJECTIVE: To introduce about artificial intelligence approaches to problem solving, various issues involved and application areas.

PRE-REQUISITES: Knowledge of neural networks, data structures

COURSE OUTCOMES: On the completion of the course, students should be able to:

CO1: Develop conceptual framework for application specification and design.
CO2: Develop advance method for organizing, accessing and exploiting multidisciplinary knowledge within organizations and enterprises.
CO3: Deeper understanding of computational intelligence and its application like neural network, fuzzy system, multi-agent system.
CO4: Develop technique for planning and learning like discovery as learning, learning by analogy; explanation based learning.
CO5: Develop techniques for expert system and current trends in intelligent systems; parallel and distributed AI.

UNIT I: INTRODUCTION TO AI AND SEARCH TECHNIQUES: Foundation and history of AI; data, information and knowledge; AI problems and techniques – AI programming languages, problem space representation with examples; blind search strategies, breadth first search, depth first search, heuristic search techniques: hill climbing: best first search, A * algorithm AO* algorithm.

UNIT II: KNOWLEDGE REPRESENTATION ISSUES AND TECHNIQUES: Predicate logic; representing knowledge using rules. Semantic nets, partitioned nets, parallel implementation of semantic nets; frames, forward and backward chaining; frame based systems.

UNIT III: REASONING UNDERUNCERTAINITY: Reasoning under uncertainty, non monotonic reasoning; Review of probability; Baye's probabilistic interferences and Dumpster Shafer theory; statistical reasoning, fuzzy reasoning.

UNIT IV: PLANNING & LEARNING: Goal stack planning; non linear planning, hierarchical planning representation for planning; partial order planning algorithm. Minimax search procedure for Game Playing. **Basic concepts of Learning**: rote learning, learning by taking advices, learning by problem solving, learning from examples, discovery as learning, learning by analogy; explanation based learning; neural nets; genetic algorithms.

UNIT V: EXPERT SYSTEM AND APPLICATIONS OF ARTIFICIAL INTELLIGENCE: Expert systems: rule based systems architecture: Principles of natural language processing:

knowledge acquisition concepts; AI application to robotics, and current trends in intelligent systems; parallel and distributed AI.

TEXT BOOKS

1. Rich Elaine and Knight Kevin, ―Artificial Intellig ence‖ 3rd Edition, Tata McGraw Hill, 1991
2. Clockson & Mellish, ―Programming PROLOG‖, 3rd Edition, Narosa Publications, 2002.

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 Intellig ence‖, 3rd Edition, Addition Wesley, 1992

BCS-306	CRYPTOGRAPHY AND DATA COMPRESSION	L T P	Cr
		3 0 0	3

OBJECTIVE

The course will provide an overview of cryptographic techniques applicable in an IT environment, and outline the constraints and limitations of realistic secure systems.
A running theme is the tradeoff between usability and security of a system.

PRE-REQUISITES

A working knowledge of C is assumed and essential.

COURSE OUTCOMES

CO1: Understand and analyze public-key cryptography, RSA and other public-key cryptosystems

CO2: Analyze and design hash and MAC algorithms, and digital signatures.

CO3: Design network application security schemes, such as PGP, S/ MIME, IPSec, SSL, TLS, HTTPS, SSH, etc.

CO4: Understand key management and distribution schemes and design User Authentication Protocol

CO5: Know about Intruders and Intruder Detection mechanisms, Types of Malicious software, Firewall Characteristics, Types of Firewalls, Firewall Location and Configurations.

UNIT I

COMPRESSION: Packing; Huffman coding; run length encoding; Lempel-Ziv-Welch; Phil Katz's PKZIP; Delta modulation; JPEG.

UNIT II

ERROR DETECTION AND CORRECTION: Parity; 1, 2, n-dimensions, Hamming codes; p-out-of-q codes

UNIT III

CRYPTOGRAPHY: Vocabulary; history, steganography – visual, textual; cipher hiding; false errors; public key cryptography - authentication, signatures, deniability

UNIT IV

MATHEMATICS: Information; confusion; diffusion; modular arithmetic; inverses; Fermat's little theorem, Chinese remainder theorem; factoring; prime numbers; discrete logarithms

UNIT V

ALGORITHMS: DES; AES (Rijndael); IDEA; one time pad; secret sharing and splitting; RSA; elliptic curves; modes; random numbers

TEXT BOOKS

1. Johannes A. Buchmann, "Introduction to Cryptography",Springer-Verlag.
2. Schneier B., "Applied Cryptography: Protocols, Algorithms and Source Code in C", 2nd edition, Wiley, 1996.

REFERENCE BOOKS

1. IEEE, “Integration of Data Compression and Cryptography: Another Way to Increase the Information Security”, IEEE Computer Society
2. Desai Suhag, “Security in Computing”, Pearson Education
3. Trappe W. and Washington L., “Introduction to Cryptography”, 2nd edition, Pearson Education, 2006

BCS-308	Android Programming	L T P	Cr
		4 0 0	4

OBJECTIVES

- Creating robust mobile applications and learn how to integrate them with other services.
- Creating intuitive, reliable mobile apps using the android services and components.
- Create a seamless user interface that works with different mobile screens.

PRE-REQUISITES

Knowledge of Java programming language that underpins all Android development

COURSE OUTCOMES

Students after undergoing this course will be able to:

CO1: Build enterprise level mobile applications with Kotlin on Android**..**
CO2: Understand both the basic and advanced concepts of Kotlin..
CO3: Understand why use Kotlin over Java. Install and configure Android Studio.
CO4: Understanding the database deployment in android studio.
CO4 Deploy the application on Google Play**.**

.**Unit 1**

Android and its tools: Introduction to Android, open handset alliance, Android Ecosystem, Need of Android, Features of Android, Tools and software required for developing android application, android architecture. Operating systems, Java, JDK, Android SDK, Android development tools (ADT), Android virtual devices (AVDs), Emulators, Dalvik Virtual Machine, Difference between JVM and DVM, Steps to install and configure Android Studio and SDK.

Unit II

UI components and layout: Control Flow, Directory Structure Components of a screen, Fundamental UI Design Linear Layout; Absolute Layout; Frame Layout; Table Layout; Relative Layout.

Unit III

Designing user Interface with view: Text View, Edit Text; Button, Image Button; Toggle Button; Checkbox; Progress Bar, List View; Grid View; Image View; Scroll View; Custom Toast Time and Date Picker.

Unit IV

Activity and Multimedia with databases: Intent, Intent Filter, Activity Lifecycle; Broadcast Lifecycle, Content Provider; Fragments Service: Features Of service, Android platform service, Defining new service, Service Lifecycle, Permission, example of service. Android System Architecture, Multimedia framework, play audio and Video, Text to speech, Sensors, Async tasks Audio Capture, Camera Bluetooth, Animation, SQLite Database, necessity of SQLite, creation and connections of the database, extracting value from cursors, transactions.

Unit V

Security and application deployment: MS Telephony, Location Based Services: Creating the project, Getting the maps API key, Displaying the map, Displaying the zoom control, navigating to a specific location, adding markers, getting location, Geocoding and reverse Geocoding, Getting Location data, Monitoring. Android security model, declaring and using permissions, using custom permissions. Application deployment: creating small applications, signing of applications, deploying apps on google play store, become a publisher, developer console.

Text Books :

1. Dawn Griffiths, David Griffiths “Headfirst Android Development” November 2021 O'Reilly Media, Inc.
2. Barry Burd, “Java Programming for Android Developers for Dummies.2nd edition”, Wiley.

Reference books:

mark murphy ,”The Busy Coder's Guide to Advanced Android Development” Commons Ware

John Horton “Android Programming with Kotlin for Beginners” 1st edition Packt Publishing Limited.

Michael Burton Android App Development FD 3rd edition For Dummies

BCS-354	ARTIFICIAL INTELLIGENCE LAB	L T P	Cr
		0-0-2	1

Course Objectives: Become familiar with basic principles of AI toward problem solving, inference, knowledge representation, and learning. Investigate applications of AI techniques in intelligent agents, expert systems.

List of Experiments:

1. Write the Program to implement Breadth First Search using python.
2. Write a program to implement Depth first search using python.
3. Write a program to implement Tic-Tac-Toe game using python.
4. Write a program to implement 8-puzzle problem.
5. Write a program to implement water jug problem.
6. Write a program to implement travelling salesman.
7. Write a program to implement tower of Hanoi.
8. Write a program to implement Monkey Banana problem.
9. Write a program to implement Missionaries-cannibals problem using python.
10. Write a program to implement N- queens problem.

TEXT BOOKS

1. Artificial intelligence with python: a comprehensive guide to building intelligent apps for python beginners and developers by Prateek Joshi.

BCS-358	Android Programming LAB	L T P	Cr
		0 0 2	1

COURSE OUTCOMES
CO1: Understand the basic concepts of java and android programming.
CO2: Apply the concepts of android programming in with kotlin .
CO3: Apply clipping and filling techniques for modifying an object.
CO4: Understand the concepts database and deployment to IDE.
CO5: Understand the practical implementation and deploy the apps on Google play store.

Android Programming Lab Experiments

Basic

1. Develop a program to implement frame layout, table layout and relative layout.
2. Develop a program to implement Text View and Edit Text.
3. Develop a program to implement Auto Complete Text View.
4. Develop a program to implement Button, Image Button and Toggle Button.
5. Develop a program to implement login window using above controls.
6. Develop a program to implement Checkbox.
7. Develop a program to implement Radio Button and Radio Group.
8. Develop a program to implement Progress Bar.
9. Develop a program to implement List View, Grid View, Image View and Scroll View.
10. Develop a program to implement Custom Toast Alert.
11. Develop a program to implement Date and Time Picker.
12. Develop a program to create an activity.
13. Develop a program to implement new activity using explicit intent and implicit intent.

Intermediate

14. Develop a program to implement content provider.
15. Develop a program to implement broadcast receiver.
16. Develop a program to implement sensors.
17. Develop a program to build Camera.
18. Develop a program for providing Bluetooth connectivity.
19. Develop a program for animation.
20. Perform Async task using SQLite.

Advance

Storage
Shared Preferences in Android with Examples
Internal Storage in Android with Example
External Storage in Android with Example
How to Save ArrayList to SharedPreferences in Android?
Preferences DataStore in Android
How to Add Views Dynamically and Store Data in Arraylist in Android?
JSON and Volley
Volley Library in Android

JSON Parsing in Android
JSON Parsing in Android using Volley Library
How to Extract Data from JSON Array in Android using Volley Library?
Threading and Multithreading
Thread Priority in Kotlin & Android
Multi-Threading in Android with Examples
Running User Interface Thread in Android using Kotlin
Create sample application with login module. (Check username and password) On successful login, Change Text View "Login Successful". And on login fail, alert user using Toast "Login fail".
Create login application where you will have to validate username and password till the username and password is not validated, login button should remain disabled.

Program: How to Build a Grocery Android App?

Reference book:

GUI Design for Android Apps Authors Ryan Cohen, Tao Wang

BCS -309A	Elective – I (NETWORK SECURITY & MANAGEMENT)	L-T-P	Cr
		3-1-0	4

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 various cryptographic systems and fundamentals of computer networks.

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To learn about different methods used for securing the data

CO2: To know the attacks and security issues related to work done on computer

CO3: To know about the strong and stringent methods used for the securing the data

CO4: To get the knowledge about the protocols of internet security and check authentication of the user

CO5: To be aware about the system security architectures

UNIT I

INTRODUCTION: Plain Text & Cipher Text; Substitution Techniques; Transposition Techniques; Types of Cryptography; Steganography; Symmetric Key Algorithm: Algorithm Types and Modes, DES; Asymmetric Key Algorithm: RSA, Digital Signatures.

UNIT II

ATTACKS ON COMPUTER SECURITY: Security issues, The need of Security; Security Approaches; Principal of Security, Types of Attacks - Man in the middle, DoS, Malware, Zero-Day, Ransomware, Firewall, Viruses, Services and Mechanism, Model for Internetwork Security.

UNIT III

DIGITAL CERTIFICATES AND PUBLIC KEY INFRASTRUCTURE: Digital Certificates ; Private Key Management; The PKIX Model ; Public Key Cryptography Standards, Difference between Authentication and Confidentiality

UNIT IV

INTERNET SECURITY PROTOCOLS AND AUTHENTICATION: Introduction; Secure Socket Layer(SSL); Secure Electronic Transaction(SET); Electronic Money; Email security; Wireless application protocol (WAP), Security in GSM, Security in 3G, Types of Authentication, Kerberos

UNIT V

NETWORK MANAGEMENT AND SYSTEM SECURITY: Overview of SNMP Architecture-SNMPV1 Communication Facility, SNMPV3, System Security - Intruders, Viruses and Related Threats, Firewall Design Principles

TEXT BOOKS

1. Atuk Kahate , “Cryptography and Network Security”, 3rd Edition, Tata Mcgraw Hill
2. Kauffman C., Perlman R. and Spenser M., “Network Security”, 2nd Edition, Prentice Hall, 2002.

REFERENCE BOOKS

1. Stallings William, “Cryptography and Network Security”, 4th Edition, Prentice-Hall, Englewood Cliffs, 2006
2. Mani Subramanian, “Network Management Principles & Practices”, Addison Wesley, 1999
3. Menezes Alfred, van Oorschot Paul, and Vanstone Scott, “Handbook of Applied Cryptography”, CRC Press, NY, 2004.
4. Bellovin S. and Chesvick W., “Internet Security and Firewalls”, 2nd Edition, Addison Wesley, 1998.
5. Schneier Bruce, “Applied Cryptography”, Wiley Student Edition, 2nd Edition

BCS-309B	COMPILER DESIGN (ELECTIVE I)	L T P	Cr
		3 0 0	3

OBJECTIVE

The Compiler Design Laboratory is to understand and implement the principles, techniques, and also available tools used in compiler construction process. This will enable the students to work in the development phase of new computer languages in industry.

PRE-REQUISITES

Good understanding of data structures: trees, linked lists, and some of the common algorithms associated with them (for example-binary search).

Basic understanding of complexity theory, mainly the big O notation.

Knowledge of basic regular expressions.

COURSE OUTCOMES

CO1: Able to define different types of phases, translators used in programming.
CO2: Explain symbol table organization and role of semantic analysis in compiler design.
CO3: Able to construct a top down and bottom up parser and SDTs.
CO4: Able to design a Lexical analyzer.
CO5: List various code generation techniques.

UNIT-I

Introduction to Compilers: Compilers and translators need of translators, structure of compiler its different phases, Compiler construction tools.
Lexical Analysis: Role of lexical analyzer, design of lexical analyzer, regular expressions, Specification and recognition of tokens, input buffering, a language specifying lexical analyzer. Finite automata, conversion from regular expression to finite automata, and vice versa, minimizing number of states of DFA.

UNIT-II

Syntax Analysis: Role of parsers, context free grammars, definition of parsing.
Parsing Technique: Shift- reduce parsing, operator precedence parsing, top down parsing, bottom-up parsing, predictive parsing.

UNIT-III

LR parsers, SLR, LALR and Canonical LR parser.
Syntax Directed Translations: Syntax directed definition, construction of syntax trees, syntax directed translation scheme, and implementation of syntax directed translation, three address code, quadruples and triples.

UNIT-IV

Symbol table & error detection and Recovery: Symbol tables, its contents and data structure for symbol tables; trees, arrays, linked lists, hash tables. Errors, lexical phase error, syntactic phase error, semantic error.

UNIT-V

Code Optimization & Code Generation: Code generation, forms of objects code, machine Dependent code, machine independent code, optimization, register allocation for temporary and user defined variables.

Text Books:

1. Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi & J.D. Ullman; 1998Addison Wesley.
2. Compiler design and construction by Pyster, Arthur B

ReferenceBooks:

1. Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc. Graw Hill.
2. System software by Dhamdere, 1986, MGH.
3. Principles of compiler Design, Narosa Publication
4. Elements compiler Design, Dr. M. Joseph, University Science Press

BCS-309C	CYBER SECURITY AND CYBER LAW(ELECTIVE I)	L T P	Cr
		4-0-0	4

OBJECTIVE

The objectives of this course are to enable learner to understand, explore, and acquire a critical understanding cyber law. Develop competencies for dealing with frauds and deceptions (confidence, tricks, and scams) and other cyber crimes.

PRE-REQUISITES

Knowledge of cyber security,web security,cyber law and investigation.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To learn about computer security,cryptography,web attack.
CO2: To learn about network vulnerabilities,Netcat,Socat ,network sniffers.
CO3: To learn web servers ,HTTP,SET,SMTP,POP,S/MI/ME.
CO4: To learn cyber crime, cyberspace, Digital Forensics, Hacking
CO5: To learn Internet crime and Act, Firewalls, Filters, password Cracking, Keyloggers and Spyware, Steganography, SQL injection.

UNIT-I

INTRODUCTION TO CYBER SECURITY: Introduction, Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control and Cryptography.Web attack: Browser Attacks, Web Attacks Targeting Users,Obtaining User or Website Data, Email Attacks.

UNIT-II

NETWORK VULNERABILITIES: Overview of vulnerability scanning, Open Port / Service Identification, Banner /Version Check, Traffic Probe,Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit.Networks Vulnerability Scanning (Netcat, Socat), Network Sniffers and Injection tools.

UNIT-III

INTERNET AND WEB SECURITY: Web Servers and Browsers, HTTP, Cookies, Caching, Plug-in, Secure Socket Layer (SSL), Secure Electronic Transaction (SET), E-mail Risks, Spam, E-mail Protocols, Simple Mail Transfer Protocol (SMTP), Post office Protocol(POP), Internet Access Message protocol (ICMP).Secured Mail: Pretty Good Privacy (PGP), S/MIME(Secure/Multipurpose Internet Mail Extensions)

UNIT-IV

INTRODUCTION TO CYBER CRIME: Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms,Traditional Problems Associated with Computer Crime,Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world.

UNIT-V

INTRODUCTION TO CYBER LAW AND INVESTIGATION: Internet crime and Act: A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

TEXT BOOKS

1.Cyber Law & Cyber Crimes By Advocat Prashant Mali; Snow White publications, Mumbai

2. Cyber Law in India by Farooq Ahmad; Pioneer Books

3. Information Technology Law and Practice by Vakul Sharma; Universal Law Publishing Co. Pvt. Ltd.

4. The Indian Cyber Law by Suresh T. Vishwanathan; Bharat Law House New Delhi

REFERENCE BOOKS

1.Guide to Cyber and E – Commerce Laws by P.M. Bukshi and R.K. Suri; Bharat Law House, New Delhi

2. Guide to Cyber Laws by Rodney D. Ryder; Wadhwa and Company, Nagpur

3. The Information Technology Act, 2000; Bare Act – Professional Book Publishers, New Delhi

3. Computer Forensics: Principals and Practices by Linda Volonino, Reynaldo Anzaldua and Jana Godwin; Pearson Prentice – Hall 2007

4. First Responder’s Guide to Computer Forensics by Richard Nolan rt al; Carnegi Mellon, 2005.

BCS-310A	BIG DATA ANALYSIS (ELECTIVE II)	L T P	Cr
		3-0-0	3

OBJECTIVE

To give the students knowledge about Big data and uses of it in the real world.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To learn the basic concepts of BIG DATA.
CO2: To aware about the basic concept of HADOOP.
CO3: To know about the eco system of HADOOP .
CO4: To aware about the use of No-SQL in BIG DATA.
CO5: To learn about the basic of machine learning

UNIT 1

INTRODUCTION TO BIG DATA: Types of Digital Data-Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – 3Vs of Big Data – Non Definitional traits of Big Data – Business Intelligence vs. Big Data – Data warehouse and Hadoop environment – Coexistence. Big Data Analytics: Classification of analytics – Data Science – Terminologies in Big Data – CAP Theorem – BASE Concept.

UNIT 2

INTRODUCTION TO HADOOP: Features – Advantages – Versions – Overview of Hadoop Eco systems – Hadoop distributions – Hadoop vs. SQL – RDBMS vs. Hadoop – Hadoop Components – Architecture – HDFS – Map Reduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression. Hadoop 2 (YARN): Architecture – Interacting with Hadoop Eco systems.

UNIT 3

HADOOP ECO SYSTEMS: Hive – Architecture – data type – File format – HQL – SerDe – User defined functions – Pig: Features – Anatomy – Pig on Hadoop – Pig Philosophy – Pig Latin overview – Data types – Running pig – Execution modes of Pig – HDFS commands – Relational operators – Eval Functions – Complex data type – Piggy Bank – User defined Functions – Parameter substitution – Diagnostic operator.

UNIT 4

NOSQL: Types of Databases – Advantages – NewSQL – SQL vs. NOSQL vs NewSQL. Mongo DB: Introduction – Features – Data types – Mongo DB Query language – CRUD operations – Arrays – Functions: Count – Sort – Limit – Skip – Aggregate – Map Reduce. Cursors – Indexes – Mongo Import – Mongo Export. Cassandra: Introduction – Features – Data types – CQLSH – Key spaces – CRUD operations – Collections – Counter – TTL – Alter commands – Import and Export – Querying System tables.

UNIT 5

INTRODUCTION – Connecting to Mongo DB – Connecting to Cassandra – Introduction to Machine learning: Linear Regression – Clustering – Collaborative filtering – Association rule mining – Decision tree.

TEXT BOOK :

1. Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCES :

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jeffrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.

BCS - 310 B	**CLOUD COMPUTING(ELECTIVE II)**	**L T P**	**Cr**
		3-0-0	**3**

OBJECTIVE

This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

COURSE OUTCOMES

The students undergoing this course will be able:
CO1: To learn the basic concepts of CLOUD computing.
CO2: To aware about the.Cloud Insights Architectural influences
CO3: To know about the Cloud Architecture .
CO4: To aware about Cloud Simulators
CO5: To learn about the basic of VMWare.

UNIT I

CLOUD COMPUTING OVERVIEW : Origins of Cloud computing – Cloud components - Essential characteristics – On-demand selfservice, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

UNIT II

CLOUD INSIGHTS ARCHITECTURAL INFLUENCES :High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

UNIT III

CLOUD ARCHITECTURE : Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

UNIT IV

CLOUD SIMULATORS : CloudSim and GreenCloud Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud .

UNIT-V

Introduction to VMWare Simulator : Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

TEXT BOOK :

1. Architecting the Cloud: Design Decisions for Cloud Computing Service Models(SaaS, PaaS, and IaaS) (Wiley CIO) by Michael J. Kavis(Author)
2. Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile,Security and More by Kris Jamsa(Author)

REFERENCES :

1. Cloud Computing ñ An Introduction bySubuSangameswar
2. Mastering Cloud Computing Paperback by Buyya (Author), Vecchiola (Author),Selvi (Author)
3. Cloud Computing for Complete Beginners: Building and Scaling High- PerformanceWeb Servers on the Amazon Cloud by IkramFatah

BCS-310C	Linear Programming(ELECTIVE II)	L T P	Cr
		4 0 0	4

LEARNING OBJECTIVES:

- Evaluate the computational performance of search, satisfaction, optimization and learning algorithms. Apply search, satisfaction, optimization and learning algorithms to real world problems.

PRE-REQUISITES

There should be an objective, clearly defined and measurable in quantitative terms. Such as, maximization of sales, minimization of cost of production, etc. The activities included should be distinctively identifiable and measurable in quantitative terms.

LEARNING OUTCOMES:

1. formulate a given simplified description of a suitable real-world problem as a linear programming model in general, standard and canonical forms
2. sketch a graphical representation of a two-dimensional linear programming model given in general, standard or canonical form
3. classify a two-dimensional linear programming model by the type of its solution
4. solve a two-dimensional linear programming problem graphically
5. use the simplex method to solve small linear programming models by hand, given a basic feasible point.

.**Unit 1**

Operations Research (OR) and its Scope, Modelling in OR, Scientific Method in Operations Research, Introduction to linear programming problem, Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format.

Unit II

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 III

Transportation problem and its mathematical formulation, North West corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem.

Unit IV

Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

Unit V

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.

TEXTBOOKS/REFERENCE BOOKS:

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.