Bachelor of Computer Application 1ST Sem

SYLLABUS & SCHEME

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BCA101	Discrete Mathematics	40	60	100
BCA103	Programming in C	40	60	100
BCA105	Fundamentals of Computers & IT	40	60	100
BCA107	Web Technologies	40	60	100
BCA109	Technical Communication I	40	60	100
BCA111	Practical 1- C program lab	60	40	100
BCA113	Practical 2- IT Lab	60	40	100
BCA115	Practical 3- Web Technologies	60	40	100
Total		380	420	800

Course Code: BCA 101

Course Name: Discrete Mathematics

LEARNINGOBJECTIVES:

The objective of this course is to provide the learners with thefollowing:

1. Knowledge about sets, relations and functions.
2. Make them familiar with basics of lattices and graphs.
3. Understanding of the concept of propositional logic.
4. Acquiring the insight of combinatorics and recurrence relations

PRE-REQUISITES: Basic Concepts of Mathematics

UNIT I

No. of Hours: 13 Chapter/Book Reference: TB1 [chapters 1, 2, 7], TB2 [chapters 1, 2, 4, 5], TB3 [chapters

1, 4]

SETS: Sets, Subsets, Equal Sets, Universal Sets, Finite and Infinite Sets, Operations on Sets: Union, Intersection difference and Complements of Sets, Algebra of sets, Cartesian product, Simple applications.

RELATION AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation, Composition of relations, and Representation of relations using digraph and Matrix, Function: Domain and Range, onto, into and One to One Functions, Composite and Inverse Functions, Hashing functions, Recursive function.

PROPOSITIONAL LOGIC: Introduction, Proposition, First order logic, Basic logical operations, truth tables, tautologies, contradictions, Algebra of Propositions, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

UNIT II

No. of Hours: 10 Chapter/Book Reference: TB2 [chapter 6] TB 3 [Chapter 6]

PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Totally ordered set, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal elements, Greatest lower bound, least upper bound, Lattices and Algebraic Structure, Principle of Duality, Elementary Properties of Lattices, Atoms. Sub lattices, Bounded lattice, Distributed & Complemented Lattices, Isomorphic lattices. Boolean lattice.

UNIT- III

No. of Hours: 11 Chapter/Book Reference: TB1 [chapters 5, 6], TB2 [chapter 3], TB3 [chapters 2, 3],

COMBINATORICS: Introduction, Basic Counting Principles, Permutations, Permutations of things not all different, Circular Permutations, Combinations, Restricted Permutations and Combinations, Derangement, Pascal's Triangle, Binomial Theorem (only for natural Numbers)

RECURRENCE RELATIONS: Introduction, Order of Recurrence Relations, Degree of Recurrence Relations, Linear Homogeneous Recurrence Relations, Non Homogeneous Recurrence Relations, Solution of linear homogeneous and non-non homogeneous recurrence relations.

UNIT -IV

No. of Hours: 10 Chapter/Book Reference: TB1 [chapter 8], TB2 [chapter 8], TB3 [chapter 8] GRAPHS: Introduction, Degree of a vertex of a graph, Handshaking Theorem, types of Graphs, sub graph, Matrix representation of a graph: adjacent and incidence matrices, Isomorphic graphs, path and circuit (Floyd's and Warshall algorithms), Connected graph, Hamiltonian graph, Euler graph, Graph coloring (Vertex, Edges and Map).

TEXT BOOKS:

TB1. Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill Education, 8th edition 2021,

TB2. Kolman, Busby and Ross, "Discrete Mathematical Structures", Pearson, 10th edition 2015

TB3. Babu Ram, "Discrete Mathematics", Pearson Education, 1st edition 2010

REFERENCE BOOKS:

RB1. D. S. Malik, M. K. Sen, "Discrete Mathematics" Cengage Learning, 2012

RB2. S.K. Sarkar "A Text Book of Discrete Mathematics" S. Chand Publications, 9th edition 2019

RB3. Singh J. P. "Discrete Mathematics for Undergraduates" ANE Books, 1st edition, 2013

RB4. Tremblay J.P. and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science" Tata McGraw Hill

Course Code: BCA103

Course Name: Programming Using 'C' Language

LEARNING OBJECTIVES:

This course will provide the learners the following:-

1. Understanding of the syntax and the semantics of C programming language
2. Building of their logics for solving a given problem.

PRE-REQUISITES: None

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1 [1,2,3,4,5,6,7]; TB2 [1,2,3,4,5,6,7]; TB3 [1,2,3,4,5,6]

C basics: C character set, Identifiers and keywords, Data types, constants, symbolic constants, variable declarations, structure of basic C program, writing and executing the first C program, #include Preprocessor directive, expression statements, compound statements, operators: Arithmetic, Unary, Relational, logical, assignment, shorthand assignment, conditional and bitwise, comma operator.

C control structures: if statement, if….else statement, else if ladder, while, do….while, for, and switch statement, nested control structure, break, labelled break, continue, labelled continue statement, exit statement, goto statement.

UNIT II

No. of Hours: 13 Chapter/Book Reference: TB1 [8,9,10,13,14]; TB2 [8,9,10,12]; TB3 [7,8, 9,10,11,12]

C Functions: Functions: declaration, definition & scope, recursion, call by value, call by reference. Preprocessor directive: #define, macros with arguments, nested macros, # and ## operators, conditional compilation.

Storage Classes: automatic, external (global), static & registers. Arrays: Arrays (1D, 2D), strings, pointers, array & pointer relationship, pointer arithmetic, dynamic memory allocation, pointer to arrays, array of pointers, pointers to functions, array of pointers to functions.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [17,19,20,21]; TB2 [11,13,14]; TB3 [13,14,16]

Structures: Structures, unions, Enumeration, passing structure to functions, arrays and structures, typed of, difference between structure and union, self-referential structure, bit fields. File handling [text (ASCII), binary]: file input output operations, file access modes, file pointers, file Positioning functions (fseek, ftell, rewind etc.)

UNIT – IV

No. of Hours: 08 Chapter/Book Reference: TB1 [15,22]; TB2 [9]; TB3 [8]

Standard library functions from stdio.h, stdlib.h, conio.h, ctype.h, math.h, string.h, process.h., Usage of command line arguments.

TEXT BOOKS:

TB1. Yashwant Kanetkar, "Let us C" 17th edition, 2020.

TB2. E. BalaGuruswamy, "Programming in ANSI C", 8th edition, 2019.

TB3. Ashok N. Kamthane, "Programming in C", Pearson Education, 3rd Edition, 2015

REFERENCE BOOKS:

RB1. K R Venugopal, Sudeep R Prasad, "Mastering C", McGraw Hill Education; 2nd edition, 2017

RB2. V Rajaraman , "Computer Programming in C", 2nd Edition, 2019

RB3. Kernighan and d. Ritchie, "The ANSI C Programming Language", 2015

RB4. Stephen Prata, "C Primer Plus" 6th Edition, 2014

RB5. Schaum's Outline Series, "Programming with C", 4th Edition, 2018

RB6. Reema Thareja, Programming In C" , Oxford University Press, September 2018

Course Code: BCA 105

Course Name: Fundamentals of Computers and IT

LEARNINGOBJECTIVES:

The objectives of thiscourse is to provide the learners:

1. Awareness of evolution of Computers, various types of computers its characteristics, usage, and limitations.
2. Identification of different categories of computers, their peripherals and memory.
3. Knowledge about operating system, their types, MS-Office various software.
4. Understanding of computer network fundamentals and various communication networks.
5. Overview of emerging technologies in IT i.e. AI and Machine Learning, IOT, Data Analytics etc.

PRE-REQUISITES: None

UNIT–I

No. of Hours: 12 Chapter/BookReference:TB1[Chapters:1,2,7,8,9], TB2:[Chapters:1,2,3,4];RB1[Chapters:6,7], RB3[Chapters:1a,1b,2a,2b,4a,5a],

Fundamentals of Computers:

Definition and Characteristics of Computer System. Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers.

Computer Hardware: Major Components of a digital computer, Block Diagram of a computer, Input-output devices, Description of Computer Input Units, Output Units, CPU.

Computer Memory: Memory Hierarchy, Primary Memory – RAM and its types, ROM and its types, Secondary Memory, Cache memory. Secondary Storage Devices - Hard Disk, Compact Disk, DVD, Flash memory.

UNIT–II

No. of Hours: 12Chapter/Book Reference: TB1 [Chapters: 10,12,14]; TB2[Chapters:6,7]; RB1[Chapters:6A, 6B, 12A,12B], RB3 [Chapters: 8, 9]

Interaction with Computers:

Computer Software: System software: Assemblers, Compilers, Interpreters, linkers, loaders. Application Software: Introduction to MS Office (MS-Word, MS Power point, MS-Excel).

Operating Systems: Elementary Operating System concepts, Different types of Operating Systems. **DOS:**

Booting sequence; Concepts of File and Directory, Types of DOS commands.

Computer Languages: Introduction to Low-Level Languages and High-Level Languages.

No. of Hours: 12Chapter/Book Reference: TB1 [Chapters:3,5,4]; TB2 [Chapters:5]; RB1[Chapter:2]

Computer Number System: PositionalandNon-positionalnumbersystems,Binary, Decimal, Octal and Hexadecimal Number Systems and their inter-conversion.

BinaryArithmetic: Addition,subtraction, multiplication and division.Use of complement method to represent negative binary numbers, 1'scomplement,2'scomplement,subtractionusing1'scomplementand2's complement. Introduction to Binary Coded Decimal (BCD), ASCII Codes, EBCDIC codes.

UNIT–IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters:17,18]; TB2[Chapters:9,10]; RB3[7A,7B,8A,8B]

Computer Network & Internet: Basic elements of a communication system, Data transmission modes, Data Transmission speed, Data transmission media, Digital and Analog Transmission, Network topologies, Network Types (LAN, WAN and MAN), Basics of Internet and Intranet.

Internet: Terminologies related to Internet: Protocol, Domain name, Internet Connections, IP address, URL, World Wide Web. Introduction to Client-Server Model, Search Engine, Voice over Internet Protocol (VOIP), Repeater, Bridge, Hub, Switch, Router, Gateway, Firewall, Bluetooth technology.

Advanced Trends in IT Applications – Brief Introduction to Cloud Computing, Internet of Things, Data Analytics, AI and Machine Learning.

TEXT BOOKS:

TB1. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, 1992.

TB2. Anita Goel "Computer Fundamentals", Pearson.

REFERENCE BOOKS:

RB1. B.Ram Computer fundamentals Architecture and Organization, New Age Intl. **RB2.** Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing. **RB3.** Norton Peter, "Introduction to computers", 4th Ed., TMH, 2001.

RB4. Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi, 2004.

Course Code: BCA 107

Course Name: Web Technologies

LEARNING OBJECTIVES:

The objective of this course is to provide the learners the following:

1. Knowledge about the semantic structure of HTML, Javascript, CSS, XML and bootstrap.
2. Ability to compose forms and tables using HTML, Javascript, CSS and Bootstrap.
3. Expertise to design static web pages
4. Skills to create dynamic user interface and perform Client-Side validations using JavaScript

PRE-REQUISITES: None

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters: 1-3]; TB2 [Chapters: 2]; TB3 [Chapters: 1-4]

World Wide Web: Introduction, Web page, Home page, Web site, Static and Dynamic website, Client Server computing concepts. Web Client and Web Server, Web Browser, Client Side and server side Scripting Languages. **HTML Overview**: Introduction to HTML, HTML

Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and Sound, lists types of lists, tables, frames and floating frames, Developing Forms, Image maps.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters: 4-5]; TB2 [Chapters: 3-5]; TB3 [Chapters: 5- 12]; TB4 [Chapters 1-3]

Cascading Style Sheet: Types of Style Sheets – Internal, inline and External style sheets, creating styles, link tag, CSS Properties, CSS Styling, Style Selector- Id, class name and Pseudo Class.

BootStrap Basics: Introduction to Bootstrap, Responsive web design, Linking with Bootstrap, container class, grids, tables, images, buttons, typography classes, jumbotron, glyphicons,

UNIT – III

No. of Hours:11 Chapter/Book Reference: TB1 [Chapters: 4-5]; TB2 [Chapters: 3-5]; TB3 [Chapters: 5- 12]

Introduction to Java Script: Data Types, Control Statements, operators, dialog boxes, Built in and User Defined Functions, Objects in Java Script, Handling Events, basic validations, Document Object Model, Browser Object Model.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters]; TB2 [Chapter: 7, 9]; TB3 [Chapter: 1]

XML: Introduction, Features, XML Naming rules, Building block of XML Document, Difference between HTML & XML, XML Parser, DTD's Using XML with HTML and CSS.

Web Hosting Concepts: Concept of domain- Physical domain, virtual domain, registering a domain, need of IP addressing, Web Hosting and Publishing Concepts

TEXT BOOKS:

TB1.   The complete reference HTML and CSS, by Thomas A powell, TMH publication. **TB2.**   Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson **TB3.**   Internet and World Wide Web Deitel HM, Deitel ,Goldberg , Third Edition.

TB4.   Bootstrap: Responsive Web development, Jake Spurlock, O'reilly, First Edition

REFERENCE BOOKS:

RB1.   HTML Black Book , Stephen Holzner, Wiley Dreamtech.

RB2.   Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.

RB3.   Jeffrey C. Jackson, "Web Technologies : A Computer Science Perspective", Pearson.

RB4.   XML How to Program by Deitel Deitel Nieto

Course Code: BCA 109

Course Name: Technical Communication

LEARNING OBJECTIVES:

This course will provide the learners the following:

1. Understanding of the correct use of English Language.
2. The student will improve in oral as well as written communication skills.

PRE-REQUISITES: Nil

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3, TB4

Concepts and Fundamentals: Introduction to Technical Communication, Need and importance of communication, channel, Distinction between general and technical communication, nature and features of technical communication, Seven Cs of communication, Types of Technical communication, style in technical communication, technical communication skills, Language as a tool of Communication, History of development of Technical Communication, Computer Aided Technical Communication

UNIT-II

No. of Hours: 12 Chapter/Book Reference: TB1, TB2, TB3

Oral Communication: Principles of effective oral communication, Introduction of Self and others, Greetings, Handling Telephone CallsInterviews**:** Meaning & Purpose, Art of interviewing, Types of interview, Interview styles, Essential, Techniques of interviewing, Guidelines for Interviewer, Guidelines for interviewee.Meetings**:** Definition, Kind of meetings, Agenda, Minutes of the Meeting, Advantages and disadvantages of meetings/ committees, Planning and organization of meetings.Project Presentations: Advantages & Disadvantages, Executive Summary, Charts, Distribution of time (presentation, questions & answers, summing up), Visual presentation, Guidelines for using visual aids, Electronic media (power-point presentation).The technique of conducting Group Discussion and JAM session.

UNIT-III

No. of Hours: 12 Chapter/Book Reference: TB1, TB2, TB3, TB4

Written Communication: Overview of Technical Writing:Definition and Nature of Technical Writing, Basic Principles of Technical Writing, Styles in Technical Writing,

Note – Making, Notice, E-mail Writing

Writing Letters: Business letters, Persuasive letters- Sales letters and complaint letters Office memorandum, Good news and bad news letters

Report Writing**:** Definition & importance; categories of reports, Elements of a formal report, style and formatting in report

Special Technical Documents Writing: Project synopsis and report writing, Scientific Article and Research Paper writing, Dissertation writing: Features, Preparation and Elements

Proposal Writing: Purpose, Types, characteristics and structure

Job Application**:** Types of application, Form & Content of an application, drafting the application, Preparation of resume.

UNIT-IV

No. of Hours: 10 Chapter/Book Reference: TB3, RB1, RB3

Soft Skills: Business Etiquettes – Professional Personality, Workplace Protocols, Cubicle. Non-Verbal Communication: Kinesics and Proxemics, Paralanguage, Interpersonal Skills

Language Skills: Improving command in English, improving vocabulary, choice of words, Common problems with verbs, adjectives, adverbs, pronouns, tenses, conjunctions, punctuations, prefix, suffix, idiomatic use of prepositions. Sentences and paragraph construction, improve spellings, common errors and misappropriation, Building advanced Vocabulary (Synonyms, Antonyms), introduction to Business English.

TEXTBOOKS:

TB1. Kavita Tyagi and Padma Misra , "Advanced Technical Communication", PHI, 2011

TB2. P.D.Chaturvedi and Mukesh Chaturvedi, "Business Communication – Concepts, Cases and Applications", Pearson, second edition.

TB3. Rayudu, "C.S- Communication", Himalaya Publishing House, 1994.

TB4. Asha Kaul , "Business Communication", PHI, second edition.

REFERENCES:

RB1. Raymond Murphy, "Essential English Grammar- A self study reference and practice book for elementary students of English" , Cambridge University Press, second edition.

RB2. Manalo, E. & Fermin, V. (2007). Technical and Report Writing. ECC Graphics. Quezon City.

RB3. Kavita Tyagi and Padma Misra , "Basic Technical Communication", PHI, 2011.

RB4. Herta A Murphy, Herbert W Hildebrandt and Jane P Thomas, "Effective Business Communication", McGraw Hill, seventh edition.

Course Code: BCA 111

Course Name: Practical -1 'C' Prog. Lab

LEARNING OBJECTIVES:

This course will provide the learners the following:-

1. Understanding of the syntax and the semantics of C programming language

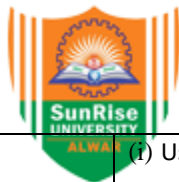2. Building of their logics for solving a given problem.

PRE-REQUISITES: None

S. No.	Detailed Statement
1.	Write a program to convert temperature from Celsius to Fahrenheit by taking input from the user.
2.	Write a program to find the greatest number among 3 numbers given by the user.
3.	Write a program to check if a given number is a prime number or not.
4.	Write a program to display the following pattern upto N rows, taking the value of N from the user: 1 2 3 4 5 6 7 8 9 10

5.	Write a program to input marks of 50 students using an array and display the average marks of the class.
6.	Write a program to search for a number entered by the user in a given array and display the array in ascending order.
7.	Write a program to check if a string is palindrome or not.
8.	Write a program to add, subtract, multiply and divide two numbers using pointers.
9.	Write a program to create a structure for employees containing the following data members: Employee ID, Employee Name, Age, Address, Department and Salary. Input data for 10 employees and display the details of the employee from the employee ID given by the user.
10.	Write a program to create two files with names EvenFile and OddFile. Input 20 numbers from the user and save even numbers in EvenFile and odd numbers in OddFile.
11.	Write a menu driven program to construct a calculator for following arithmetic operations: addition, subtraction, multiplication, division, average and percentage.

12.	Write a menu driven program to perform the following operations: (i) Print armstrong numbers upto N, (ii) Display prime numbers between 1 to N, (iii) Reverse of an integer
13.	Write a program to convert a hexadecimal number into a binary number.
14.	Write a program to calculate factorial of a number and display fibonacci series upto N terms using recursive functions.
15.	Write a program to perform matrix addition, (ii) matrix multiplication, and (iii) Matrix transpose) on 2D arrays.
16.	Write a program to make use of arrays with structures in the following ways:

S. No.	Detailed Statement
	(i) Use array as a structure data member.
	(ii) reate array of structure variables
17.	Write a program to compare the contents of two files by taking names of the files through command line arguments.
18.	WAP to perform I/O and make use of file positioning functions on Binary files. (using fseek, ftell, rewind functions)
19.	Write a menu driven program to implement the following string operations: (i) Calculate length of a string (ii) Concatenate at the end of a given (iii) Copy one string to another (iv) Compare contents of two strings (v) Copy nth character string to another
20.	Write a program to read time in string format and extract hours, minutes and second also check time validity

Course Code: BCA

Course Name: Practical – II IT Lab

LEARNING OBJECTIVES:

The objective of this course is to provide the learners :

1. Basic knowledge of computers Software and Hardware

2. Expertise in using DOS Commands.

3. Attain proficiency in using application software for Word Processing, Spreadsheet and Presentation.

PRE-REQUISITES: Nil

S. No.	Detailed Statement

1.	To explore the System settings – Personalisation, System, Devices, Apps, Network & Internet.
2.	To practice basic DOS commands like cd, md, dir, erase, cls, copy, date etc.
3.	To explore Windows Explorer functionalities like create, rename, move, delete folder and files etc.
4.	To practice the use of basic formatting features - Format Painter, Indentation, Line spacing, background color, find, replace, dictate commands.
5.	To practice the use of Bullets, numbering, multilevel lists and use of Table Feature- Insert table with rows and columns, draw tables, excel spreadsheet and quick tables etc.
6.	To practice the use of Insert Features – add picture, Chart, SmartArt, WordArt, Equation, Symbols, Header and Footer, Page Numbering etc. and the use of Design Features – Watermark, Page color, Page Border, Themes implementation etc.
7.	To practice the use of Layout Features – Margins, Orientation, Size, Columns, Indent, Spacing etc.
8.	To practice the use of Mail Merge Feature to generate Envelops and Labels.
9.	To practice the use of Excel basic formatting features – Wrap Text, Insert and Delete (Cells, Sheet, Row or Column), Format – Cell Height, Cell Width, Hide, Un Hide Cell, Protection, Freeze and Unfreeze panes, Macros etc.
10.	To practice the use of Insert Features- Pivot Table, Pivot Chart, Picture, Chart and its formatting and Design and the use of Page Layout Features- Margins, Orientation, Page Break , Background, Height and Width of Cells.
11.	To practice the use of Formula Features – user defined function, predefined functions – Logical, Date, Time, Maths and the use of Data Manipulation Features – Sort, Filter, Advanced Filters, Whatif analysis.
12.	To practice the creation of Blank presentation and Selecting Themes and the use of the basic design features – Adding New Slides, Reuse slides, Slides layout etc.
13.	To practice the use of Insert Features – add pictures, screenshots, shapes, wordart, audio, video, date-time etc. and use of Design Features- Changing the theme of presentation, format background and design ideas.
14.	To practice the use of Transition features to be applied on Slides content, setting sound, duration etc. and the use of Animation Features to be applied on presentation of Slide, set animation timings and rehearse etc.

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Recognized by UGC Act, 1956 u/s 2 (f)

15.	To practice the use of Slide Show Features – Custom Slide Show, Rehearse Timing etc.
16.	Create a Folder by your name in your system, store all the work done in this semester inside that folder.
17.	Create your Resume using basic formatting features like : table, bullets, wordart etc
18.	Design an Invitation to Birthday Party using mail merge features send the invitation to 10 friends.
19.	Write an Article for Magazine with 3 columns and hyperlink.
20.	Create your own marksheet using basic formatting features.
21.	Create a list of marks of 10 students create charts and pivot table.
22.	Prepare a Sales summary and use features like sort, filter etc. to manipulate the data.
23.	Create a Power Point Presentation on any topic of your choice using animation and transition features.

Course Code: BCA

Course Name: Practical-III Web Tech Lab

LEARNING OBJECTIVE

In this course, the learners will be able to develop expertise related to:

1. Apply the Semantic Structure of HTML, javascript, CSS, bootstrap and XML
2. Design forms and tables using HTML, CSS and bootstrap.
3. Design Client-Side programs using JavaScript
4. Design and develop static Web page.

S. No.	Detailed Statement

1.	Make following five different web pages:
	i. Formatting Styles and Headings: Include Bold, italics, Underline, Strike, Subscript, superscript and all six type of headings
	ii. Font Styles and Image tag
	iii. Marquee: Move text, image and hyperlink
	iv. Other tags: br, hr, pre, p Include following specifications:
	• In all these web pages only mention about use, attributes apply them.
	• Insert a background image on home page
	• Make all the topics as hyperlinks and go to some other page for description
	• Insert a marquee showing HTML Tutorial as moving text.
	• Use different font style for different topics
	• On every page, make a hyperlink for going back to home page and internal link also.
2.	Create an unordered list nested inside ordered list and apply the following :
	• Insert an image of Main item on top right corner of web page.
	• Display heading as a marquee.
	• Use different font styles and colors for different ordered list items.
	• Insert horizontal line after each ordered item.
3.	Design a table with row span and column span and make use of attributes colspan, rowspan, width, height, cellpadding, cellspacing etc.
4.	Design following frame:
5.	Make an image map showing the usage of shape, coords, href attributes in map definition. Link each hotspot to their respective details. All the web pages should be designed with proper background color, images, font styles and headings.

6.	Design Student registration form for admission in college.
7.	Create a webpage and show the usage of inline and internal style sheet and

	external style sheet?
8.	Create a webpage containing a background image and apply all the background styling attributes?
9.	Create a web page showing the usage of font styling attributes
10.	Create a web page and apply all Text styling attributes use Id and class selector.
11.	Create a webpage and implement all list styling attributes.
12.	Create a Webpage with three equal columns.
13.	Create a webpage containing bootstrap table.
14.	Create a webpage containing various types of images.
15.	Create a webpage containing various types of buttons
16.	Create a webpage containing various, typography classes.
17.	Create a webpage containing to display the heading using. Jumbotron.
18.	Write a program to show the usage of inbuilt functions and dialog boxes.
19.	Write a program to show the usage of alert box and confirm box
20.	Write a program to implement event handling using onclick, on mouse over and on mouse out events.
21.	Write a program to show the usage of all the date, math and string object functions
22.	WAP to display the bookstore details in XML with CSS and internal DTD.
23.	WAP to format the Teacher details in XML with CSS using external DTD
24.	Design the registration form for a web site and when the user clicks on submit button the login form should be appeared on the screen (use external javascript file).
25.	Design a website and apply all the features of HTML, css, javascript and bootstrap to make the website attractive.
26.	Write a JavaScript function that creates a table, accept row, column numbers from the user, and input row-column number as content (e.g. Row-0 Column-0) of a cell.

BCA SECOND SEMESTER EXAMINATION SCHEME AND SYLLABUS

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BCA102	Applied Mathematics	40	60	100
BCA104	Web based programming	40	60	100
BCA106	Data Structure and algorithm using C	40	60	100
BCA108	DBMS	40	60	100
BCA110	Environment Studies	40	60	100
PRACTICAL				
BCA112	Web based programming lab	60	40	100
BCA114	DSA LAB	60	40	100
BCA116	DBMS	60	40	100
Total		380	420	800

CourseCode: BCA 102

CourseName: Applied Mathematics

LEARNING OBJECTIVES:

The objectives of this course are to provide the learners with the following:

1. The Knowledge of mathematical probability
2. Understanding of various numerical techniques
3. Familiarity with the Linear Programming and it's applications

PRE-REQUISITES: Basic Concepts of Mathematics

UNIT -I

No. of Hrs. 12 Chapter/Book Reference: TB2 [chapters 3, 4], TB3 [chapters 2, 3, 4, 5, 6] PROBABILITY: Introduction, Axiomatic definition of Probability, Addition Theorem, Multiplication theorem, Conditional Probability, Baye's Theorem and its applications

PROBABILITY DISTRIBUTIONS: Random Variable, Probability Mass function, Probability density function, Mathematical Expectations of a Random Variable, Binomial Distribution, Poisson distribution, Normal Distribution.

UNIT -II

No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 2, 3], TB3 [chapters 7, 8, 9]

INTERPOLATION: Operators: Shift; Forward Difference, Backward Difference Operators and their Inter- relation, Interpolation Formulae-Newton's Forward, Backward and Divided Difference Formulae: Lagrange's Formula

SOLUTIONS OF NON LINEAR EQUATIONS: Bisection Method, False Position Method, Newton – Raphson

Method for Solving Equation Involving One Variable only.

UNIT -III

No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 5, 6], TB3 [chapters 10, 11]

SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS: Gaussian Elimination Method with and without Row Interchange: LU Decomposition: Gauss - Jacobi and Gauss-Seidel Method; Gauss – Jordan Method and to find Inverse of a Matrix by this Method.

NUMERICAL DIFFERENTIATION: First and Second Order Derivatives at Tabular and Non-Tabular Points, **NUMERICAL INTEGRATION**: Trapezoidal Rule, Simpsons 1/3 Rule: Error in Each Formula (without proof.)

UNIT -IV

No. of Hrs. 12 Chapter/Book Reference: TB4 [Chapters 2, 3, 4, 9, 10]

LINEAR PROGRAMMING: Formulation of linear Programming model, Graphical method of solving linear Programming problem, Simplex Method (Maximization and Minimization)

TRANSPORTATION & ASSIGNMENT PROBLEM: General structure of transportation problem, solution procedure for transportation problem, methods for finding initial solution, test for optimality. Maximization of transportation problem, unbalanced transportation problem, Assignment problem approach of the assignment model, solution methods of assignment problem, maximization in an assignment, unbalanced assignment problem, restriction on assignment

TEXT BOOKS:

TB1.   S.S. Sastry, "Numerical Analysis"; Prentice Hall of India, 1998.
TB2.   Johnson, R., Miller, I. and Freunds, J., Miller and Freund's "Probability and Statistics for Engineers, Pearson Education (2005) 7th Ed.
TB3.   Singh J P "Probability and Numerical Methods" ANE Books, 4th Edition 2019
TB4.   Sharma, J.K.; Operations Research: problems & solutions; Macmillan India

REFERENCE BOOKS:

RB1.   Grewal B S "Numerical Methods in Engineering and Science" Khanna Publishers, 2012
RB2.   Walpole, Ronald E., Myers, Raymond H., Myers, Sharon L. and, Keying Ye, Probability and Statistics for Engineers and Scientists, Pearson Education (2007) 8th Ed.
RB3.   Gupta S C, Kapoor V K "Fundamental of Mathematical Statistics" Sultan Chand and Sons 11th edition 2002

RB4.   Manmohan, Gupta, P K, Kanti Swarup "Introduction to Management science operations research" Sultan Chand and Sons

Course Code: BCA 104

Course Name: Web Based Programming

LEARNING OBJECTIVES:
The objectives of this course are to provide the learners expertise in the following:-

1. Understanding of the syntax and semantics of PHP language
2. Ability to design and develop web applications using PHP as a server side language.
3. Performing CRUD operations in the database

PRE-REQUISITES:

1. Basic knowledge of HTML, CSS and Javascript.
2. Skills to Design static Webpage.

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters 1-3, 5]

Introduction to web applications, Client Side Scripting Vs Server Side Scripting, Web Servers : Local Servers and Remote Servers, Installation Process - WAMP, LAMP, XAMPP & MAMP Server, Static website vs Dynamic website development.

Introduction to PHP: Data types, Variables, Super Global Variables, Constants, Comments, Operators and Expressions, Regular Expression, Advantages of PHP

Control statements: Conditional Statement -if else, if elseif else, nested if, switch case, PHP Loops – for, while, do while and foreach loop

Arrays: Indexed Array, Associate Array, Multi-dimensional Array, Array pre-defined Functions

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 7]

Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions, variable scope, Mail function, PHP Errors

Working with Forms: Get and Post Methods, HTML form controls and PHP, State Management: Cookies, Session, Query String, Hidden Field.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 6]

Working With Files: Opening and Closing Files, creating directories and files, Reading and Writing to Files, file inclusion, file uploading and downloading, Getting Information on Files.

Object Oriented Features: Classes and Objects, Building Classes, Access Modifiers, Reusability, Constructors, Destructor.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 8]

PHP Database Connectivity: Using PHP to Access a Database, Relational Databases and SQL, PHP Data Objects, MySQLi Object Interface, SQLite, MongoDB

Introduction to MYSQL, Creating database and other operations on database, Querying a MySQL database with PHP database, connecting to a database, Parsing of the query results, Checking data errors.

TEXT BOOKS:

TB1.   Programming PHP: Creating Dynamic Web Pages, Kevin Tatroe. Peter Macintyre, Rasmus Lerdorf, O'Reilly, Third Edition

REFERENCE BOOKS:

RB1.   Professional   PHP   Programming,Jesus   Castagnetto,Harish   Rawat,   Sascha Schumann,Chris Scollo,Deepak Veliath - Wrox Publications
RB2.   PHP 5 Advanced, Larry Ullman, Peachpit Press
RB3.   Core PHP Programming. Leon Atkinson (Prentice Hall, ISBN 0130463469).
RB4.   Beginning PHP5 and MySQL: From Novice to Professional, W. Jason Gilmore, 2004,Apress, ISBN: 1- 893115-51-8

Course Code: BCA 106

Course Name: Data Structure and Algorithm Using C

LEARNING OBJECTIVES:
In this course, the learners will be provided expertise in

1. Understanding of the basic concepts of data structures and their operations like, insertion, deletion, searching and sorting
2. Design algorithms and pseudo codes of various linear and non-linear data structures

PRE-REQUISITES:

1. C Programming Skills

2. Discrete Mathematics

UNIT – I

No. of Hours: 14 Chapter / Book Reference: TB1 [Chapters 1, 4, 9], TB2 [Chapters 1, 6, 7], TB3

[Chapters 1, 2,6,10]

Linear Data Structures- Static: Introduction to Algorithms- Attributes, Design Techniques, Time Space Trade Off, Data Structures, Classification and Operations of Data Structures.

Arrays: Single Dimension, Two-Dimension and Introduction to Multi Dimensions, Memory Representation, Address Calculation, Sparse Matrices- Types, Representation.

Searching and Sorting: Linear and Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Elementary Comparison of Searching and Sorting Algorithms.

Hashing: Hash Table, Hash Functions, and Collision Resolution.

UNIT – II

No. of Hours: 10 Chapter / Book Reference: TB1 [Chapter 5], TB2 [Chapter 4], TB3 [Chapter 3] Linear Data Structures- Dynamic

Introduction: Dynamic Memory Allocation**,** Dynamic Memory versus Static Memory Allocation. **Linked List Types:** Singly Linked List, Doubly Linked List, Header Linked List, Circular Linked List**. Operations:** Creation, Insertion, Deletion, Modification, Searching,Sorting, Reversing, and Merging.

UNIT – III

No. of Hours: 09 Chapter / Book Reference: TB1 [Chapter 6], TB2 [Chapters 2, 4], TB3 [Chapters 4, 5] Abstract Data Types:

Stacks: Introduction, Static and Dynamic Implementation, Operations, Applications- Evaluation and Conversion between Polish and Reverse Polish Notations.

Queues: Introduction, Static and Dynamic Implementation, Operations, Types- Linear Queue, Circular Queue, Doubly Ended Queue, Priority Queue.

UNIT – IV

No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters 7, 8], TB2 [Chapters 5, 8], TB3 [Chapters 7,8]

Non Linear Data Structures:

Introduction to Graphs: Notations & Terminologies, Representation of Graphs- Adjacency Matrix, Incidence Matrix and Linked Representation.

Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict, Expression Binary Tree, Tree Traversals (Recursive), Binary Search Tree and Basic Operations

Introduction and Creation (Excluding Implementation): AVL Tree, Heap Tree, M- Way Tree, and B Tree.

TEXT BOOKS:

TB1. Schaum's Outline Series, "Data Structures", TMH, Special Indian Ed., Seventeenth Reprint, 2014.

TB2. Y. Langsam, M. J. Augenstein and A.M. Tanenebaum, "Data Structures using C and C++", Pearson Education India, Second Edition, 2015.

TB3. D. Samanta, "Classic Data Structures", PHI, Second Edition, 2009.

REFERENCE BOOKS:

RB1. Ashok N kamthane "Introduction to Data Structures in C", Pearson**,** Third Edition, 2009.

RB2. E. Horowitz and S. Sahni, "Fundamentals of Data Structures in C". Universities Press, Second edition, 2008.

RB3. D. Malhotra and N. Malhotra, "Data Structures and Program Design using C", Laxmi Publications, Indian adapted edition from Mercury Learning and Information-USA, First edition, 2018.

RB4. Y. Kanetkar " Data Structures through C", BPB Publication, Third Edition, 2019.

RB5. R.F Gilberg, and B A Frouzan- "Data Structures: A Pseudocode Approach with C", Thomson Learning, Second Edition, 2004.

RB6. A. K. Rath, and A.K. Jagadev, "Data Structures and Program Design Using C", Scitech Publications, Second Edition, 2011.

Course Code: BCA 108

Course Name: Database Management System

LEARNING OBJECTIVES:

The paper aims to introduce the concept of Back end, data storage in computers, design of a DBMS, Queries to construct database, store and retrieve data from the database.The objective of this course is to provide the learners expertise in the following:

1. Understanding of the requirement of database management System for storing data and its advantages over file management system.
2. Designing the database conceptually, physically and finally implementing the creation of database for any application.
3. Learning of queries in SQL for creating database and performing various operations for manipulating data in the database.
4. Knowledge of database utilities i.e. backup, recovery, transaction processing.

PREREQUISITE: Basic knowledge of data storage and file management system

UNIT-I

[No. of Hrs.: 10] Chapter/Book Reference: TB1 [Chapter 2]; TB2 [Chapter 1]

Introduction: An overview of database management system, Characteristics of database approach, DBMS architecture, client/server, data Models, Introduction to Distributed Data processing, schema and instances, data independence,

Data Modelling using Entity Relationship Model: Basic introduction about the terminologies like Entity, Entity types, entity set, notation for ER diagram, attributes and keys, Types of attributes (composite, derived and multivalued attributes) and keys (Super Key, candidate key, primary key), relationships, relation types, weak entities, enhanced E-R, specialization and generalization.

UNIT – II

[No. of Hrs.: 13] Chapter/Book Reference: TB1 [Chapter 8]; TB2 [Chapter 2];

Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.

Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.

Logical operators: BETWEEN, IN, AND, OR and NOT

Null Values: Disallowing Null Values, Comparisons Using Null Values

Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key

Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses,

Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins.

Overview of other SQL Objects: Views, Sequences, Indexes, Triggers and stored procedure.

UNIT – III

[No. of Hrs.: 12] Chapter/Book Reference: TB1 [Chapter 7 & 15]; TB2 [Chapter 3];

Relational Data Models: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints and constraints on null, relational DB schema. Codd's Rules

Relational algebra: Basic operations selection and projection,

Set Theoretic operations: Union, Intersection, set difference and division (Order, Relational calculus: Domain, Tuple, Well Formed Formula, specification, quantifiers)

Join operations: Inner, Outer, Left outer, Right outer, and full outer join

ER to relational mapping: Steps to map ER diagram to relational schema

Data Normalization: Functional dependencies, Armstrong's inference rule, & Normalization (Upto BCNF)

UNIT – IV

[No. of Hrs.: 9] Chapter/Book Reference: TB1 [Chapter 19 & 20]; TB2 [Chapter 5]; Transaction Processing: Definition of Transaction, Desirable ACID properties

Database recovery and Database Security: System failure, Backup & recovery Techniques, Authentication, Authorization.

Overview of Query by Language, NoSql databses

TEXT BOOKS:

TB1.   R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.

TB2.   Singh S.K., "Database System Concepts, design and application", Pearson Education [TB3] **TB3.** Ramakrishnan and Gherke, "Database Management Systems", TMH.

TB4.   Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991.

REFERENCE BOOKS:

RB1.   Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.

RB2.   Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.

RB3.   A. K. Majumdar, P. Battacharya, "Database Management Systems', TMH, 2017.

Course Code: BCA 110

Course Name: Environmental Studies

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Development of critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.

2. Acquisition of values and attitudes towards understanding complex environmental economic-social challenges, and active participation in solving current environmental problems and preventing the future ones.

3. Encouraging adoption of sustainability as a practice in life, society, and industry.

PRE-REQUISITES: Basic awareness about the natural environment.

UNIT–I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 1, 6]; TB2 [Chapters 8, 11, 25]; TB3

[Chapters 1, 35]

Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies; components of environment: atmosphere, hydrosphere, lithosphere, and biosphere.

- Scope and importance; Concept of sustainability and sustainable development

- Emergence of environmental issues: Climate change, Global warming, Ozone layer depletion, Acid rain etc.

- International agreements and programmer: Earth Summit, UNFCCC, Montreal and Kyoto protocols, Convention on Biological Diversity(CBD), Ramsar convention, The Chemical Weapons Convention (CWC), UNEP, CITES, etc

UNIT–II

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 2, 3]; TB2 [Chapters 2, 15, 16, 17]; TB3

[Chapters 2, 7, 11, 12]

Ecosystems and Natural Resources

- Definition and concept of Ecosystem

- Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem: Physical (energy flow), Biological (food chains, food web, ecological succession), ecological pyramids and homeostasis.

- Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries); importance and threats with relevant examples from India

- Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration

- Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs; Energy contents of coal, petroleum, natural gas and bio gas; Agro-residues as a biomass energy source

UNIT–III

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 4]; TB2 [Chapters 4, 5, 6]; TB3 [Chapters 22, 23, 24]

Biodiversity and Conservation

- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity
- India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples.
- Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis
- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation (National Parks, Wildlife Sanctuaries, and Biosphere reserves.
- Case studies: Contemporary Indian wildlife and biodiversity issues, movements, and projects (e.g., Project Tiger, Project Elephant, Vulture breeding program, Project Great Indian Bustard, Crocodile conservation project, Silent Valley movement, Save Western Ghats movement, etc)

UNIT–IV

No. of Hours: 9 + 5 for field visit Chapter/Book Reference: TB1 [Chapter5]; TB2 [Chapters7, 20, 21, 23]; TB3 [Chapters25, 26, 27, 28, 30, 31]

Environmental Pollution and Control Measures

- Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards
- Nuclear hazards and human health risks
- Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E- waste, etc.; Waste segregation and disposal
- Environmental Impact Assessment and Environmental Management System
- **Field work/ Practical's (any one)**
- Field visit to any of the ecosystems found in Delhi like Delhi Ridge/ Sanjay lake/Yamuna river and its floodplains etc., or any nearby lake or pond, explaining the theoretical aspects taught in the class room
- Visit to any biodiversity park/ reserve forest/ protected area/ zoo/ nursery/ natural history museum in and around Delhi, such as Okhla bird sanctuary/ Asola Bhatti Wildlife Sanctuary/ Yamuna Biodiversity Park/ Sultanpur National Park, explaining the theoretical aspects taught in the classroom
- Visit to a local polluted site (urban/rural/industrial/agricultural), wastewater treatment plants, or landfill sites, etc

TEXT BOOKS:

TB1.   Sanjay Kumar Batra , Kanchan Batra ,Harpreet Kaur; Environmental Studies; Taxmann's, Fifth Edition.

TB2. M.M. Sulphey; Introduction to Environment Management; PHI Learning, 2019

TB3. S.P. Mishra, S.N. Pandey; Essential Environmental Studies; Ane Books Pvt. Ltd. ; Sixth Edition.

RFERENCE BOOKS:

RB1. Asthana, D. K. (2006).Text Book of Environmental Studies. S. Chand Publishing.

RB2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India

RB3. Bharucha, E. (2013). Textbook of Environmental Studies for Undergraduate Courses. Universities Press.

RB4. Mahapatra, R., Jeevan, S.S., Das, S. (Eds) (2017). Environment Reader for Universities, Centre for Science and Environment, New Delhi.

RB5. Masters, G. M., & Ela, W. P. (1991).Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.

RB6. Odum, E. P., Odum, H. T., & Andrews, J. (1971).Fundamentals of ecology. Philadelphia: Saunders.

RB7. Sharma, P. D., & Sharma, P. D. (2005).Ecology and environment. Rastogi Publications

Course Code: BCA 112

Course Name: WBP Lab

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to:

1. Understand the syntax and semantics of PHP language

2. Design and develop web applications using PHP as a server side language

3. Perform database connectivity using MYSQL as database server.

PRE-REQUISITES:

1. Knowledge of HTML, CSS, Javascript, bootstrap and XML.

2. Able to Design Static Website.

S. No.	Detailed Statement
1.	Write regular expressions including modifiers, operators, and metacharacters.
2.	Write a program to show the usage of nested if statement.
3.	Write a Program in PHP for type Casting Of a Variables
4.	Write a program to create a menu driven program and show the usage of switch-case.
5.	Write a program to show the usage of for/while/do while loop
6.	Write a program to perform all four types of sorting
7.	Write a program to implement Array-pad(),aaray_slice(),array_splice(),list() functions.(use foreach wherever applicable)
8.	Write a program to show the application of user defined functions.
9.	Write a program that Passes control to another page (include, require, exit and die functions)
10.	Write a program to validate the form data using Filter_var() function.
11.	Write a program to show the usage of Cookie.

12.	Write a program to show the usage of Session
13.	Write a program to implement oops concepts.
14.	Do Form handling In PHP Design a personal Information form , then Submit & Retrieve the Form Data Using $_GET(), $_POST() and $_REQUEST() Variables
15.	Design A Login Form and Validate that Form using PHP Programming
16.	Create Admin Login ,Logout form using session variables
17.	Write a program to create a file.
18.	Write a program that use various PHP library functions, and that manipulate files and directories.
19.	Write a program to read and display the content of previously created file.
20.	Write a program to modify the content of an existing file.
21.	Create a web page and which provides File uploading and downloading a file.
22.	Design a from which upload And Display Image in PHP
23.	Use phpMyAdmin and perform the following: import, review data and structure, run SQL statements, create users and privileges
24.	Write a program to create a mysql database.
25.	Write a program to create a table and insert few records into it using form.
26.	Write a program to select all the records and display it in table.
27.	Write a program to modify (delete/modify/add) a table.
28.	Write a PHP script, to check whether the page is called from 'https' or 'http'.

29.	Write a program to verify text data as per the pattern.
30.	Create a dynamic website by incorporating the following functionalities: Implement a basic registration and login system, with styling, Make the database connection Make a connection to a MySQL database, and log in with valid credentials. Create Dynamic, interactive and database - Driven web application using php & mysql Perform some validation check. If any of these operations cause an error, stop execution and print the error message. The script should respond differently depending on the situation. Add a "Log Out" button to logout from the system

Course Code: BCA 114

Course Name: DS Lab

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to:

       1. Implement various types of data structures using C

       2. Implement different operations on linear and non-linear data structures

PRE-REQUISITES:

C Programming Skills

S. No.	Detailed Statement
1.	WAP to implement following operation on one dimensional array (i) Insertion (ii) Deletion (iii) Traversal (iv) Reverse (v) Merge
2.	WAP to Sort an array using menu driven: (i) BUBBLE SORT (ii) MERGE SORT(iii) INSERTION SORT (iv) SELECTION SORT
3.	WAP to implement a Singly Linked List.
4.	WAP to implement a Circular Linked Lists
5.	WAP to implement Doubly Linked Lists
6.	Write a menu driven program to implement (i) Static Stack (ii) Dynamic Stack.
7.	WAP to implement a (i) Static (ii) Dynamic Circular Queue
8.	WAP to implement a (i) Static (ii) Dynamic De-Queue.
9.	Implement recursive algorithms for the following operations on Binary Search Tree a) Insertion b) Searching
10.	Implement recursive algorithms for BST traversal- Inorder, Preorder, Postorder.
11.	WAP to search & display the location of an element specified by the user, in an array using (i) Linear Search (ii) Binary Search technique.
12.	WAP to accept a matrix from user, find out matrix is sparse or not and convert into triplex matrix.

13.	WAP to implement Polynomial addition operation using linked list.
14.	Write a C program to create two linked lists from a given list in following way INPUT List:- 1 2 3 4 5 6 7 8 9 10 OUTPUT:-
	First List:- 1 3 5 7 9 Second List:- 2 4 6 8 10
15.	WAP to implement Student Database using Linked List with the following structure • Name • Rollno • Marks of 5 subjects • Average • Result, If the average < 50, then print 'Fail', otherwise 'Pass'
16.	Write a program to convert Infix to equivalent (i) Prefix expression (ii) Postfix expression
17.	Write a program to evaluate (i) Prefix Expression (ii) Postfix Expression using stack.
18.	Let us assume a Patient's coupon generator for the Doctors' clinic. The patients are given the coupons on first-come-first-serve basis. After the visit of a patient, patient-ID is kept stack-wise. At the end of the day, the count is generated from the stack. Construct a menu-based program for patients' coupons generator using an appropriate data structure.
19.	WAP to implement an expression tree. (For example: (a + b / (c * d) – e))
20.	Sometimes a program requires two stacks containing the same type of items. Suppose two stacks are stored in separate arrays, then one stack might overflow while there is considerable unused space in the other. A neat way to avoid this problem is to put all spaces in one stack and let this stack grow from one end of the array, and the other stack starts from the other end and grows in the opposite direction, i.e., toward the first stack. In this way, if one stack turns out to be large and the other small, then they will still both fit, and there will be no overflow until all space is used. Declare a new structure that includes these two stacks and perform various stack operations.

Course Code: BCA 116

Course Name: DBMS Lab

LEARNING OBJECTIVES:

The course is to provide the basics of SQL. To understand RDBMS and construct queries using SQL to design a database and manipulate data in it.

PRE-REQUISITES: NIL

List of Practicals		
S. No.	**Detailed Statement**	
Core Practicals (Implement All the mentioned practicals)		
The following are two suggestive databases. The students may use any one or both databases for their core practicals. However, the instructor may provide any other databases for executing these practical. **1. COLLEGE DATABASE**: STUDENT (USN, SName, Address, Phone, Gender) SEMSEC (SSID, Sem, Sec) CLASS (USN, SSID) SUBJECT (Subcode, Title, Sem, Credits) IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA) **2. COMPANY DATABASE:** EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours)		
1	Draw an E-R diagram from given entities and their attributes	
2	Convert the E-R diagram into a Relational model with proper constraints.	

3	Write queries to execute following DDL commands :
	CREATE :Create the structure of a table with at least five columns ALTER:Changethesizeofa particular column.
	Add a new column to the existing table. Remove a column from the table.
	DROP: Destroythetablealongwithitsdata.
4	Write queries to execute following DML commands : INSERT: Insertfiverecordsineachtable.
	UPDATE: Modify data in single and multiple columns in a table DELETE: Delete selective and all records from a table
5	Write queries to execute following DML command :
	SELECT: Retrievetheentirecontentsofthetable.
	Retrievetheselective contents (based on provided conditions) from a table.
	Retrieve contents from a table based on various operators i.e. string operators, logical operators and conditional operators,Boolean operators.
	Sort the data in ascending and descending order in a table on the basis of one column or more than one column.
6	Create table using following integrity constraints: Primary Key
	Unique Key Not Null Check Default Foreign Key
7	Write queries to execute following Aggregate functions
	Sum,Avg,Count,Minimum and Maximum value of a numeric column of a table using aggregate function
8	Retrieve data from a table using alias names .
9	Retrieve data of a table using nested queries.
10	Retrieve data from more than one table using inner join, left outer, right outer and full outer joins
11	Create view from one table and more than one table.
12	Create index on a column of a table.

13	Consider the Insurance company's Database given below. The primary keys are underlined and the data typesare specified.
	
	PERSON(driver_id# : string, name : string, address : string) CAR(regno : string, model : string, year : int) ACCIDENT(report_number : int, acc_date : date, location : string) OWNS(driver_id# : string, regno : string)
	
	PARTICIPATED(driver_id# : string, regno : string, report_number : int, damage_amount
	
	:number(10,2))
	
	    (i) Create the above tables by properly specified the primary key and the foreign key
	
	    (ii) Enter at least five tuples for each relation
	
	    (iii) Demonstrate how you can
	
	        a. Update the damage amount for the car with a specific regno, the accident with report number 12 to 25000.
	
	        b. Add a new accident to the database.
	
	    (iv) Find the total number of people who owned cars that were involved in accident in2002.
	
	(iv) Find the number of accident in which cars belonging to a specific models were involved

14	Consider the following schema of a library management system.Write the SQL queries for the questions given below; **Student(Stud_no : integer, Stud_name: string)** **Membership(Mem_no: integer, Stud_no: integer) Book_(book_no: integer, book_name:string, author: string)**

	lss_rec_(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer)
	
	    (i) Create the tables with the appropriate integrity constraints
	
	    (ii) Insert around 10 records in each of the tables
	
	    (iii) Display all records for all tables
	
	    (iv) List all the student names with their membership numbers
	
	    (v) List all the issues for the current date with student and Book names
	
	    (vi) List the details of students who borrowed book whose author is Elmarsi & Navathe
	
	    (vii)Give a count of how many books have been bought by each student
	
	    (viii) Give a list of books taken by student with stud_no as 1005

(ix) Delete the List of books details which are issued as of today

(x) Create a view which lists out the iss_no, iss _date, stud_name, book name

Use the relations below to write SQL queries to solve the business problems specified.
CLIENT (clientno#,name, client_referred_by#)

ORDER (orderno#, clientno#, order_date, empid#)

ORDER_LINE (orderno#, order line number#, item_number#, no_of_items, item_ cost,shipping_date)

ITEM (item_number#, item_type, cost)

EMPLOYEE (empid#, emp_type#, deptno, salary, firstname, lastname) Notes:

a. Column followed by # is the primary key of the table.

b. Each client may be referred by another client. If so, the client number of the referring client is stored in referred_by.

c. The total cost for a particular order line = no_of_items * item_cost.c.

Write queries for the following

(i) Create all the above tables.

(ii) Insert at least five records.

(iii) Display all the rows and columns in the CLIENT table. Sort by client name in reverse alphabetical order.

(iv) Display the item number and total cost for each order line (total cost = no of items X item cost). Name the calculated column TOTAL COST.

(v) Display all the client numbers in the ORDER table. Remove duplicates.

(vi) Display the order number and client number from the ORDER table. Output the result in the format. Client <clientno> ordered <orderno>

(vii) Display full details from the ORDER_LINE table where the item number is (first condition) between 1 and 200 (no > or < operators) OR the item number is greater than1000 AND (second condition) the item cost is not in the list 1000, 2000, 3000 OR the order number is not equal to 1000.

15

	(viii) Display the client name and order date for all orders.	
	(ix) Repeat query (6) but also display all clients who have never ordered anything.	
	(x) Display the client name and order date for all orders using the join keywords.	
	(xi) Display the client name and order date for all orders using the JOIN method.	
	(xii) Display the client number, order date and shipping date for all orders where the shipping date is between three and six months after the order date.	
	(xiii) Display the client number and name and the client number and name of the person who referred that client.	
	(xiv) Display the client name in upper case only and in lower case only.	
	(xv) Display the second to fifth characters in each client name.	

Note:

1. In total 15 practicals to be implemented.

2. This is a suggestive list of practicals. However, the instructor may add or change any other database for executing queries the requirement.

REFERENCEBOOKS:

RB1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.

BCA THIRD SEMESTER EXAMINATION SCHEME AND SYLLABUS

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BCA 201	Computer Network	40	60	100
BCA 203	Computer Organization and Architecture	40	60	100
BCA 205	Object Oriented Programming with C++	40	60	100
BCA 207	Cyber Security	40	60	100
BCA-209	Human Values and Ethics	40	60	100
BCA 211	Principles of Management & Organizational Behaviour	40	60	100
PRACTICAL				
BCA213	C++ LAB	60	40	100
BCAP 215	Cyber Security Lab.	60	40	100
Total		**360**	**440**	**800**

Course Code: BCA 201

Course Name: Computer Networks

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following: -

1. To study different types of media, multiplexing, switched networks, the Internet, TCP/IP suite, fiber- optic communications and the state-of-art networking applications.
2. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.
3. Identify and discuss the underlying concepts of IPv4 & IPv6 protocols, along with their characteristics and functionality.
4. Details of IP operations in the Internet and associated routing principles

5. Analyzing various layering protocols in computer networks.

PRE-REQUISITES:

1. Fundamentals of Computers and IT

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1[Chapter-1], TB2[Chapter-1, 2]

Basic Concepts: Components of data communication, distributed processing, Line configuration, topology, transmission mode, and categories of networks. **OSI and TCP/IP Models:** Layers and their functions, comparison of models. **Transmission Media:** Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon Capacity.

UNIT – II

No. of Hours: 12 Chapter/Book Reference: TB1[Chapter-2, 3], TB2[Chapter-3, 9]

Telephony: Multiplexing, WDM, TDM, FDM, circuit switching, packet switching and message switching. **Data Link Layer:** Types of errors, Framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- NARQ, Selective repeat ARQ.

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB1[Chapter-5], TB2[Chapter-18, 19, 20, 22]

Network Layer: Internetworking & Devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway, Modems; Addressing: IPv4 and IPv6 addressing, IPv4 subnetting; Routing: Unicast Routing Protocols: RIP, OSPF, BGP; Routing: Routing Methods- Static and Dynamic Routing, Routing basic commands, Distance vector protocol, Link state protocol

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1[Chapter-6,7], TB2[Chapter-23, 24,25]

Transport and upper layers in OSI Model: Transport layer functions and Protocols, connection management, functions of session layers, Presentation layer, and Application layer.

TEXT BOOKS:

TB1. A. S. Tenanbaum, "Computer Networks"; Pearson Education Asia, 4th Ed., 2003.

TB2. Behrouz A. Forouzan, "Data Communication and Networking", 2nd edition, Tata Mc Graw Hill.

REFERENCES:

RB1. D. E. Comer, "Internetworking with TCP/IP", Pearson Education Asia, 2001.

RB2. William Stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002.

RB3. Leinwand, A., Pinsky, B. (2001). Cisco router configuration. United Kingdom: Cisco Press.

Course Code: BCA 203

Course Name: Computer Organization and Architecture

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To study the various logic gates and design principles of different digital electronic circuits
2. To design different combinational and sequential circuits.
3. Identify the functional units of the processor and the factors affecting the performance of a computer
4. To learn about the Input –Output organization of a typical computer

PRE-REQUISITES:

Fundamentals of Computer

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB2[Chapter-2, 4], RB1 [Chapter-5, 6]

Boolean Algebra and Logic: Basics Laws of Boolean Algebra, Logic Gates, Simplifications of Boolean equations using K-maps SOP and POS, Don't Care condition.

Arithmetic Circuits: Adder, Subtractor, Parallel binary adder/Subtractor.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB2 [Chapter-5, 6], RB1[Chapter-6,7]

Combinational Circuits: Multiplexers, De-Multiplexers, Decoders, Encoders.

Flip-flops: S-R, D, J-K, T, Clocked Flip-flop, Race around condition, Master slave Flip-Flop, Realisation of one flip-flop using other flip-flop, Applications of flip flop: Latch, Registers, Counters (elementary treatment to be given).

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1[Chapter-5, 9], RB3[Chapter-11]

Data Transfer Operations: Register Transfer, Bus and Memory Transfer, Registers and micro-operations. **Basic Computer Organizations and Design**: Instruction Codes, Computer Registers, Instruction Cycle, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes,

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1[Chapter-12, 13], RB3[Chapter-7]

Input-Output Organization: Peripheral Devices, Input-Output Interfaces, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA)

Memory Organization: Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

TEXT BOOKS:

TB1.   Morris Mano, Computer System Architecture, 3rd Edition, Prentice-Hall of India Private Limited, 1999.

TB2.   Moris Mano, "Digital Logic and Computer Design", PHI Publications, 2002

REFERENCES:

RB1.   R. P. Jain, "Modern Digital Electronics", TMH, 3rd Edition, 2003.

RB2.   WIliam Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall of India Private Limited, 2001

RB3.   Subrata Ghosal," Computer Architecture and Organization", Pearson 2011

RB4.   Malvino, "Digital Computer Electronics: An Introduction to Microcomputers", McGraw Hill

Course Code: BCA 205

Course Name: Object Oriented Programming with C++

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Gain knowledge and develop a broad understanding of bottom up approach
2. Construct object oriented solutions for real world scenarios

PRE-REQUISITES:

1. Knowledge of C programming
2. Basic Programming Skills

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 1, 2], TB2 [Chapters 1, 2, 3]

Object Oriented Paradigm: Procedural vs. object-oriented development, basic concepts of object-oriented programming, applications and benefits of OOP, comparison between C and C++.

Beginning with C++: Stream based I/O, literals- constant qualifiers, operators in C++, reference variable, functions, default arguments, parameter passing by value, reference and pointer, inline functions, type conversion, basic C++ programs, new, delete operators- basic use and dynamic memory allocation for arrays.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters 10, 11], TB2 [Chapters 5, 6]

Classes and Objects: C++ class declaration, access specifiers, member functions, arrays within a class, array of objects, memory allocation of objects, passing objects as arguments, returning objects from functions, function overloading, static data and member functions, friend function and friend class, this pointer

Constructors &Destructors: Introduction to constructor and destructor, parameterized constructor, constructor with default arguments, multiple constructors in a class, copy constructor.

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters 13, 14, 15], TB2 [Chapters 7, 8, 9]

Inheritance: Types of inheritance, derivation – public, private & protected, ambiguity resolution (function overriding), aggregation, composition v/s classification, virtual base class, constructor and destructor in derived classes.

Polymorphism: Types of polymorphism, early v/s late binding, Virtual Functions: Need for virtual functions, pointer to derived class objects, pure virtual functions, abstract classes**.**

Operator Overloading: Overloading unary operators, nameless objects, overloading binary operators, overloading with friend functions, conversion between basic types and user-defined types.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters 16, 17, 18, 19],TB2 [Chapters 11, 12, 13]

Parametric polymorphism: Generic Programming with Templates, Introduction, function templates/generic functions, characteristics, overloading of template functions, class templates, template arguments.

Exception Handling: Exception-handling model, types of exception, catching and handling exceptions, generic catch, rethrowing an exception, specifying exceptions for a function.

Streams &Files: C++ Streams, basic stream classes, C++ predefined streams, I/O operations, unformatted console I/O operations, manipulators, opening and closing a file- different modes and methods, error handling during file operations, file pointers and their manipulations, sequential access to file, random input and output operations, persistent objects, command line arguments.

TEXT BOOKS:

TB1.   K.R. Venugopal, Rajkumar, T. Ravishanker, "Mastering C++", TMH

TB2.   E. Balagurusamy, "Object Oriented Programming with C++", McGraw-Hill Education

REFERENCE BOOKS:

RB1.   Ashok N. Kamthane, "Object-Oriented Programming with ANSI And Turbo C++", Pearson Education.

RB2.   Schildt Herbert, "C++: The Complete Reference", Tata McGraw Hill.

RB3.   R. Lafore, "Object Oriented Programming using C++", Galgotia Publications.

Course Code: BCA 207

Course Name: Human Values and Ethics

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To distinguish between values and skills, and understand the significance of values in personal and professional life
2. To understand harmony at all the levels of human living, and live accordingly.
3. To understand the role of a human being in ensuring harmony in society and nature.
4. To apply the understanding of harmony in existence in their profession and lead an ethical life

PRE-REQUISITES:

None

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters-1, 2], TB2 [Chapters-1] Introduction to human values:

- Understanding the need, basic guidelines, process of value education
- Understanding the thought provoking issues- continuous happiness and prosperity
- Right understanding- relationship and physical facilities, choice making- choosing, cherishing and Acting
- Understanding values- Personal Values, Social values, Moral values and spiritual values, Self- Exploration and Awareness leading to Self-Satisfaction; Tools for Self-Exploration.

UNIT-II

No. of Hours: 10 Chapter/Book Reference: TB2 [Chapters 5-10]

Harmony and role of values in family, society and human relations

- Understanding harmony in the Family- the basic unit of human interaction; Understanding values in human-human relationship; Understanding harmony in the society-human relations.

- Interconnectedness and mutual fulfilment; Coexistence in nature.
- Holistic perception of harmony at all levels of existence-universal harmonious order in society. Visualizing a universal harmonium order in society- undivided society (Akhand Samaj), universal order (Sarvabhaum Vyawastha)- from family to world family.

UNIT-III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters-2, 3] Coexistence and role of Indian Ethos:

- Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self- regulation in nature
- Ethos of Vedanta; Application of Indian Ethos in organizations in management; Relevance of Ethics and Values in organizations in current times.

UNIT-IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters-4, 5], TB2 [Chapters-12, 13] Professional ethics

- Understanding about Professional Integrity, respect and equality, Privacy, Building Trusting relationships, Co-operation, respecting the competence of other profession.
- Understanding about taking initiative, promoting the culture of openness, depicting loyalty towards goals and objectives.
- Ethics at the workplace: - cybercrime, plagiarism, sexual misconduct, fraudulent use of institutional resources, etc.;

Ability to utilize the professional competence for augmenting universal human order.

TEXT BOOKS:

TB1.   A Textbook on Professional Ethics and Human Values by R S Naagarazan.

TB2.   A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P. Bagaria.

TB3.   Indian Ethos and Modern Management by B L Bajpai New Royal Book Co., Lucknow., 2004, Reprinted 2008.

REFERENCE BOOKS:

RB1.   A N Tripathy, 2003, Human Values, New Age International Publishers

RB2.   Human Values and Professional Ethics by Vaishali R Khosla, Kavita Bhagat

RB3.   I.C. Sharma. Ethical Philosophy of India Nagin & co Julundhar

Course Code: BCA209
Course Name: Cyber Security

Students will be able to understand and learn the concept, layers of Cyber Security.
1.   Students will be able to learn about cybercrime and types of attack.
2.   Students will be able to learn about how many tools and methods available of cybercrime.
3.   To study about cybercrime real life examples and cases.
4.   Students will be able to understand and learn about Ethical Hacking.
5.   Students will be able to understand and learn about Cyber Forensics.

PRE-REQUISITES:
1.   Fundamentals of Information Technology

UNIT – I
No. of Hours: 12Chapter/Book Reference: TB1 [Chapters – 1, 2], TB2[Chapters - 1, 2]

Introduction to Cyber Security: Basic Cyber Security Concepts, Layers of Cyber Security, Cybercrimes, Cybercriminals, Cyberspace, Cyber threats, Cyberwarfare, Classification of Cybercrimes, Categories of Cyber Crime, Types of criminal attack, cyberstalking, botnet, cybercrime and cloud computing.

UNIT – II
No. of Hours: 10Chapter/Book Reference: TB1 [Chapters – 2, 3], TB2 [Chapter - 3, 4, 11]

Cybercrime attacks on Mobile/Cell Phones, Introduction to Cybercrime Tools and Methods: phishing and its working, password cracking and its types, Keyloggers and its types, viruses, Trojan horse and backdoor, steganography, DoS & DDoS attack,

UNIT – III
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter – 4], TB3 [Chapter - 2, 21]

Cryptography: Introduction to Cryptography, Symmetric-key Cryptography, Asymmetric-key Cryptography, User Authentication, Password Authentication, Message Authentication, Digital Signature.
Securing Web Application, Services: Introduction, Basic security for HTTP Applications, Email Security, Backupissues, Identity Management and Web Services, Authorization Patterns, Firewall

UNIT – IV
No. of Hours: 12Chapter/Book Reference: TB1 [Chapter – 6], TB2 [Chapter - 7]

Introduction to Cyber Forensics: Need of Cyber Forensics, Digital Evidence and its rules, RFC2822, Life cycle of Digital Forensics, process of Digital Forensics, Phases of Computer Forensics/Digital Forensics, Computer Forensics Investigation, Computer Forensics and Steganography, OSI 7-layer model to Computer Forensics.

TEXT BOOKS:
TB1. Supriya Madan and Rajan Gupta, "Security in Cyber Space and its LegalPerspective", 1ˢᵗ Edition, AGPH Books.
TB2. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics andLegal Perspectives, Wiley.
TB3. Kevin Beaver, Hacking for Dummies Wiley Publishing, Inc.
TB4. Stallings and Brown, Computer Security: Principles and Practice, Fourth Edition, Publisher: Pearson,2018.

REFERENCE BOOKS:
RB1. Cyber Security Essentials, James Graham, Richard Howar and Ryan Otson, CRC Press.
RB2. Introduction to Cyber Security: Jeetendra Pande.
RB3. Certified Ethical Hacker STUDY GUIDE Kimberly Graves Sybex.

Course Code: BCA 211
Course Name: Principles of Management & Organizational Behaviour
UNIT – I
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 1, 2, 4]

Management: Meaning & concept, Management principles (Fayol & Taylor), Management process

(in brief), Managerial levels, Skills, Roles and Functions of a manager, Management Theories (Classical, Neo classical, Behavioral, Systems & Contingency).

UNIT – II
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters – 7, 8, 10, 16, 17, 27, 28]

Planning: Meaning, Purpose & process, Decision making: Concept & process, Organizing: Process,Departmentation, Authority & Responsibility relationships, Decentralization.

Staffing: Concept, nature & importance of staffing and Directing.

UNIT – III
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 13, 18, 32, 33]

Motivation: concept & theories (Maslow's, Herzberg Two factor, McGregor's theory X & Y),Leadership: Concepts & styles. Controlling: Nature, Importance, significance & Process of control.

Organizational Behavior: concept and Nature of Organisational Behaviour, Importance, Challenges and Opportunities.Organizational culture: Meaning, importance and characteristics of organization culture.

UNIT – IV
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters –34, 35, 36, 40, 41]

Managing People - Meaning, Need of understanding human behavior in organization, Models of OB, Major concepts in OB (elementary) - Personality, Learning, concept of perception & perception theories, Attitude Building and Leadership.

TEXT BOOKS:
TB1. Dr. C.B Gupta "Management concepts & practices" S.Chand & Sons, 2009.

REFERENCES BOOKS:
RB. Stoner, Freeman & Gilbert, "Management" 6th Edition, Pearson International.
RB2. Ankur Chhabra, "Organisational Behaviour", Sun India Publications, 2009 **RB3.**Robbins, Stephen P, "Organisational Behaviour". PHI, 2010

Course Code: BCA 213
Course Name: Practical – VII C++ Lab

LEARNING OBJECTIVES:
In this course, the learners will be able to:
1. Develop concepts related to Object Oriented Programming
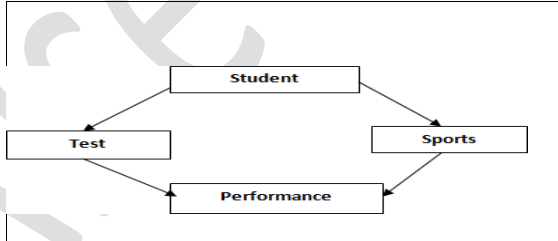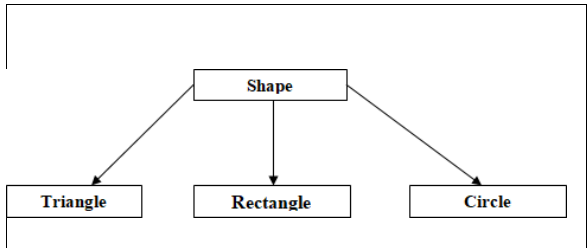2. Construct object oriented solutions in real world scenarios

PRE-REQUISITES:
1. Knowledge of C programming
2. Basics of Programming

S. No.	Detailed Statement
1	WAP to implement '*Inline function*'

2	WAP to implement call by reference and return by reference using class. [Hint. Assume necessary functions]
3	WAP to implement friend function by taking some real life example
4	WAP to implement '*Function Overloading*'
5	WAP to implement *Parameterized Constructor, Copy Constructor* and *Destructor*
6	WAP to show the usage of constructor in base and derived classes, in multiple inheritance
7	WAP to show the implementation of '*containership*'
8	WAP to show swapping using template function (Generic)
9	WAP to implement '*Exception Handling*'
10	WAP to read and write values through object using file handling

| 11 | Create a class employee which have name, age and address of employee, include functions getdata() and showdata(), getdata() takes the input from the user, showdata() display the data in following format:

Name:

Age:

Address: |
|---|---|
| 12 | Write a class called **CAccount** which contains two private data elements, an integer

accountNumber and a floating point **accountBalance,** and three member functions:

- A constructor that allows the user to set initial values for **accountNumber** and **accountBalance** and a default constructor that prompts for the input of the values for the above data numbers.

- A function called **inputTransaction**, which reads a character value for **transactionType**('D' for deposit and 'W' for withdrawal), and a floating point value for **transactionAmount**, which updates **accountBalance**.

A function called **printBalance**, which prints on the screen the **accountNumber** and |

	accountBalance.
13	Define a class *Counter* which contains an int variable *count* defined as static and a static function Display () to display the value of *count*. Whenever an object of this class is created *count* is incremented by 1. Use this class in main to create multiple objects of this class and display value of count each time
14	WAP to add and subtract two complex numbers using classes
15	Write program to overload Binary + to add two similar types of objects. (Both with and without using friend functions)
16	WAP to implement += and = operator
17	Implement the following class hierarchy considering appropriate data members and member functions
18	Implement the following hierarchy considering appropriate data members and member functions (use Virtual functions).
19	WAP to convert meter to centimeter and vice versa, using data conversions

	and operator
	overloading
20	WAP to count digits, alphabets and spaces, stored in a text file, using streams

Course Code: BCA 215

Course Name: Cyber Security

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper**.**

List of Practicals

S.No.	Problem Statement
1	Install and configure any Antivirus software on System
2	Implement prevention mechanisms to protect PC from Cyber Attack
3	Implement Steganography Algorithms
4	Implement and install the keyloggers to understand their working.
5	Implement hiding of Data in image using tools.
6	Apply security to Files/ Folder/ Application using access permissions
7	Study of System threat attacks - Denial of Services.

8	Study of Techniques uses for Web Based Password Capturing.
9	Study of Anti-Intrusion Technique – Honey pot.
10	Study of Sniffing and Spoofing attacks.

BCA FOURTH SEMESTER EXAMINATION SCHEME AND SYLLABUS

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BCA 202	Java Programming	40	60	100
BCA204	Software Engineering	40	60	100
BCA 206	Introduction to Management & Entrepreneurship Development	40	60	100
BCA 208	Introduction to Data Science	40	60	100
BCA 210	Digital Marketing	40	60	100
PRACTICAL				
BCA212	Practical –XII Java Lab	60	40	100
BCA 214	Practical – IX SE Lab	60	40	100
BCA 216	Introduction to Data Science Lab.	60	40	100
Total		**380**	**420**	**800**

Course Code: BCA 202

Course Name: Java Programming

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Learn how to implement Object Oriented concepts through Java.
2. Identify and apply the Java thread model to program Java applications.
3. Develop GUI applications using Java swings

PRE-REQUISITES:

1. Programming fundamental
2. Object-Oriented concepts

UNIT–I

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 1, 2, 3, 5, 6], TB2[Chapters - 2, 3, 4, 5, 6, 7, 8]

Java Basics: Java as Object-oriented Programming Language History of Java, Features of Java, Difference between Java and C++, Java Architecture (JDK, JVM, JRE), Java Tokens: Data types, Literals, Variables, Scope and lifetime of variables, Operators. Control Structures, Arrays.

Introducing Classes: Creating a Class: properties, methods and constructors. Object Access modifiers, Method Overloading, Garbage collection, this keyword, Static (variable, method, block), final keyword, Wrapper Classes, String class and methods.

UNIT – II

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 7, 8, 9], TB2[Chapters - 9, 10, 11] Inheritance: Types, Super keyword, method overriding, covariant return type, abstract CLASS **Interfaces and Packages:** Creation and implementing an interface, difference between abstract class and interface, Packages, and importing a package.

Exception Handling: Exception Class, built-in checked and unchecked exceptions, user-defined exceptions, use of try, catch, throw, throws, finally

UNIT – III

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters – 11, 12], TB2[Chapters - 13]

Using I/O: Elementary concepts of Input/Output, using the byte streams, reading and writing using byte streams, automatically closing a file, using the character-based streams, File I/O using character streams (using a File Writer and using a File Reader)

Multi-threaded programming: Multithreading fundamentals, Thread class, and Runnable interface, the life cycle of thread, creation of single and multiple threads, implementation of Thread methods, Synchronization (using Synchronized methods, synchronized statement).

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters – 17, 18]

Swings Fundamentals: Components (JLabel and ImageIcon, using swing Buttons (JButton, JToggleButton, JCheckBox, JRadioButton), JTextField, JScrollPane, JList, JComboBox) and Containers, Layout managers, event delegation Model, event handling (event sources, event listeners, event classes and interfaces, adapter classes). **JDBC:** JDBC Architecture, JDBC Drivers, Connection, Statement, Prepared Statement, Result set, Connecting to the Database using JDBC.

TEXT BOOKS:

TB1. Herbert Schildt, "Java 2 -The Complete Reference" – Tata McGraw Hill Education Private Limited, 2010

TB2. Trilochan Tarai, "Java Core Concepts and Applications", I.K. International Publishing house pvt. Ltd., 2015

REFERENCEBOOKS:

RB1. E.Balaguruswamy,"Programming with Java A Primer", McGraw Hill Education Private Limited, 5th Edition,2015.

RB2. Herbert Schildt, Dale Skrien, "Java Fundamentals A Comprehensive Introduction" – Tata McGraw Hill Education Private Limited, 2013

RB3. Cay S. Horstmann, "Core Java Volume 1 – Fundamentals", 10th edition, Pearson, 2017

RB4. Ken Arnold, Davis Holmes, James Gosling, Prakash Goteti, "The Java Programming Language", 3rd edition, Pearson, 2008.

Course Code: BCA 204

Course Name: Software Engineering

LEARNING OBJECTIVES:

The paper aims to understand the importance, limitations and challenges of processes involved in software development. In this course, the learners will be able to develop expertise related to the following:

1. To gain knowledge of various software models.
2. To gain knowledge of various software design activities.
3. To learn cost estimation, software testing, Maintenance and debugging.

PRE-REQUISITES:

NONE

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters - 1, 3], TB2 [Chapters - 3, 5]

Introduction of software engineering: Software Crisis, Software life cycle models, Waterfall, Prototype, Spiral Models, Agile model.

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD, Requirement analysis using (DFD use-case, sequence and class diagram (with case studies), ER Diagrams, Requirements documentation: SRS, Characteristics & organization of SRS

UNIT – II

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 1, 4]

Software Project Planning: Software Metrics-Definition and Need, Types of Metrics-Product, Process and Project Metrics, Size Estimation like lines of Code & Function Count, Halstead Software Science measure, Cost Estimation: Need, Models COCOMO: Basic model, Intermediate model

Risk Management: Software Risks, Types of risk, risk management activities: risk assessment, risk control

UNIT 3

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 5, 6], TB2 [Chapter - 24]

Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling,

Quality management: Quality concept, software quality assurance, Total Quality Management (TQM), software review, software inspection

Software Implementation: Structured coding techniques, coding style, Standards and guidelines, documentation guidelines. Reverse Engineering, Software Re-engineering, Configuration Management.

UNIT – IV

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapter 8, 9], TB2 [Chapter 8]

Software Testing: Testing Process, Levels of Testing: Unit testing, Integration testing and system testing. Types of Testing: Manual testing, Automation Testing. Methods of Testing- , Black box, White box and Grey Box Testing. Validation, Verification, Alpha-Beta testing, Acceptance testing, Functional Testing and its types, Structural Testing Difference between: Testing and Debugging

Software Maintenance: Management of Maintenance, The Maintenance Process and Types of maintenance: Preventive, Perceptive, Adaptive and Corrective Maintenance.Maintenance tools and techniques.

TEXT BOOKS:

TB1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International, 2005.
TB2. I. Sommerville, "Software Engineering", 9th Edition, Pearson Edu.

REFERENCE BOOKS:

RB1. Jibitesh Mishra and Ashok Mohanty, "Software Engineering", Pearson
RB2. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.
RB3. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.

Course Code: BCA 206

Course Name: Introduction to Management and Entrepreneurs Development

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Development of critical thinking and to inspire students to developed an entrepreneurial mind-set.
2. Acquisition of values and attitudes towards understanding complex business problems
3. Promoting active participation in solving current business problems and preventing the future ones.
4. Encouraging students to understand the fundamentals of management

PRE-REQUISITES:

Basic awareness about the Entrepreneurship Development

UNIT–I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapters - 1, 2, 3], TB3 [Chapter - 1]

Introduction to Entrepreneurship: Meaning and concept of entrepreneurship, the history of entrepreneurship development, Role of entrepreneurship in economic development, General characteristics and personality traits of entrepreneurs. Factors affecting entrepreneurship, Agencies in entrepreneurship development in India.

UNIT–II

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 11], TB2 [Chapters - 6, 7], TB3 [Chapter - 4]

Creativity: Necessity of Creativity in the development of entrepreneur, Steps in Creativity, Defining Innovation, importance of innovation. Identification of opportunities for problem solving with innovation. Decision making and Problem Solving (steps indecision making). Example from industry, day to day operations

UNIT–III

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 7], TB2 [Chapters - 10, 2, 1]

Role of an Entrepreneur: The Entrepreneur's role in the context of contribution to society; Examples from industry; the role of changing the mindset and the development of out of box thinking. Introduction to Design Thinking. Entrepreneurs as role models, mentors and influencers. Entrepreneurial success stories.

Historical Perspective, Global Indian Entrepreneurs, Institutions, Modern Entrepreneurs

UNIT–IV

No. of Hours: 10 Chapter/Book Reference: TB3 [Chapters - 21, 22]

Fundamentals of Management: Meaning of Business and its management the role and importance of leadership in entrepreneurship. Difference between Management and Leadership. The importance of planning in entrepreneurship venture. The role and importance of business plan in entrepreneurship venture

TEXT BOOKS:

TB1. S.S Khanka, Entrepreneurship Development, S.Chand

TB2. Sangram Keshari Mohanty, Fundamentals of Entrepreneurship, PHI Learning Private Limited 2018

TB3. Abha Mathur; Entrepreneurship Development, Taxman, Fifth Edition

REFERENCE BOOKS

RB1. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.

RB2. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.

RB3. Chabbra, T.N, Entrepreneurship Development, Sun India

Course Code: BCA 208

Course Name: Introduction to Data Science

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Apply mathematical principles to the analysis of data.
2. Analyze data sets in the context of real world problems.
3. Develop and implement data analysis strategies base on theoretical principles, ethical considerations, and knowledge of the underlying data

PRE-REQUISITES:

None

UNIT–I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 2]

Introduction to data Science, Evolution of Data Science, Data Science Roles, Stages in a Data science Project, Applications of Data Science In various fields, Data security Issues.

Data Collection Strategies, Data Pre-processing overview- Data Cleaning- Data Integration and transformation- Data Reduction- Data Discretization.

UNIT–II

No. of Hours: 11 Chapter/Book Reference: TB2 [Chapters - 4, 6, 7, 14]

Statistics for Data Science: Describing a Single Set of Data, Central Tendencies and Dispersion. Descriptive Statistics-Mean, standard Deviation, Skewness and Kurtosis, Box plots, Pivot Table, Linear Regression.

UNIT–III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 5, 6, 7]

Why Python? - Essential Python libraries

Introduction to NumPy: NumPy Basics: Arrays and Vectorized Computation- The NumPyndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing

Data handling using Pandas in python: Series (creation from ndarray, dictionary; mathematical operations; Head and Tail functions), DataFrames (creation from dictionary of series, operations on rows and columns).

Statistical functions using pandas like min, max, count, sum, quartile, standard deviation, variance & DataFrame operations like aggregation, group by, Sorting, Deleting, Renaming Index, Pivoting.

UNIT–IV

No. of Hours: 11 Chapter/Book Reference: TB2 [Chapters - 15, 20, 23]

Case Studies: Checking different patterns in data, Forecasting demand, investigating clinical data

TEXT BOOKS:

TB1. McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition,2018

TB2. Agile tools for real world data : Python for Data Analysis by Wes McKinney, O'Reilly

TB1. Applying Data Science Business Case Studies Using SAS By Gerhard Svolba · 2017

REFERENCE BOOKS:

RB1. Python: The Complete Reference by Martin Brown

RB2. Programming Python, 4th Edition by Mark Lutz Released December 2010 Publisher(s): O'Reilly Media, Inc

Course Code: BCA 212
Course Name: Practical – VIII Java Lab

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:
1. Basic understanding of Object-Oriented Programming Concepts and create classes.
2. Learn Inheritance, exception handling in Java.
3. Understand and implement multithreading programming.
4. Learn building GUI applications using various controls in Swings.

PRE-REQUISITES: Prior knowledge of programming language is mandatory.

S. No.	Detailed Statement
1.	Write a program declaring a class Rectangle with data member's length and breadth and member functions Input, Output and CalcArea.
2.	Write a program to demonstrate use of method overloading to calculate area of square, rectangle and triangle.
3.	Write a program to demonstrate the use of static variable, static method and static block.
4.	Write a program to demonstrate concept of ``this``.
5.	Write a program to demonstrate multi-level and hierarchical inheritance.
6.	Write a program to use super() to invoke base class constructor.
7.	Write a program to demonstrate run-time polymorphism.
8.	Write a program to demonstrate the concept of aggregation.
9.	Write a program to demonstrate the concept of abstract class with constructor and ``final`` method.
10.	Write a program to demonstrate the concept of interface when two interfaces have unique methods and same data members.
11.	Write a program to demonstrate checked exception during file handling.
12.	Write a program to demonstrate unchecked exception
13.	Write a program to demonstrate creation of multiple child threads.
14.	Write a program to use Byte stream class to read from a text file and display the content on the output screen.
15.	Write a program to demonstrate any event handling.

16.	Create a class employee which have name, age and address of employee, includemethods getdata() and showdata(), getdata() takes the input from the user, showdata() display the data in following format: Name : Age: Address:
17.	Write a Java program to perform basic Calculator operations. Make a menudriven program to select operation to perform (+ - * /). Take 2 integers andperform operation as chosen by user.
18.	Write a program to make use of BufferedStream to read lines from the keyboarduntil 'STOP' is typed.
19.	Write a program declaring a Java class called SavingsAccount with members ``accountNumber`` and ``Balance``. Provide member functions as ``depositAmount ()`` and ``withdrawAmount ()``. If user tries to withdraw anamount greater than their balance then throw a user-defined

S.No.	Detailed Statement
20.	Write a program creating 2 threads using Runnable interface. Print your name in ``run ()`` method of first class and "Hello Java" in ``run ()`` methodof second thread.
21.	Write program that uses swings to display combination of RGB using 3 scrollbars.
22.	Write a swing application that uses atleast 5 swing controls
23.	Write a program to implement border layout using Swing.
24.	Write a java program to insert and update details data in the database.
25.	Write a java program to retrieve data from database and display it on GUI.

Course Code: BCA 214
Course Name: Practical-IX SE Lab

LEARNING OBJECTIVES: Students will be capable to acquire the generic software development skill through various stages of software life cycle. Students will also be able to ensure the quality of software through software development with various protocol based environment. After completion of course student will be able to prepare SRS, analysis the requirement, design the requirements and generate test cases to test the project. Students will also be able to handle software development models through rational method. Rational Rose Enterprise Edition software is used to serve the objectives.
PRE-REQUISITES:
None

List of Practicals

S.No.	Detailed Statement
1.	Select and Write down the problem statement for a real time system of relevance.
2.	Analyze requirement for a system and develop Software Requirement Specification Sheet (SRS) for suggested system.
3.	To create the function oriented diagram: Data Flow Diagram (DFD)
4.	To perform the user's view analysis for the suggested system: Use case diagram.
5.	To draw the structural view diagram for the system: Class diagram
6.	To draw the behavioral view diagram : State-chart diagram or Activity diagram
7.	To perform the behavioral view diagram for the suggested system : Sequence diagram

8.		Draw the component diagram
9		Draw the Deployment diagram.
10		Perform Measurement of complexity with Halstead Metrics for chosen system.

Suggested Applications

(i)   Inventory Management
(ii)   Library Management
(iii)   Result Management
(iv)   Hotel Management System
(v)   Any Website
(vi)   Any mobile application
(vii)   E-Commerce website
(viii) Any other application

Note:

1. **Students are required to identify an application in the beginning of the semester and conduct all practicals for the same application.**
2. **In total 10 practicals to be implemented.**
3. **Students may use any open source software i.e. argoUML for drawing the above diagrams.**
4. **Students may Use testing tool such as junit.**
5. **Student may Use configuration management tool-libra.**

Course Code: BCA 216

Course Name: Introduction to Data Science

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

S. No.	Detailed Statement
1.	Create a pandas series from a dictionary of values and an ndarray.
2.	Create a Series and print all the elements that are above 75th percentile.
3.	Perform sorting on Series data and DataFrames
4.	Write a program to implement pivot() and pivot-table() on a DataFrame.
5.	Write a program to find mean absolute deviation on a DataFrame.
6.	Two Series object, Population stores the details of four metro cities of India and another object AvgIncome stores the total average income reported in four years in these cities. Calculate income per capita for

	each of these metro cities.
7.	Create a DataFrame based on E-Commerce data and generate mean, mode, median.
8.	Create a DataFrame based on employee data and generate quartile and variance.
9.	Program to implement Skewness on Random data.
10.	Create a DateFrame on any Data and compute statistical function of Kurtosis.
11.	Series objects Temp1, temp2, temp3, temp 4 stores the temperature of days of week 1, week 2, week 3, week 4. Write a script to:- a. Print average temperature per week b. Print average temperature of entire month
12.	Write a Program to read a CSV file and create its DataFrame.
13.	Consider the DataFrame QtrSales where each row contains the item category, item name and expenditure and group the rows by category, and print the average expenditure per category.
14.	Create a DataFrame having age, name, weight of five students. Write a program to display only the weight of first and fourth rows.
15.	Write a program to create a DataFrame to store weight, age and name of three people. Print the DataFrame and its transpose.

BCA FIFTH SEMESTER EXAMINATION SYLLABUS & SCHEME

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BCA 301	Operating System	40	60	100
BCA 303	Computer Graphics	40	60	100
BCA 305	Cloud Computing	40	60	100
BCA 307	Data Visualization & Analytics	40	60	100
BCA 309	Minor Project	40	60	100
PRACTICAL				
BCA 311	Practical – Linux - OS Lab	60	40	100
BCA 313	Practical – CG Lab	60	40	100
BCA315	Data Visualization & Analytics Lab.	60	40	100
Total		380	420	800

Paper Code: BCA-301

Paper: Operating System

Pre-requisite: None

Aim: To introduce an operation System and describe the functionalities of Operating System.

Objectives

- To Understand the services provided by an operating system.

UNIT – I

Introduction: What is an Operating System, Simple Batch Systems, Multiprogrammed Batches systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems**Memory Management:** Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation

Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms,

Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations **[No. of Hrs.: 12]**

UNIT – II

Processes: Process Concept, Process Scheduling, Operation on Processes

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple- Processor Scheduling,

Process Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization   **[No. of Hrs.: 10]**

UNIT – III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary- Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability   **[No. of Hrs.: 10]**

UNIT – IV

Information Management: Introduction, A Simple File System, General Model of a File System, Types of File System File-System Interface: File Concept, Access Methods, Directory Structure, Protection: Goals of protection, Domain of protection, Access rights, Consistency Semantics Security: Authentication, Program threats, System threats, Encryption. **[No. of Hrs.: 12]**

TEXT:

[T1] Silbersachatz and Galvin, "Operating System Concepts", John Wiley & Sons, 7th Ed. 2005 [T2] Haldar/Aravind, "Operating System", Pearson Edu.

REFERENCES:

[R1] Madnick E., Donovan J., "Operating Systems", Tata McGraw Hill, 2001 [R2] Tannenbaum, "Operating Systems", PHI, 4th Edition, 2000

[R3] An Introduction to Operating Systems: Concepts & Practice, Bhatt, PHI

Paper Code: BCA 303

Paper: Computer Graphics

Pre-requisites: None

Aim: To understand the graphics applications and its use.

UNIT – I

Introduction: The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Applications, Development of Hardware and Software for Computer Graphics, Conceptual Framework for Interactive Graphics. Overview, Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses.

Graphics Hardware

Hardcopy Technologies, Display Technologies, Raster-Scan Display Systems, The Video Controller, Random-Scan Display Processor, Input Devices for Operator Interaction, Image Scanners, Antialiasing.

Clipping

Cohen- Sutherland Algorithm, Cyrus-Beck Algorithm, Midpoint Subdivision algorithm. [T1][T2]**[No. of Hrs.: 12]**

UNIT – II

Geometrical Transformations

2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, The Window-to-Viewport Transformation, Efficiency, Matrix Representation of 3D Transformations, Transformations as a Change in Coordinate System.[T1][T2][R3]**[No. of Hrs.: 10]**

UNIT – III

Representing Curves & Surfaces Polygon Meshes, Parametric Cubic Curves **Solid Modeling**

Representing Solids, Regularized Boolean Set Operations, Primitive Instancing, Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry, Comparison of Representations, User Interfaces for Solid Modeling. [T1][T2]**[No. of Hrs.: 10]**

UNIT – IV

Three Dimensional Viewing: Introduction, Representation of Three-dimensional objects, Projections, Parallel projections: Orthographic Projections, Oblique Projections. Perspective Projection, Three dimensional clipping, Three-dimensional Cohen-Sutherland clipping algorithm**.**

Hidden Surface Removal: Depth-Buffer(z-buffer) method, Depth-sorting Method(Painter's algorithm)[T1][T2]**[No. of Hrs.: 12]**

TEXT BOOKS:

[T1] Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & Practice, 2000, Pearson [T2] Chennakesava R. Alavla "Computer Graphics", PHI Learning Pvt. Limited

REFERENCES BOOKS:

[R1] D. Hearn & Baker: Computer Graphics with OpenGL, Pearson Education, Third Edition, 2009.

[R2] Foley, J.D. & Van Dam, A: Fundamentals of Interactive Computer Graphics.

[R3] Rogers & Adams, "Mathematical Elements for Computer Graphics", McGraw Hill, 1989.

SUBJECT CODE & NAME BCA 305 (CLOUD COMPUTING)

Course 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 Contents:

UNIT 1: Cloud Computing Overview

Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self- service, 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 & References:

Text:

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw-Hill , New Delhi – 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

BCA 6TH SEMESTER EXAMINATION SCHEME AND SYLLABUS

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
BCA 302	Data Ware Housing & Data Mining	40	60	100
BCA 304	E- Commerce	40	60	100
BCA 306	Internet of Things	40	60	100
BCA 308	Machine Learning	40	60	100
BCA 310	Major Project	-	-	100
BCA 312	Seminar/ Conference Presentation	-	-	100
PRACTICAL				
BCA 314	Practical – IOT Lab	60	40	100
BCA 316	Machine Learning LAB	60	40	100
Total		280	320	800

Paper Code: BCA 302

Paper: Data warehouse and data miningPre-requisites:

- **Information System Concepts**

Objectives: This course is an attempt to provide you with the basic information about data ware house and their development. This course also provides the basic conceptual background necessary to design and develop data ware house applications.

Data mining: Inttroduction, Data mining – on what kind of data, data mining functionalities – what kind of patterns to be mined, Classification of data mining systems, data mining task primitives, integration of a data mining systems with a database or data warehouse systems,major issues in data mining.

Data preprocessing: Descriptive data summarization, data cleaning, data integration and transformation, data reduction, data descretization and concept hierarchy generation.

UNIT – II

Data warehouse and OLAP technology: What is data warehouse, A multidimensional data model, data warehouse architecture, data warehouse implementation, data warehouse usage, OLAP, OLAM

Mining frequent patterns, association and correlation, efficient and scalable frequent itemset mining methods, From association mining to correlation analysis.

[No. of Hrs: 11]

UNIT – III

Classification and prediction: Introduction, issues, classification by decision tree induction, rule based classification, classification by back propagation, lazy learners, other classification methods, Prediction: accuracy and error measures, evaluating the accuracy of a classifier or predictor.

Cluster Analysis: Types of data in cluster analysis, a categorization of major clustering methods, partitioning methods.

[No. of Hrs: 11]

UNIT – IV

Mining complex types of data: Multidimensional analysis and descriptive mining of complex data objects, mining spatial database, multimedia database, mining world wide web.

Applications and trends in data mining: Data mining applications, data mining system products and research prototypes, social impact of data mining, trends in data mining.

TEXT BOOKS:

[T1] Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P.Ltd.,2001.

[T2] Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003

REFERENCE BOOKS:

[R1] Margaret Dunham, " Data Mining: Introductory and Advanced Topics, 1/e", Pearson

[R2] G. K. Gupta, "Introduction to Data Mining with Case Studies", PHI, 2006.

[R3] W. H. Inmon, "Building the Operational Data Store",2nd Ed., John Wiley, 1999

[R4] B. M. Shawkat Ali, Saleh A. Wasimi, "Data Mining Methods and Techniques", Cengage Learning, 2009

Paper Code: BCA 304

Paper: E-commerce Pre-requisites: None

Aim: To understand the process of Electronic commerce and Business strategy involved in it.

UNIT-I

An Overview of E-Commerce: Trade Process & Trade Cycles their linkages with information exchange; Definitions of E-commerce & E-business & their difference; Problems with Manual Systems, Aims of E-

commerce, Functions of E-commerce, Applications of E-commerce in business functions, Tools & Technologies for E-commerce,Types of E-commerce,Operational & Strategic benefits of E-commerce, Issues & Challenges in E-commerce .

Electronic Data Interchange (EDI): Definition, Concept & Evolution of EDI, Traditional versus EDI enabled system for document exchange, EDI Layered Architecture, Process of EDI Message Exchange, Components of EDI, UNEDIFACT Standards & Message Structure, EDI in India, EDI enabled procurement process, EDI Implementation, UN '**Model Interchange Agreement**' for international commercial use of EDI**.**

Web based E-Commerce: Need for web based business, Choosing the right format of website: Characteristics of PR site, Marketing site, Sales site/web-store and vertical & horizontal portals; Steps in setting up business on Internet: Selection & registration of domain name, Websitedevelopment-client & server side tools, web authoring tools, catalogue & web store tools, Website hosting considerations-own versus rented server; Website Maintenance Online Promotion tools & techniques: Getting links to your site, banner advertisements & measuring advertisement effectiveness, Web Traffic Analysis: Various measures, structure of log file data at server side & its analysis for promotion and tools for analysis, Search Engine optimization techniques, Payment Gateways for online payment, Security of transactions on Web: Selling through Secure Servers, use of digital certificates and international standards.

                                                                                                              ]

UNIT – II

Intranet, Extranet and VPN: Architecture of Intranet, Intranet Software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment; The architecture of Extranets, Extranet Products & Services, Applications of Extranets, BusinessModels of Extranet Applications; Virtual Private Network (VPN): Architecture of VPN - service provider dependent & service provider independent configurations, VPN Security- User authentication & Data Security.

Electronic Payment Systems: E-cash: Purchasing & using of e-cash; Electronic Purses their loading with cash and use; E-cheque payment system; Online Third Party Verified Payment System through Credit & Debit Cards & encryption mechanism; ATM based cash disbursement system; Electronic Bill Payment System; 6. Inter bank clearing system.

Security E-Commerce Transactions: Security issues: confidentiality, integrity, authentication, non-repudiation & access control their objectives & techniques; Types of security attacks; Cryptography & Digital Signatures: Symmetric & asymmetric cryptography, Public-Private Key Cryptography, Digital signatures & their use, Public Key Infrastructure (Digital Certificate, Certification Authority, Registration Authority, Key Repository), SSL and SET, Legal issues in cryptography   **[No. of Hrs: 12]**

UNIT – III

Business Strategy in an Electronic Age: Impact of Internet on Competition - Porter's Five Forces Model & Business Strategies in Digital Economy; Impact of IT Enabled Systems on Value Chain - Porter's Value Chain Model; Supply Chain & Supply Chain Management: Definition & flows in a supply chain, Evolution of supply chain-JIT & Quick Response Retailing, Push, Pull and Built-to-order model of supply chains, E-commerce enabled supply chain management using Internet, Intranet & Extranet.

Business Process Management: Concepts of Business Process Management & Business Process Reengineering; Call Centre operations: Purpose & functions, mode of operations, Components (Telephony, Web, Application servers & middle ware, Desktop applications); Customer Relationship Management (CRM).   **[No. of Hrs: 10]**

UNIT – IV

Technology & Legal Issues in E-Commerce: Technological Issues: Availability of telecom infrastructure, interoperability, bandwidth issues, technical standards & spectrum management, Expansion of Internet: 128 bit IP addressing issue; Legal Issues: Uniform Commercial code for E-commerce (**'Model Law on Electronic Commerce'** by United Nations Commission on International Trade Law, IT Act 2000 by Govt of India), Intellectual Property Protection (Copyrights, Patents, Trademarks & Domain Names), Privacy, Security (storage of electronic messages & their evidence value), Customs & Taxation laws, Role of governments & regulatory bodies, Jurisdiction issues.

Applications of E-Commerce & Case Studies: 1. Case studies & applications of e-commerce in Retailing, Banking, Manufacturing, Airlines & Railway reservation & e-governance; 2. Cyber Crimes.   **[No. of Hrs: 10]**

TEXT BOOKS:

[T1] e-commerce: Strategy, Technologies and Applications, David Whiteley, Tata McGraw Hill

[T2] E-Commerce: The Cutting Edge of Business, KK Bajaj & Debjani Nag, McGraw Hill.

REFERENCES:

[R1] The Complete Reference: Internet, Margaret Levine Young, Tata McGraw Hill.

[R2] e-Commerce: Concepts, Models, Strategies, CSV Murthy, Himalayas Publishing House.

[R3] Frontiers of Electronic Commerce, Ravi Kalakota & Andrew B. Wilson, Addison-Wesley (An Imprint of Pearson Education)

[R4] Network Security Essentials: Applications & Standards, William Stallings, Pearson

Paper Code: BCA 306
Paper: INTERNET OF THINGS

1 Introduction: Objective, scope and outcome of the course.

2 Introduction to IoT: Definition and characteristics of IoT, Design of IOT: Physical design of IOT, Logical Design of IOT- Functional Blocks, communication models, communication APIs, IOT enabling Technologies- Wireless Sensor Networks, Cloud computing, big data analytics, embedded systems. IOT Levels and deployment templates. 08

3 IoT Hardware and Software: Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS. 07

4 Architecture and Reference Model: Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers (URIs). Challenges in IoT- Design challenges, Development challenges, Security challenges, Other challenges. 08

5 IOT and M2M: M2M, Difference and similarities between IOT and M2M, Software defined networks, network function virtualization, difference between SDN and NFV for IoT. 08

6 Case study of IoT Applications: Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyles.

Paper Code: BCA 308
Paper: MACHINE LEARNING

Contents	Hours
Introduction: Objective, scope and out come of the course.	**01**
Supervisedlearningalgorithm: Introduction,typesoflearning,application,Supervisedlearning:LinearRegressionModel,NaiveBayesclassifierDecisionTree,Knearestneighbor,LogisticRegression,SupportVectorMachine,Randomforestalgorithm	**09**
Unsupervised learning algorithm: Grouping unlabelled items using k means clustering, Hierarchical Clustering, Probabilistic clustering, Association rule mining, A priori Algorithm, fp growth algorithm, Gaussian mixture model.	**08**
Introduction to Statistical Learning Theory, Feature extraction - Principalcomponentanalysis,Singularvaluedecomposition.Featureselection– feature ranking and subset selection,filter,wrapper and embedded methods, Evaluating Machine Learning algorithms and Model Selection.	**08**
Semi supervised learning, Reinforcement learning: Markov decision process (MDP), Bellman equations, policy evaluation using Monte Carlo, Policy iteration and Value iteration, Q-Learning, State-Action-Reward-State-Action(SARSA),Model-basedReinforcementLearning.	**08**
Recommendedsystem,Collaborativefiltering,Content-basedfilteringArtificialneuralnetwork,Perceptron,Multilayernetwork,Backpropagation,IntroductiontoDeeplearning.	**08**
Total	**42**

PRACTICAL . INTERNET OF THINGS 314

List of Experiments
Start Raspberry Pi and try various Linux commands in command terminal window: *ls,cd,touch,mv,rm,man,mkdir,rmdir,tar,gzip,cat,more,less,ps,sudo,cron,chown, chgrp, ping etc.*

Run some python programs on Pi like:

a) Read your name and print Hello message with name

b) Read two numbers and print their sum, difference, product and division.

c) Word and character count of a given string.

d) Area of a given shape(rectangle, triangle and circle)reading shape and appropriate values from standard input.

Run some python programs on Pi like:

a) Print a name 'n'times, where name and n are read from standard input, using for and while loops.

b) Handle Divided by Zero Exception.

c) Printcurrenttimefor10timeswithanintervalof10seconds.

d) Read a file line by line and print the word count of each line.

a) Light an LED through Python program

b) Get input from two switches and switch on corresponding LEDs

c) FlashanLEDatagivenontimeandofftimecycle,wherethetwotimesaretakenfroma

file.

a) Flash an LED based on cron output (acts as an alarm)

b) Switch on a relay at a given time using cron, where the relay's contact terminal sare

Connected to a load.

c) Get the status of a bulb at a remote place (on the LAN) through web.

The student should have h ands on experience in using various sensors like temperature,

humidity,smoke,light,etc.and should be able to use control web-

camera, network, and

relays connected to the Pi.

PRACTICALS -MACHINE LEARNING 316

List of Experiments
Implement and demonstrate the FIND- S algorithm for finding the most specific Hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample

Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriated datasets

Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a . CSV file. Compute the accuracy of the classifier,

Considering few test datasets.

Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used

to write the program. Calculate the accuracy, precision, and recall for your data

set.

Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use

Java/Python ML library classes/API.

Apply EM algorithm to cluster a set of data stored in a.CSV file. Use the same dataset for clustering using k-Means algorithm. Compare the results of the set two algorithms and comment on the quality of clustering. You can add

Java/Python ML library classes/API in the program.

Write a program to implement k-Nearest Neighbour algorithm to classify there is dataset. Print both correct and wrong predictions. Java/Python ML library

Classes can be used for this problem.

Implement the non-parametric Locally Weighted Regression algorithm in order

To fit data points. Select appropriate data set for your experiment and draw graphs.