

BACHELOR OF COMPUTER APPLICATION

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SCHEME & SYLLABUS

The revised syllabus for BCA Programme provides a strong foundation to pursue post graduation programme in computer science / applications. The knowledge acquired by the students may also equip them to meet the industrial need, and get placed.

Course Objectives

The BCA Programme is designed with the following specific objectives.

1. To attract young minds to the potentially rich & employable field of computer applications.
2. To be a foundation graduate programme which will act as a feeder course for higher studies in the area of Computer Science/Applications.
3. To develop skills in software development so as to enable the BCA graduates to take up self-employment in Indian & global software market.
4. To Train & Equip the students to meet the requirement of the Industrial standards.

DEFINITIONS

‘Semester’ means a term consisting of a minimum of **450** contact hours distributed over **90** working days, inclusive of examination days, within **18** five-day academic weeks.

‘Academic Week’ is a unit of five working days in which distribution of work is organized from Monday to Friday, with five contact hours of one hour duration on each day.

‘Programme’ means a three year programme of study and examinations spread over six semesters, according to the regulations of the respective programme, the successful completion of which would lead to the award of a degree.

‘Course’ means a complete unit of learning which will be taught and evaluated within a semester.

‘Common Course I’ means a course that comes under the category of courses for English

‘Core course’ means a course in the subject of specialization within a degree programme.

‘Complementary Course’ means a course which would enrich the study of core courses.

‘Open course’ means a course outside the field of his/her specialization, which can be opted by a student.

‘Credit’ is the numerical value assigned to a course according to the relative importance of the content of the syllabus of the programme.

‘Parent Department’ means the department which offers core courses within a degree programme.

‘**Grade**’ means a letter symbol (A, B, C, etc.), which indicates the broad level of performance of a student in a course/ semester/programme.

‘**Grade point**’(GP) is the numerical indicator of the percentage of marks awarded to a student in a course.

Words and expressions used and not defined in this regulation shall have the same meaning assigned to them in the Act and Statutes.

Programme Duration	6 Semesters
Total Credits required for successful completion of the programme	120
Minimum credits required from Core courses + Complementary + Project	79
Minimum credits required from Open course	3
Minimum attendance required	75%

- No course shall carry more than 4 credits.
- Student shall have the option to choose Open courses offered by any other Department.

There shall be a maximum of three credits for the open course and remaining one credit should be shifted to choice based course or any other core course.

2. **SCHEME OF EXAMINATION**

The evaluation of each course shall contain two parts:

- (i) **Internal or In-Semester Assessment (ISA)**
- (ii) **External or End-Semester Assessment (ESA)**

The internal to external assessment ratio shall be 1:4, for both courses with or without practical. There shall be a maximum of 80 marks for external evaluation and maximum of **20** marks for internal evaluation. For all courses (theory & practical), grades are given on a 07-point scale based on the total percentage of marks. **(ISA+ESA)** as given below

Percentage of Marks	Grade	Grade Point
90 and above	A+ - Outstanding	10
80-89	A - Excellent	9
70-79	B - Very Good	8
60-69	C - Good	7
50-59	D - Satisfactory	6
40-49	E - Adequate	5
Below 40	F - Failure	4

Note: Decimal are to be rounded to the next whole number

CREDIT POINT AND CREDIT POINT AVERAGE

Credit Point (CP) of a course is calculated using the formula

$$CP = C \times GP, \text{ where } C = \text{Credit}; GP = \text{Grade point}$$

Credit Point Average (CPA) of a Semester/Programme is calculated using the formula

$$CPA = TCP/TC, \text{ where } TCP = \text{Total Credit Point}; TC = \text{Total Credit}$$

Grades for the different semesters and overall programme are given based on the corresponding CPA as shown below:

CPA	Grade
<i>Above 9</i>	<i>A+ - Outstanding</i>
<i>Above 8, but below or equal to 9</i>	<i>A - Excellent</i>
<i>Above 7, but below or equal to 8</i>	<i>B - Very Good</i>
<i>Above 6, but below or equal to 7</i>	<i>C - Good</i>
<i>Above 5, but below or equal to 6</i>	<i>D - Satisfactory</i>
<i>Above 4, but below or equal to 5</i>	<i>E - Adequate</i>
<i>4 or below</i>	<i>F - Failure</i>

Note: A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 40% are required for a pass for a course. For a pass in a programme, a separate minimum of Grade E is required for all the individual courses. If a candidate secures F Grade for any one of the courses offered in a Semester/Programme only F grade will be awarded for that Semester/Programme until he/she improves this to E grade or

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above within the permitted period. Candidate who secures **E** grade and above will be eligible for higher studies.

MARKS DISTRIBUTION FOR EXTERNAL EXAMINATION AND INTERNAL EVALUATION

Components of the internal evaluation and their marks are as below.

For all courses without practical

- a) Marks of external Examination : 80
 b) Marks of internal evaluation : 20

All the three components of the internal assessment are mandatory. For common course English in I Semester, internal oral examination shall be conducted instead of test paper.

Components of Internal Evaluation	Marks
Attendance	5
Assignment /Seminar/Viva	5
Test paper(s) (1 or 2) (1x10=10; 2x5=10)	10
Total	20

For Practical papers in 2nd, 3rd and 4th Semesters

- a) Marks of Practical - External Examination: 40
 - Internal Evaluation: 10

Components of Practical Internal Evaluation	Marks
Attendance	3
Assignment/Seminar/Viva	2
Test paper(s) (1 or 2) (1x5=5; 2x2.5=5)	5
Total	10

Attendance Evaluation

1) For all courses without practical

% of attendance	Marks
90 and above	5
85 – 89	4
80-84	3
76-79	2
75	1

(Decimals are to be rounded to the next higher whole number)

2) For Practical papers in 2nd, 3rd and 4th Semesters

% of Attendance	Marks for theory
90 and above	3
80--89	2
75--79	1

(Decimals are to be rounded to the next higher whole number)

ASSIGNMENTS

Assignments are to be done from 1st to 4th Semesters. At least one assignment should be done in each semester.

SEMINAR/VIVA

A student shall present a seminar in the 5th semester and appear for Viva-voce in the 6th semester.

INTERNAL ASSESSMENT TEST PAPERS

At least one internal test-paper is to be attended in each semester for each course. The evaluations of all components are to be published and are to be acknowledged by the candidates. All documents of internal assessments are to be kept in the college for two years and shall be made available for verification by the University. The responsibility of evaluating the internal assessment is vested on the teacher(s), who teach the course.

PATTERN OF QUESTIONS

Pattern of questions for external examination for theory paper without practical.

Section	Total no. of questions	Number of questions to be answered	Marks of each question	Total marks
A	10	10	1	10
B	12	8	2	16
C	9	6	4	24
D	4	2	15	30
Total	35	26	x	80

Project Evaluation: (Max. marks100)

Components of Project-Evaluation	Marks
Internal Evaluation	20
Dissertation (External)	50
Viva-Voce (External)	30
Total	100

All students are to do a **project**. This project can be done individually or as a group of 3 students. The projects are to be identified during the II semester of the programme with the help of the supervising teacher. The report of the project in duplicate is to be submitted to the department at the sixth semester and are to be produced before the examiners appointed by the College.

Electives:

BCA603 (A): FOSS
 BCA603 (B): Wireless Computing Technology
 BCA603(C): Ecommerce

Open Course for students of other Departments : Web Designing

PROJECT WORK

TITLE OF THE PROJECT
Bonafide Work Done

by

STUDENT NAME

REG. NO.

Project submitted in partial fulfillment of the requirements for the award of
Bachelor of Computer Applications



GUIDE

HOD

Submitted for the Viva-Voce Examination held on _____

Internal Examiner

External Examiner

MONTH – YEAR

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COURSE STRUCTURE

Semester 1

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab		
CEN101	English-I (Common)	5	-	3	4
DMC101	Mathematics (Complementary)	4	-	3	4
DSC101	Basic Statistics (Complementary)	4	-	3	4
BCS101	Introduction to IT(Core)	4	-	3	3
BCS102	Programming in C (Core)	4	-	3	4
BCS1P01	Programming in C Lab(Core)		2	3	2
	Total	21	2		21

Semester 2

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab		
CEN201	English-II (Common)	5	-	3	4
DMC201	Discrete Mathematics(Complementary)	4	-	3	4
BCS203	Internet Programming(Core)	3	-	3	3
BCS204	Data Structures using C (Core)	4	-	3	3
BCS205	Fundamentals of Digital Systems (Core)	4	-	3	3
BCS2P02	Internet Programming Lab	-	2	3	2
BCS2P03	DS Lab (Core)		3	3	2
	Total	20	5		21

Semester 3

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab		
DSC301	Advanced Statistical Methods (Complementary)	4	-	3	4
BCS306	Computer Graphics (Core)	4	-	3	3
BCS307	Computer Organization & Architecture. (Core)	4	-	3	3
BCS308	Object Oriented Programming and C++ (Core)	4	-	3	3
BCS309	System Software(Core)	3	-	3	3
BCS3P04	Graphics Lab (Core)	-	3	3	2
BCS3P05	C++ Lab (Core)		3	3	2
	Total	19	6		20

Semester 4

Course No.	Course	No. of hours per week		Durn of Exam in hours	Credits
		Lect	Lab		
DSC401	Operational Research (Complementary)	4	-	3	4
BCS410	Operating Systems (core)	4	-	3	3
BCS411	System Analysis & Design (Core)	4	-	3	3
BCS412	DBMS & MYSQL (Core)	4	-	3	3
BCS413	Web Programming with PHP(Core)	3	-	3	4
BCS4P06	PHP Lab (Core)	-	3	3	2
BCS4P07	MYSQL Lab (Core)	-	3	3	2
	Total	19	6		21

Semester 5

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab		
BCS 514	Computer Networks (core)	4	-	3	4
BCS 515	Software Project Management (Core)	4	-	3	4
BCS516	Java Programming (core)	3	-	3	4
BCS 517	Open Course (core)	3	-	3	3
BCS5P08	JAVA Lab (core)	-	7	3	2
BCS5PJ	Mini Project in PHP & MYSQL (core)	-	4	-	2
	Total	14	11		19

Semester 6

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab		
BCS618	Programming with .NET	4	4	3	4
BCS619	Software Testing (core)	4	-	3	4
BCS620	Elective (core) 1. FOSS 2. Wireless Computing Technology 3. Ecommerce	4	-	3	4
BCS6P09	Seminar (Core)	-	2	-	2
BCS6PJ	Main Project (Core)	-	7	-	4
	Total	12	13		18

TOTAL CREDITS - 120

SEMESTER	Common Course	Complementary		Core			
	ENGLISH	MATHEMATICS	STATISTICS	COMPUTER SCIENCE	OPEN COURSE	MINI PROJECT	MAIN PROJECT
I	4	4	4	9			
II	4	4		13			
III			4	16			
IV			4	17			
V				14	3	2	
VI				14			4
TOTAL	8	8	12	83	3	2	4

CEN101 ENGLISH (Common Course)

(Syllabus as approved by Board of Studies of English (UG))

DMC101 MATHEMATICS (Complementary)

(Syllabus as approved by Board of Studies of Mathematics (UG))

DSC101: BASIC STATISTICS (Complementary)

(Syllabus as approved by Board of Studies of Statistics (UG))

SEMESTER 1 INTRODUCTION TO IT

Aim: To provide the students Basic knowledge of computers and information technology.

Objectives:

- To understand the evolution of computers in different generations.
- To provide the basic knowledge about the functional units of computer system
- To familiarize the operating system and network.

Unit-1: Introduction: Parts of Computer System- Hardware, Software, Data, Users, Different types of computers, Characteristics of computers, Computer Languages - Machine , Assembly Language and Higher Level languages - 3GL, 4GL, 5GL

Unit-2: Interacting with Computers:-Input Devices - Key Board, Mouse, Variants of Mouse, Handheld devices, Optical Input devices, Output Devices: Monitors, Sound Systems, and Hard copy devices, Graphics software. Display devices- Raster Scan Display, DVST, Flat panel, LCD, Raster Scan systems, Random Scan systems.

Unit-3: Data Processing: Representation of data, processing of data - The CPU, Memory- different types of RAM and ROM, Factors affecting speed

Unit-4: Storing Information in a Computer: Types of Storage Devices - Magnetic Storage Devices –Data storage and organization on a Magnetic Disk, Finding data on a disk -Diskettes - Hard Disks- Tape drives- Optical Storage devices, Solid state storage devices

Unit-5: System Maintenance: Installation - Operating System, CD-ROM Drive, Sound Card, printer, Control panel - Display properties, Adding and removing software, setting date and time, screen saver, appearance. Antivirus installation, Formatting, Disk cleanup, Disk defragmenter. Configure and Connect Dial-Up Networking, Configure a Peer-to-Peer Network, Writing data on disc- CD/DVD Burning, Customize the Windows Desktop, Use Files and Folders

Core Reference:

1. Peter Norton's Introduction to Computers, Published by Tata McGraw Hill, Seventh Edition

References:

1. P K Sinha & Priti Sinha, Computer Fundamentals, BPB Publications, Sixth Edition
2. Introduction to Computer Science, IITL Education Solution limited, Second edition

SEMESTER 1 PROGRAMMING IN C

Aim: To Understand the Programming Fundamentals and the basics of the ‘C’ Programming Language.

Objectives:

- To be able to build own logic for a given problem and finally develop one’s own programs
- To understand the syntax and the semantics of C programming language.

UNIT 1: Program Concept, Characteristics of Programming, Various stages in Program Development Programming aids Algorithms, Flow Charts - Symbols, Rules for making Flow chart, Programming Techniques – Top down, Bottom up, Modular, Structured - Features, Merits, Demerits, and their Comparative study. Programming Logic- Simple, Branching, Looping.

Unit 2:C language basics: C character set, Identifiers and keywords, Data types, Enumeration type, constants, variables, declarations, qualifiers – long, short and unsigned declarations, expressions, symbolic constants, input/output functions, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, increment and decrement operators, Precedence and order of evaluation, conditional operators, bit operators, type casting, using library functions in math.

Unit 3: Control flow: If statement, if...else statement, nested if ..else statement, switch statements, looping – for loop , while loop, do ... while statements, nested loop structure, break, continue and go to statements.

Arrays & Strings: Single dimensional arrays, multidimensional arrays, initializing array using static declaration, Searching and sorting of Arrays, Array of Characters, Character arrays and strings, String handling Functions.

Unit 4: User Defined Functions: Function declaration, definition & scope, recursion, Arrays and functions, call by value, call by reference, Storage Classes: automatic, external (global), static & registers.

Unit 5: Structures: Definition of Structures, declaration, structure passing to functions, array of structures, arrays with in structures, unions, typedef statements.

Pointers: Pointer Definition, pointer arithmetic, array & pointer relationship, pointer to array, pointer to structure, dynamic memory allocation.

Core References:

1. E. BalaGuruswamy, Programming in ANSI C 6E, TMH
2. Byron S Gottfried, Shaum’s Outline series, Programming in C, TMH

References:

1. P K Sinha & Priti Sinha Computer Fundamentals, Sixth Edition.
2. B. Kernighan and D. Ritchie, “The ANSI C Programming Language”, PHI, Second Edition

SEMESTER 1 PROGRAMMING IN C LAB (CORE)

1. Programs using Basic Constructs: Fundamental data types, qualifiers- long, short, unsigned, input/output functions – scanf(), printf(), Arithmetic expressions, Evaluation of integer, real and mixed mode arithmetic expressions, truncation effect, type casting, relational and logical expressions, Conditional operators, trigonometric functions- sin(), cos(), tan(), mathematical functions – abs(), sqrt(), round() defined in math.h, printing formatted outputs using width specifier.

2. Programs using control structures: if, switch, for, while, do...while, nested structures, break and continue. Sample programs should include printing of Fibonacci numbers, prime numbers, check for Armstrong numbers, summation series – exp(x), sin series etc and verification of result using built in functions, printing pyramid like pattern & other similar patterns using nested loops.

3. Programs using Arrays: Array based programs – Creation of array containing prime numbers, matrix addition, matrix multiplication, transpose of a matrix, array sorting, preparing rank lists based on marks, searching of arrays (linear) for finding price of an item. Static initialization of arrays.

4. String manipulation programs – reading strings using %s, gets(), getchar(), copying one string into another, counting number of characters, vowels, words etc, using string handling functions.

5. User Defined Functions: Programs using return type functions, void type functions, example program using recursive functions, array sorting program using function with call by reference, function to copy one string into another.

6. Program using structures: array of structures, program using structure containing arrays and array of structures. Rank list preparation

7. Simple program using pointers

8. IT (for In Semester Assessment only-ISA)

1. Installation - Operating System, CD-ROM Drive, Sound Card, printer
2. Control panel –
 - 2.1 Display properties
 - 2.2 Adding and removing software
 - 2.3 Setting date and time
 - 2.4 Setting Screen saver, appearance using windows accessories.
 - 2.5 Antivirus installation
 - 2.6 Formatting, Disk cleanup, Disk defragmenter.
 - 2.7 Configure and Connect Dial-Up Networking, Configure a Peer-to-Peer Network, Troubleshoot Software and Hardware,
3. Writing data on disc using CD DVD Burner
4. Customize the Windows Desktop
5. File & Folder Operations

SEMESTER 2 INTERNET PROGRAMMING

Aim: To highlight the features of different technologies involved in Web Development

Objectives:

- To design and implement websites.
- To use client-side technologies (CSS, forms, JavaScript).
- To recognize and evaluate website organizational structure and design elements.

UNIT 1: INTERNET- Basics of internet- Addresses & names for the internet, Web objects & site , E-mail, WWW, File transfer, The TELNET, The USENET , Gopher, Wais, Archie, Veronica, Internet chat, Web server, Proxy server, Fast ready connections to the Web, Web Browser.

UNIT 2 : HTML, Basic HTML, Document Body Text, Hyperlink, Adding more formatting, LISTS- Using Colour & images- Tables, Multimedia objects, Frames, forms- MARQUEE.

UNIT 3: DHTML, Cascading ,style sheets, Introduction using styles, Working simple examples, Defining your own styles, Properties & values in styles , Style sheets– A worked example , Formatting blocks of information.

UNIT 4: Java script – Introduction to Java script – Basics – Variables – String manipulation – Mathematical Functions – Operations – Arrays – Functions – Objects in Java script- regular expressions – Built- in objects – Data validation – Messages & Confirmation – Status bar- Writing to a different frame.

UNIT 5: CGI Programming: HTML Forms and Fields; Perl: Basic control structures, datatypes and basic features; CGI Programs: GET & POST methods, simple applications; Cookies; Server Side Includes; Example Applications

Core References:

1. Raj Kamal, Internet & Web Technologies, Tata McGraw Hill
2. Chris Bates, Web Programming, John Wiley & Sons, Third Edition

References:

1. Steven Holzner, HTML Black Book, Dreamtech Publishers

SEMESTER 2

DATA STRUCTURES & ALGORITHMS (CORE)

Aim: To understand the use of the basic data structures along with their applications.

Objectives:

- To learn the use and working of the various data structures.
- To build own algorithms and pseudo codes for the various applications of the basic data structures.

Unit 1: Concept of Structured data: Data structure definition, Different types and classification of data structures, Arrays– representation of array in the memory, linear array operations, Bubble sort, Selection sort, linear search, binary search, sparse matrix.

Unit 2: Stacks and Queues: organization and operation on stacks– Conversion between infix to postfix & prefix representations- Expression Evaluation - Organization and operations on queues-circular queue-multiple stacks and queue - Applications of stacks and queues.

Unit 3: Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion– examples, circular list – doubly linked lists, garbage collection.

Unit 4: Trees: Concept of recursion, definition of - trees, binary trees, strictly binary trees, complete binary tree and Binary search tree, Creation of binary search tree, traversing methods - examples.

Unit 5: Algorithm: Introduction, Definition, Areas of algorithm study, performance analysis - space complexity, time complexity, asymptotic notations

Core References:

1. G.S Baluja Danapat Rai & Co. Data Structures Through C (A Practical Approach)
2. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures, Galgotia Publications, Second Edition

References:

1. Ashok N. Kamthane, Introduction to data structures in C, Person Education
2. Seymour Lipschutz, Theory and Problems of Data Structures, Schaum's Outline Series
3. Tanenbaum, Data structures using C and C++, Second Edition

SEMESTER 2 FUNDAMENTALS OF DIGITAL SYSTEMS (CORE)

Aim: To understand various digital systems and their applications.

Objectives:

- To understand number systems
- To learn about the design principles of different digital electronic circuits
- To design different logic circuits

Unit 1: Number Systems: Base of a number system, Positional number system, Popular number systems (Decimal, Binary, Octal and Hexadecimal), Counting in binary number system, Conversion-Decimal to Binary, Binary to Decimal, Decimal to Octal, Octal to decimal and binary, Decimal to hexadecimal, Hexadecimal to decimal, Binary and octal, Concept of binary addition and subtraction, Complements in binary number systems, 1's Complement, 2's Complement and their applications, Number representation in memory- bi-stable devices, Signed magnitude form, Representation of real numbers, BCD numbers- concept and addition, Concept of parity bit.

Unit 2: Boolean Algebra: Basic laws of Boolean Algebra, Simplification of Expressions, De Morgan's theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Don't care conditions

Unit 3: Gate Networks: Logic gates- AND, OR, NOT, NAND and NOR – Truth tables and graphical representation, Representation of simplified expressions using NAND/NOR Gates, XOR and its applications, parity generator and checker.

Unit 4: Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave, Triggering of flip flops, Counters- Synchronous and asynchronous, BCD, Ripple counters, Half adder, Full adder (need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers (working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle).

Unit 5: The Memory Elements: Concept of Registers, Shift Registers, and Flip flops as building blocks of memory, introduction to RAM & ROM

Core References:

1. M.M.Mano-Digital Logic and Computer design

References:

1. Thomas C Bartee- Digital computer Fundamentals, Sixth Edition
2. Floyd- Digital Fundamentals, Tenth Edition
3. Malvino & Leach- Digital Principles and Applications

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SEMESTER 2
INTERNET PROGRAMMING LAB(CORE)

1. Web page designing using basic HTML tags
2. Style specifications using CSS
3. Programs using JavaScript
4. CGI Programming

SEMESTER 2
DS LAB (CORE)

I. Data Structures using C

1. Array search and sort – Bubble sort, Selection sort, linear search, binary search, sparse matrix, polynomial addition.
2. Stack implementation, Application of stacks – Conversion of infix expression to postfix, expression evaluation.
3. Queue implementation, Implementation of circular queue.
4. Linked list- implementation, concatenation etc., circular list and doubly linked list implementation, implementation of stacks and queue using linked lists.
5. Creation and traversal of binary search trees.

SEMESTER 3 COMPUTER GRAPHICS (CORE)

Aim: To understand the computer graphics and its applications.

Objectives:

- To provide a comprehensive introduction to computer graphics
- To focus on 2D & 3D Modelling
- To create interactive graphics techniques using different algorithms

Unit 1: Points and lines: Line drawing algorithms, Simple DDA. Circle generation, Midpoint circle algorithm, Character generation.

Unit 2: 2D Transformations: Translation, Rotation, Scaling – Matrix representation and homogenous coordinates, composite transformation, raster methods for transformations. **Two-dimensional viewing:** viewing pipeline, concept of window and view port, window to viewport transformation. Clipping operations – point clipping, line clipping, Cohen Sutherland line clipping, polygon clipping, Sutherland-Hodgeman polygon clipping.

Unit 3: Structure Concepts: Basic structure functions, setting structure attributes, Editing structures. **Graphical User interface and interactive input methods:** Input of graphical data, interactive picture construction techniques.

Unit 4: Three-dimensional concepts: Three dimensional display methods, three dimensional graphics packages. **Three dimensional object representations:** Polygon surfaces, sweep representations, constructive solid geometry methods, octrees and quad trees.

Unit 5: Working with Scilab: Installation of the software Scilab. Basic syntax, Mathematical Operators, Predefined constants, Built in functions. Complex numbers, Polynomials, Vectors, Matrix. Handling these data structures using built in functions. Programming – Functions, Loops, Conditional statements, Handling .sci files. Graphics handling- 2D, 3D, Generating .jpg files

Core References:

1. Hearn D & Baker MP, “Computer Graphics”, PHI
2. Amarendra Sinha, Computer Graphics, PHI

References:

1. Newman W M & R F Sproul, “Principles of Interactive Computer Graphics”, Mc-Graw Hill Book Company.
2. Plastock R & Xiang Z, “Theory and problems of computer Graphics”, Schaum Series, McGraw Hill book Company.

SEMESTER 3

COMPUTER ARCHITECTURE AND PARALLEL PROCESSING

Aim: To understand the organization & architecture of computer

Objectives:

- To gain knowledge in addressing modes, memory organization
- To know about parallel computer structures
- To familiarize different processing techniques

Unit 1: Functional units of a computer: Basic operational concepts, Bus structure, Addressing methods, Memory locations and addresses, Instructions and instruction sequencing, Instruction execution.

Unit 2: Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Instruction Classification, Addressing modes.

Unit 3: Main Memory: Organization of RAM, SRAM, DRAM,, Read Only Memory-ROM,PROM,EROM,EEPROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

Unit 4: Input-Output organization: Peripheral devices, I/O interface, Accessing I/O devices- Modes of transfer, interrupts, DMA, Buses

Unit 5: Pipelining and Vector processing: Introduction to parallel processing, Pipeline computers, Multi processing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD. Introduction to pipelining, Instruction and Arithmetic pipelines (design) Vector processing, Array Processors.

Core References:

1. M.M Mano-Computer Systems Architecture, Third Edition
2. Hamachar-Computer Organization, TMH, Fifth Edition

References:

1. W. Stallings, "Computer Organization and Architecture - Designing for Performance", Prentice Hall of India

SEMESTER 3 OBJECT ORIENTED PROGRAMMING AND C++

Aim: To understand the basics of Object Oriented Programming and their applications.

Objectives:

- To discuss the principles of object oriented model and its implementation in C++.
- To know about constructing programs using Bottom-up design approach.
- To implement different stream operations.

Unit 1: Introduction: Object Orientation- object oriented development-Object oriented Methodology-Object oriented Models-Object oriented themes-Modeling-Objects and classes concepts-Links and association concepts-Generalization and Inheritance-state modeling-interaction modeling

Unit 2: Object Oriented language C++: Basic concept of object oriented programming - benefits of oops-Structure of C++ Program-Basic, derived and user defined data types-Symbolic constants-operators in C++ - Control Structures -Functions in C++-The main function, function prototyping-call by reference-return by reference- inline function-function overloading- friend and virtual functions

Unit 3: Classes and objects-specifying a class - Defining member functions - Nesting of member functions - Private member functions - arrays within a class - static data members - static member functions - Arrays of objects-objects as function arguments. Constructors and Destructors- Constructors- Parameterized Constructors-Multiple constructors - Copy constructor - Dynamic constructor-Destructors

Unit 4: Operator overloading & Inheritance- Operator overloading & Type conversions. Inheritance-Defining derived classes-Single, Multiple, Multilevel, Hierarchical and hybrid inheritance- private, public, protected inheritance-virtual base classes-Abstract classes- Constructors in derived classes- nesting of classes.

Unit 5: Pointers-Virtual functions and polymorphism-Pointers-Pointers to objects-this pointer-pointer to derived classes-virtual functions-Pure virtual functions-C++ streams-Stream classes-Unformatted and Formatted console I/O operations- Managing output with manipulators, Manipulating strings.

Core References:

1. E. Balaguruswamy, Object oriented Programming with C++, Sixth edition
2. James Rumbaugh, Michael Blaha, Object Oriented Modeling and Design with UML, Second Edition

References:

1. Yashwant Kanetkar, Let Us C++, BPB Publications, Second Edition
2. John R Hubbard, Programming with C++, Shaum's Outline series.
3. Rajesh K Shukla, Wiley India, Objected-Oriented Programming in C++
4. Venugopal, Rajkumar, Ravishankar, *Mastering C++*, TMH

Board of Studies in Computer Sciences (UG), SB College, Changanacherry

SEMESTER 3 INTRODUCTION TO INFORMATION SECURITY

Aim:

- To introduce internetworking and the issues and methods of information security over internetworks.

Objectives:

- Be aware of principles and protocols of internetworks
- Understand the basic issues in information security
- Understand the concept of ciphers and cryptography.
- Understand the concept of digital signatures and e-mail security policies
- To impart an idea on malicious software and remedies.

Unit I: Information Security: Elements, Confidentiality, integrity, authentication, security policy, basic network security terminology, cryptography, symmetric encryption, substitution ciphers, transposition ciphers, steganography.

Unit 2: Data Encryption Standards: Block ciphers, modes of operation, Data Encryption Standard, Public key cryptography, applications, strength and weakness, RSA algorithm, key distribution (concepts only).

Unit3: Authentication, authentication methods, message digest, digital signatures, digital signature algorithm, DSS, E-mail security: Pretty Good Privacy, working of PGP, S/MIME, MIME, IP Security, Architecture, IPSec: strengths and benefits, IPv4, IPv6, ESP protocol, Web Security: Secure Socket layer, SSL session and connection.

Unit4:Malicious Software, viruses, working of anti-virus software, worms, Trojans, spyware, firewall, characteristics of firewall, packet filters, application level gateways, firewall architecture, trusted systems.

Unit5: Security and Law:- Regulations in India. Information Technology Act 2000/2008.Cyber Crime and the IT Act 2000/2008.Indian Contract Act 1872, Indian Penal Code, Indian Copyright Act, Consumer Protection Act, Future Trends – The Law of Convergence.

Core References:

1. Pachghare, V.K., Cryptography and Information Security, PHI.
2. Brijendra Singh, Network Security & Management, PHI.

References:

1. Behrouz A. Forouzan, “Cryptography and Network Security”, Tata McGraw Hill, Special Indian Edition
2. William Stallings, “Cryptography and Network Security: Principles and Practice”, Pearson Education, Sixth edition

SEMESTER 3 GRAPHICS LAB

I. Graphics using Scilab

1. Write a program to draw a line
2. Write a program to draw a circle
3. Write a program to implement 2D transformation.
4. Write a program to implement clipping
5. Write a program to move a car
6. Write a program to bounce a ball and move it with sound effect.
7. Write a program to test whether a given pixel is inside or outside or on a polygon.

SEMESTER 3 C++ LAB

I. Programs using C++

1. Programs based on class, objects and manipulation of objects using member functions
2. Programs based on friend functions, passing objects as arguments to function.
3. Programs based on array of objects.
4. Programs based on function overloading, Default arguments.
5. Programs based on operator overloading (binary, unary) using member functions and friend functions.
6. Programs based on constructors, different types of constructors- copy constructor, default constructor.
7. Programs based on Inheritance, different types of inheritance.
8. Programs using virtual functions and polymorphism, this pointer

SEMESTER 4 OPERATING SYSTEMS

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

Objectives:

- To understand the services provided by an operating system.
- To understand what a process is and how processes are synchronized and scheduled.
- To know about memory management and the file system.

Unit 1:Introduction: OS Definition, Functions, OS as a resource manager, types of OS Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

Unit 2: Process: Basic Concepts, Process Scheduling, Operations on ‘Processes, Inter process communication, Process Scheduling – Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Unit 3: Process Coordination: Synchronization – The Critical Section problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. DeadLocks : System Model, Dead Lock Characterization, Methods of Handling Dead Locks, Dead Lock Prevention, Dead Lock Avoidance, Dead Lock Detection, Recovery from Dead Lock.

Unit 4: Memory Management: Memory Management Strategies–Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement

Unit 5:Storage Management :-File System :- File Concept, Access Methods, Directory Structure, protection , Implementing File Systems-File System Structure, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.

Core References:

1. Abraham Silberschatz, Peter Galvin and Greg Gagne, John Wiley Operating System Principles, Seventh Edition.
2. William Stallings, Operating Systems, Fifth Edition

Reference:

1. Milan Kovic, Operating Systems, TMH, Second Edition

SEMESTER 4 SOFTWARE ENGINEERING

Aim: To understand the importance, limitations and challenges of processes involved in software development.

Objectives:

- To gain knowledge of various software models.
- To gain knowledge of various software design activities.
- To familiarize about coding and metrics.

Unit 1: Introduction to Software Engineering, Definition, Program Vs Software, and Software process and product metrics, Software Characteristics, Brief introduction about product and process, Software process and product matrices. Software life cycle models- Definition, Waterfall model, Increment process models, spiral model, prototyping model, Evolutionary process models, Selection of a life cycle model.

Unit 2: Software Requirement Analysis and Specification, Requirements Engineering, type of requirements, Feasibility Studies, Requirement Elicitation, Various steps for requirement analysis, DFD, Leveling of DFD, Requirement documentation, Requirement validation, an example to illustrate the various stages in Requirement analysis. Project planning-Size estimation, cost estimation, the constructive cost model (COCOMO).

Unit 3: Software Design: Function oriented design-Design principles, problem partitioning, abstraction, modularity, top-down & bottom-up approach, **Object oriented design-** OO Analysis & design, design methodology, **Detailed design-** PDL, logic algorithm design, state modeling of classes.

Unit 4: Coding & Testing: Programming practice- top-down & bottom-up approach, structured programming, information hiding, programming style, internal documentation, verification-code reading, static analysis, symbolic execution, code inspections and reviews. Software Testing - Functional testing & structural testing.

Unit 5: Software Maintenance: Categories, problems, process, Maintenance models, estimation of maintenance cost.

Core References:

1. K K Aggarwal, Yogesh Singh, Software Engineering, New Age International Publications, Third Edition
2. Pankaj Jalote, An Integrated approach to Software Engineering, Narosa Publishing Company, Pearson Education, Third Edition

References:

1. Rajib Mall, Fundamentals of Software Engineering, PHI, Fourth edition
2. Waman S Jawadekar, Software Engineering Principles and Practice, Tata McGraw-Hill

SEMESTER 4 DATA BASE MANAGEMENT SYSTEM

Aim: 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

Objectives:

- To understand conceptual and physical design of a database.
- To understand RDBMS and queries to design database and manipulate data in it.
- To know basic database backup and recovery.

Unit 1: Introduction: Characteristics of database approach, Data base users-DBA, Data base designers and end users, Advantages of using DBMS, Data Modes- Schemas and instances, DBMS architecture and data independence. DBMS language-DDL, DML, DCL Data Base system environment, DBMS Component and modules.

ER Modeling- Introduction- Entity types, Entity sets, Attributes and Keys, Relationship Types, Relationship Sets relationship instances, Constraints on relationship types, Weak entity types, sample ER diagrams.

Unit 2: Relational Data Model: Relational model concepts domains, attributes, tuples and relations, characteristics of relations. Relational Model constraints Relational Databases and relational data base schemas, entity integrity, referential integrity and foreign keys with examples.

Relational algebra and Relational calculus:

Relations Operations- SELECT, PROJECT, UNION, INTERSECTION, The CARTESIAN PRODUCT, JOIN, EQUIJOIN, Aggregate functions. Examples of queries in Relations Algebra Tuple relations calculus, Domain relational calculus. Relational Data base design using ER-to-Relational mapping.

Unit 3: SQL: Data definition commands- CREATE, ALTER, DROP, Adding constraints, Basic SQL queries-INSERT, SELECT, DELETE, UPDATE Ordering of rows UNION, EXCEPT, INTERSET Substring comparisons using LIKE operator, BETWEEN operator, Complex Queries-Nested queries, EXISTS and UNIQUE functions, NULL values, Renaming of attributes and joining of tables, Aggregate functions and grouping, Managing views

Unit 4: Data Normalization:- Informal Design Guide lines for relation schemas, functional dependencies, Normal forms- first, second and third normal form, Boyce- Codd normal form.

Indexing structures for files- types of single level ordered indexes.

Unit5: Transaction processing:- Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions. Concurrency Control:- Locking techniques for concurrency control.

Database Security and Authorization:- Types of security, control measures, database security and the DBA, Access protection, User accounts and database audits, Access Control based on granting and Revoking privileges.

Core Reference:

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems” Pearson Education, Fifth edition

References:

1. C.J Date, An Introduction to Database systems
2. Reghu Ramakrishnan, Data base Management Systems, McGraw Hill International Edition.
3. Bipin Desai, “ An Introduction to Database Systems” Galgotia Publications

SEMESTER 4

WEB PROGRAMMING WITH PHP

Aim: To highlight the features of different technologies involved in Web Development

Objectives:

- To implement different navigation strategies in website.
- To develop simple back-end database to support a website.
- To recognize and evaluate website organizational structure and design elements.

Unit 1:Introduction - Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type , Operator and Expression, Decisions and loop - Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html

Unit 2:Array - Anatomy of an Array, Creating index based and Associative array, Accessing array Element, Looping with Index based array, Looping with associative array using each() and foreach(), Some useful Library functions

Unit 3:Function - What is a function, Define a function, Call by value and Call by reference, Recursive function , String - Creating and accessing String, Searching & Replacing String, Formatting String , String Related Library function, String matching with regular expression, regular expression, Pattern matching in Php, Replacing text, Splitting a string with a Regular Expression

Unit 4:Handling Html Form with Php - Capturing Form Data, Dealing with Multi-value filed, uploaded form, redirecting a form after submission, Working with file and Directories, Understanding file& directory, Opening and closing a file, Copying, renaming and deleting a file, File Uploading & Downloading

Unit 5:Database–Introduction to OOPS, Class, Object, New Keyword and constructor, Connectivity with MySql, Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query, Join.

Core References:

1. VIKRAM VASWANI, PHP A Beginner’s Guide, Tata McGraw-Hill
2. Steven Holzner, PHP: The Complete Reference

References:

1. George Schlossnagle, Advanced PHP Programming, Pearson Education
2. Luke Welling & Laura Thomson, PHP and MYSQL Web Development
3. Steven Holzner, Spring into PHP5 –Tata McGraw Hill Edition

SEMESTER 4 PHP LAB

1. Designing User Interface
2. Simple programs using decision making and loops.
3. Database Connectivity using Controls - Designing user interface with forms and controls and create database connectivity using MySQL
4. Mini project using PHP

SEMESTER 4 MYSQL LAB

I MySQL Commands (2 hours)

1. **Data definition commands** - CREATE, ALTER, DROP, Adding Constraints – Primary key, foreign key, unique key, check, not null.
2. **Basic SQL queries** – INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.
3. **Complex Queries** – Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.
4. **Managing views, Simple stored procedures.**
5. **Data Control commands** - Access Control and Privilege commands.

SEMESTER 5

DATA COMMUNICATIONS AND COMPUTER NETWORKS

Aim: The aim of this course is to allow students to develop background knowledge as well as core expertise in networking technologies.

Objectives:

- To build an understanding of the fundamental concepts of computer networking.
- To familiarize the categories and topologies of networks
- To understand the details of IP operations in the Internet and associated routing principles

UNIT -1: Need of network: Network classifications-LAN, MAN , WAN, wireless networks & Internet. Data and signals-analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth. Transmission impairments- attenuation distortion and noise. Data communication protocols and standards, Network models - OSI model-layers and their functions.TCP/IP protocol suite.

UNIT-2: Bandwidth utilization Multiplexing: FDM, TDM, spread spectrum. Transmission Media- guided media and unguided media. Switching: message, Circuit and packet switched networks, datagram networks, virtual- circuit networks.

UNIT-3: Hop to Hop Delivery: Error Detection and Correction –Type of Errors, Redundancy, Detection, Correction, Forward Error and Retransmission. Coding -Block Coding (Parity Check Code and Hamming Code) and Cyclic Codes. Framing, flow and error control, Protocols - Noiseless channels (Simplest, Stop and Wait) and Noisy channels (Stop and Wait and Piggy Backing) .

UNIT-4: Multiple Access Protocols, Random Access-ALOHA, CSMA. Wired LANs-IEEE standards, standard Ethernet, Virtual circuit networks, frame relay, ATM-architecture, layers, congestion control and quality of service.

UNIT-5: Host-To-Host Communication, Network Level Logical addressing-IPv4 addresses, IPv6 addresses, Internet protocol-IPv4 andIPv6, Process to Process Delivery –Connectionless and Connection Oriented Service : UDP, TCP. Congestion control, quality of service.Client Server Programs. Name space, domain name space, Remote logging, Electronic mail, file transfer.

Core Reference:

1. Data communications and Networking, B.A. Forouzan, fourth edition

References:

1. W. Stallings, Data and Computer Communications, Macmillan Publishing, Fourth Edition
2. Andrew S Tanenbaum, Computer Networks, Fourth Edition

SEMESTER 5 SOFTWARE PROJECT MANAGEMENT

Aim:

To understand the fundamental principles of Software Project management

Objectives:

- To familiarize the different methods and techniques used for project management.
- To create project plans that address real-world management challenges.
- To identify the project management tools and techniques

Unit1: Introduction to Software Project management: Introduction– Why is Software project management is important? – What is a project? – Software project versus other types of project – Contract Management and technical project management – Activities covered by software project management – plans, methods, methodologies – some ways of categorizing software projects. Stepwise: an overview of project planning. Programme Management and Project Evaluation: Programme Management – Managing the Allocation of resources within programmes –strategic programme management – creating a programme – aids to programme management – Benefits Management – Evaluation of Individual projects –technical assessment – cost-benefit analysis - cash flow forecasting – cost-benefit evaluation techniques – risk evaluation.

UNIT 2: Software Effort Estimation: Problem with over and under-estimates – basis for software estimating – software effort estimation techniques – expert judgment – estimating by analogy. Activity Planning: The objectives – When to plan? – Project schedules – project and activities – sequencing and scheduling activities – Network Planning models – formulating a network model – adding time dimension – forward pass – backward pass. Risk Management: Risk – Categories – Dealing with risk – Risk identification, assessment, planning and management – Evaluating risk to schedule.

UNIT 3: Resource Allocation: Introduction - Nature of resources – identifying the resource requirements – scheduling resources – creating critical path – counting the cost – being specific – publishing the resource schedule – cost schedules – scheduling the sequence. Monitoring and Control: Creating framework – collecting the data – visualizing progress – cost monitoring – earned value analysis – prioritizing monitoring – getting the project back to target – change control.

UNIT 4: Managing Contracts: ISO 12207 approach – supply process – types of contract – stages in contract placement, management– acceptance. Managing People and Organizing Terms: understanding behavior – organizational behavior – selecting the right person for the job – instruction in the best methods – Motivation – Working in groups– becoming a team – decision making – Leadership – organizational structures – dispersed and virtual teams - influence of culture – stress– health and safety.

UNIT 5: Software Quality: The place of software quality in project planning – importance of software quality – defining software quality – ISO 9126 - practical software quality measures – product vs process quality management – external standards – techniques to help enhance software quality- quality plans. Small Projects: Introduction – Some problems with student projects – content of a project plan – conclusion.

Board of Studies in Computer Sciences (UG), SB College, Changanacherry

Core Reference:

1. Bob Hughes & Mike Cotterell, SOFTWARE PROJECT MANAGEMENT, PHI, Fourth edition

References:

1. Lawrence J Peters, Getting results from software development teams, Microsoft Press
2. Walker Royce, Software project Management, Addison-Wesley

SEMESTER 5 JAVA PROGRAMMING

Aim: To understand the use of object oriented features along with their applications

Objectives:

- To understand the model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism
- To use the Java environment to create, debug and run simple Java programs.
- To write a computer program to solve specified problems.

Unit 1: Object oriented programming: Encapsulation-Inheritance-Polymorphism-Genesis of Java-characteristics of java- program structure-identifiers-operators-variables-literals-data types- Arrays. Control Statements-selection statements-iterative statements-jump statements - Loops-while loop-do while loop- for loop

Unit 2: Classes: Declaration –object references-instantiation- method declaration-method calling – this operator- constructor- method overloading-constructor overloading-method overriding-inheritance-super class-dynamic method dispatch-final-static-abstract classes– String Handling.

Unit 3: Packages: Creating packages-using packages-Interfaces-Exception Handling Techniques-try-catch-throw-throws-finally-Multithreading - creation of multithreaded program-Thread class-Runnable interface- thread priorities.

Unit 4: Event Handling: Delegation Event Model-Event Classes-Sources of Events-Event Listeners- AWT: Frame Class-AWT Controls: Label-Button-Checkbox-List-Choice control-Text Field-Text Area- Lay out Managers.

Unit 5: Applet Fundamentals: Applet tag-applet life cycle-passing parameters to applets-working with graphics –Line-Rectangle-Oval – Arc- color setting-I/O Streams: DataInputStream-DataOutputStream-BufferedReader-BufferedWriter classes

Core Reference:

1. E. Balagurusamy, Programming with java, McGraw-Hill Education India, Fifth edition

References:

1. Patrick Naughton, Java2 The Complete Reference, Seventh Edition.
2. Java 6 Programming Black Book, Dreamtech press

SEMESTER 5 JAVA LAB

Part I: Applet Programs: Graphics- AWT controls- Event Handling (using class and read inputs from keyboard)

Part II: Java Programs: Method Overloading- Method Overriding-inheritance-abstract class – interfaces- packages-Exception Handling-Multithreading.

SEMESTER 5 MINI PROJECT

Mini project shall be a small complete project, to make the student confident in designing a system based on *Software Engineering* course, using **PHP** and **MySQL**

SEMESTER 5 PROGRAMMING WITH .NET

Aim: To understand Object Oriented and Object based programming paradigm in event based programming environment.

Objectives:

- To get the Knowledge about different Object Oriented Features.
- To learn programming features of VB.net
- To understand architecture of .Net.

UNIT 1: Introduction to .Net: .net framework- difference between VB6 and VB.Net-Object-Oriented programming and VB.Net-Data types-Variables-Operators-Arrays-Conditional logic.

UNIT 2: Procedures- Dialog boxes- File IO and System objects- Error handling- Namespaces-Classes and Objects- Multithreading-Message Queue- Programming MSMQ.

UNIT 3: VB.Net IDE-Compiling and Debugging-Customizing- Data access: ADO.Net- Visual studio .Net and ADO.Net. Windows Forms: Controls-Specific controls- Irregular forms.

UNIT 4: Vb.Net and web: Introduction to ASP.Net page framework- HTML server controls-Web controls- Validation controls- Events-CSS- State management- Tracing- Security.

UNIT 5: Web Services: Introduction- Infrastructure- SOAP-Building web services- Deploying and publishing web services- Finding and consuming web services.

Core References:

1. Bill Eyjen, Jason Beres, et.al, —Visual Basic .Net programming, Wiley Dreamtech India (p) Ltd.
2. Shirish Chavan, Visual Basic.NET, Pearson Education

References:

1. Fergal Grimes, —Microsoft .NET for programmers, shroff publishers & distributors (p) Ltd.
2. Thuan Thai & Hoang Q.Lam, —.NET Framework essentials, shroff publishers & distributors (p) Ltd.

SEMESTER 6 SOFTWARE TESTING

Aim:

To study fundamental concepts in software testing

Objectives:

- To understand the different testing strategies.
- To understand software test automation problems and solutions.
- To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Unit 1:Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.

Unit-2: Flow/Graphs and Path Testing– Achievable paths – Path instrumentation – Application – Transaction Flow Testing Techniques

Unit 3: Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.

Unit-4: Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats–Test Cases.

Unit-5: Logic Based Testing – Decision Tables – Transition Testing –States, State Graph, State Testing.

Core Reference:

1. B. Beizer, 2003, Software Testing Techniques, DreamTech India, Second edition
2. K.V. Prasad, 2005, Software Testing Tools, DreamTech India, New Delhi.

References:

1. I. Burnstein, Practical Software Testing, Springer International Edition
2. E. Kit, 1995, Software Testing in the Real World: Improving the Process, PearsonEducation, Delhi.
3. R.Rajani and P.P.Oak, Software Testing, Tata McGraw Hill, New Delhi.

OPTIONAL COURSE IN COMPUTER APPLICATION
SEMESTER 6
PAPER 1- FOSS

Aim: To study about different Open Source Softwares.

Objectives:

- To understand open, free softwares
- To familiarize open OS & Mobile OS
- To understand the syntax and the semantics of Python programming language

Unit 1: Open Source Software - Definition of open source software, essential requirements for being open, free software vs open source software, 4 degrees of freedom, FOSS examples, open source hardware

Unit 2: Open OS - Features, Advantages, distributions, Basic Architecture, File System Introduction, File System Hierarchies, Desktop environments – KDE, GNOME. Editors-vim, emacs. Overview of Shells– BASH and other. Linux commands- Commands for files and directories– cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, head, tail. Creating and viewing files using cat. Pipes, Introduction to IO redirection. Filters: grep, egrep, sed, wc, cut, sort, uniq, paste.

Unit 3: Mobile OS - Introduction-open handset alliance, Android ecosystem, Advantages, Versions, Features, Architecture, Applications, Designing User interface with view- text, button, image, edit text, checkbox, toggle button, radio button, progress bar, autocomplete text view, spinner, List, grid, scroll, custom toast alert, time and date picker. Brief description of other OS.

Unit 4: Python: Introduction, Line Structure and Indentation, Identifiers and Reserved Words, Numeric Literals, String Literals, Containers, Delimiters, and Special Symbols, Documentation Strings, Decorators, Source Code Encoding, Operators and Expressions-Operations on Numbers, Operations on Sequences, String Formatting, Advanced String Formatting, Operations on Dictionaries, Operations on Sets, Augmented Assignment, The Attribute (.) Operator, The Function Call () Operator, Conversion Functions, Boolean Expressions and Truth Values, Object Equality and Identity, Order of Evaluation, Conditional Expressions

Unit 5: Program Structure and Control Flow: Program Structure and Execution, Conditional Execution, Loops and Iteration, Functions, Parameter Passing and Return Values, Scoping Rules, Functions as Objects and Closures, Decorators, Generators and yield, Coroutines and yield Expressions, Using Generators and Coroutines, List Comprehensions, Generator Expressions, Declarative Programming, The lambda Operator, Recursion, Documentation Strings, Function Attributes, eval(), exec(), and compile()

Core References:

1. Jesús M. González-Barahona et al, “Introduction to Free Software”, Free Technology Academy, Europe, 2009.
2. Beginning Linux Programming, Fourth edition, Wrox publications
3. Prasanna Kumar Dixit, Android, Vikas Publications
4. David M Beazley, Python Essential Reference, Fourth edition

References:

1. Christopher Negus, Linux Bible, Willey India publications Ltd
2. **Michael Dawson, Python Programming, third edition**

SEMESTER 6

PAPER 2- WIRELESS COMPUTING TECHNOLOGY

Aim: To provide basic knowledge on Wireless Communications, Mobile Internet and Mobile Content Services.

Objectives:

- To learn the basics of Wireless voice and data communications technologies.
- To build working knowledge on various telephone and satellite networks.
- To build skills in working with Wireless application Protocols to develop mobile content applications

UNIT 1: Introduction: Mobility of Bits and Bytes –Wireless The Beginning –Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Application and services- Developing Mobile computer Applications – security in mobile computing – Standards – Why is it necessary – Standard bodies. Architecture for mobile computing– Three-tier architecture – Design considerations for mobile computing– Mobile computing through Internet – Making exiting applications mobile enabled

UNIT 2: Mobile Computing Through Telephony: Evaluation of telephony – Multiple access procedures – Mobile computing through telephone – IVR Application – Voice XML – TAPI

UNIT 3: Emerging Technologies: Blue Tooth – RFID – WiMAX – Mobile IP – IPv6 – Java Card. GSM : Global System for mobile communications – GSM Architecture – GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency allocations – Authentications and Security. SMS

UNIT 4: GPRS – GPRS and packet data network – GPRS network architecture – GPRS network operations – Data services in GPRS – Application for GPRS- Limitations – Billing and Charging. WAP : MMS – GPRS Applications

UNIT 5: CDMA and 3G: Spread spectrum technology – Is 95 – CDMA vs GSM – Wireless Data – Third generation networks – Applications on 3G IEEE 802.11 standards – Architecture – Mobile in Wireless LAN – Deploying wireless LAN – Mobile adhoc networks and sensor networks – Wireless LAN Security –WiFi vs 3G

Core Reference:

1. Asoke K Talukder, Roopa R Yavagal, Mobile Computing, TMH

Reference:

1. Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, Sandeep Gupta (Author), Golden Richard Iii, Loren Schwiebert

SEMESTER 6 PAPER 3- ECOMMERCE

Unit 1: Introduction to E-business: E-commerce vs. E-business, trends driving E-business, Business framework, Business models, Revenue models, Value chain, Business technology.

Unit 2: Launching online business: Business plan, Funding, Web hosting, content creation management, Website design and construction, Strategies for web development, 7 Cs framework, web technologies: website and page development tools, Open source tools.

Unit 3:E-Payment system: Traditional vs. Digital payment systems, Digital Payment requirements, Merchant account, Payment gateway, E-payment methods: Credit cards, E-wallet, Digital Token based E-payment systems, E-Cash, Innovative payment methods, E-loyalty and Reward programmes, E-payment system Design, E-Banking, Main Concerns in Banking.

Unit 4:E-Security: Network and website security, Security Technologies, Internet Security Holes, Cryptography, Codes and Cipher, Data Encryption standard, Authentication, PKI, Digital signature, SSL, Firewalls, VPN, Cryptographic applications . E-Commerce Risk Management, Information Security in India, NASSCOM's Flagship Initiatives, Cyber laws in various countries.

Unit 5: Mobile Commerce: Introduction to mobile commerce, Wireless applications, Hand Held Devices, Mobile Computing, Wireless Web, Concepts of WAP.E-Marketing: Browsing behavior model, Internet Marketing Trends, E-Advertising, E-branding, Marketing Strategies, SEO, Location based commerce, Emergence of Web 2.0, Social Media Strategies.

Core References:

1. Joseph P.T., *E-commerce An Indian Perspective*, PHI

References:

1. Dave Chaffey, *E-Business and E-Commerce Management*, Pearson Education
2. Kalakota Ravi and M.Robinson, *E-Business 2.0: Roadmap for Success*, Pearson Education.

SEMESTER 6 SEMINAR

The student shall choose a modern topic of current day interest in the areas of Computer Science / Information Technology and present a seminar using appropriate presentation media such as LCD projector, OHP etc. A seminar report in bound form in the pattern of a complete technical report (with contents page, well structured presentation, references etc.) shall be submitted.

SEMESTER 6 MAIN PROJECT

The project topic shall be chosen from areas of current day interest using latest packages/ languages running on appropriate platforms, so that the student can be trained to meet the requirements of the Industry. A project report shall be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

OPEN COURSE IN COMPUTER APPLICATION SEMESTER 5 WEB DESIGNING

Aim:

Develop the skills to design a web site.

Objectives:

- To understand the importance of the web as a medium of communication.
- To learn the language of the web: HTML and CSS.
- To embed social media content into web pages.

Unit 1: Internet: Basics of Internet, website, domain, Web browser, web server, search and search engine for internet, Internet Agents, mobile agents, meta search sites, URL, Email

Unit 2: HTML: Introduction to HTML, Basic formatting tags: heading, paragraph, underline break, bold, italic, underline, superscript, subscript, font and image. Different attributes like align, color, bgcolor, font face, border, size. Navigation Links using anchor tag: internal, external, mail and image links. Lists: ordered, unordered and definition, Table tag, HTML Form controls: form, text, password, textarea, button, checkbox, radio button, select box, hidden controls, Frameset and frames.

Unit 3: Photoshop: Working environment, image and color basics, the painting tools, editing tools, selection, layers, paths, filter

Unit 4: Flash: Getting started, tools panel, working with colors, objects, text, timeline panel, using symbols, instances, library, animation

Unit 5: Dreamweaver: Exploring the Dreamweaver, working with panels and workspace, setting up a website and its files, working with webpage elements-text, graphics, tables, hyperlinks, audio/video, frames and forms.

Core References:

1. Raj Kamal, Internet & Web technologies, Tata McGraw Hill
2. Jon Duckett, Web Programming with HTML, XHTML, CSS, Wrox Beginning.
3. Photoshop CS5, Tata McGraw Hill
4. Flash CS6, DreamTech Press
5. Dreamweaver CS6, DreamTech Press

References:

1. Html 4.0 In Simple Steps, Kogent Solutions, Wiley India
2. Ed Tittel & Mary Burmeister, Html 4 For Dummies, Wiley References
3. Harley Hahn, "Internet Complete Reference"

BSc INDUSTRIAL MICROBIOLOGY & ZOOLOGY
(COMPLEMENTARY COURSES IN COMPUTER APPLICATION)
Semester 1
PAPER1 - INTRODUCTION TO IT

Aim: To provide the students Basic knowledge of computers and information technology.

Objectives:

- To understand the evolution of computers in different generations.
- To provide the basic knowledge about the functional units of computer system
- To familiarize the operating system and network.

Unit-1: Introduction: Parts of Computer System- Hardware, Software, Data, Users, Different types of computers, Characteristics of computers, Computer Languages - Machine , Assembly Language and Higher Level languages - 3GL, 4GL, 5GL

Unit-2: Interacting with Computers:-Input Devices - Key Board, Mouse, Variants of Mouse, Handheld devices, Optical Input devices, Output Devices: Monitors, Sound Systems, and Hard copy devices, Graphics software. Display devices- Raster Scan Display, DVST, Flat panel, LCD, Raster Scan systems, Random Scan systems.

Unit-3: Data Processing: Representation of data, processing of data - The CPU, Memory- different types of RAM and ROM, Factors affecting speed

Unit-4: Storing Information in a Computer: Types of Storage Devices - Magnetic Storage Devices –Data storage and organization on a Magnetic Disk, Finding data on a disk -Diskettes - Hard Disks- Tape drives- Optical Storage devices, Solid state storage devices

Unit-5: System Maintenance: Installation - Operating System, CD-ROM Drive, Sound Card, printer, Control panel - Display properties, Adding and removing software, setting date and time, screen saver, appearance. Antivirus installation, Formatting, Disk cleanup, Disk defragmenter. Configure and Connect Dial-Up Networking, Configure a Peer-to-Peer Network, Troubleshoot Software and Hardware, Writing data on disc- CD/DVD Burning, Customize the Windows Desktop, Use Files and Folders, Familiarize DOS internal & external commands.

Core Reference:

1. Peter Norton's Introduction to Computers, Seventh Edition, Published by Tata McGraw Hill

References:

1. P K Sinha & Priti Sinha, Computer Fundamentals, Sixth Edition, BPB Publications.
2. Introduction to Computer Science, Second edition, IITL Education Solution limited

Software Lab 1

1. Installation - Operating System, CD-ROM Drive, Sound Card, printer
2. Control panel –
 - 2.1 Display properties
 - 2.2 Adding and removing software
 - 2.3 Setting date and time
 - 2.4 Setting Screen saver, appearance using windows accessories.
 - 2.5 Antivirus installation
 - 2.6 Formatting, Disk cleanup, Disk defragmenter.
 - 2.7 Configure and Connect Dial-Up Networking, Configure a Peer-to-Peer Network, Troubleshoot Software and Hardware,
 - 2.8 Writing data on disc using CD DVD Burner
 - 2.9 Customize the Windows Desktop
3. Files and Folders

SEMESTER 2 PAPER 2 - OFFICE AUTOMATION

Aim:

To provide the basic knowledge about office packages

Objectives:

- To learn how to create documents
- To familiarize about presentations
- To know about spreadsheets

Unit -1:Document: Introduction; Features- Word User Interface Elements; Creating new Documents; Basic Editing, Saving a Document; Printing a Document; Print Preview, Page Orientation- Viewing Documents; Setting tabs-Page Margins; Indents; Ruler, Formatting Techniques; Font Formatting, Paragraph Formatting; Page Setup; Headers & Footers; Bullets and Numbered List; Borders and Shading; Find and Replace; Page Break& Page Numbers; Mail Merging-Spelling and Grammar Checking; Thesaurus; Automating Documents; Macros; Tables; Side-by-side and Nested Tables; Formatting Tables; Drawing; WordArt.

Unit -2 :Desktop Publishing: Introduction to Desktop publishing as a Process- tools and Pallettes - Working with objects -type Styling options Working with text - formatting options: Leading, Margins and indents - Scaling text, Paragraph formatting options - Working with Grids - Creating frames, Layers.

Unit -3 : Spreadsheet package:Introduction, User Interface, Working with cell and cell addresses, Selecting a Range, Moving, Cutting, Copying with Paste, Inserting and Deleting cells, Freezing cells, Adding, Deleting and Copying Worksheet within a workbook, Renaming a Worksheet. Cell Formatting Options, Formatting fonts, Aligning, Wrapping and Rotating text, Using Borders, Boxes and Colors, Centering a heading, Changing row/column height / width, Formatting a Worksheet Automatically, Insert Comments, Clear contents in a cell. Using print Preview, Preparing Worksheet for the printer, Selecting Print Area, Margin and Orientation, Centering a Worksheet, Using header and footer, Inserting page breaks, Creating list, Sorting Data.

Unit -4: Advanced Features of Spreadsheet: Functions- Logical Functions, Statistical functions, Mathematical etc. Linking Data between Worksheet, Elements of Excel Charts, Categories, Create a Chart, Choosing chart type, Edit chart axis - Titles, Labels, Data series and legend, Adding a text box, Rotate text in a chart, Converting a chart on a web page, Saving a chart. Use of Pivot tables, Templates.

Unit -5 : Presentation Package: Advantages of Presentation Screen layout creating presentation inserting slides adding sounds & videos-formatting slides -slide layout views in presentation - colour scheme background action buttons slide transition Custom animation Creating Master slides Managing slide shows - using pen Setting slide intervals

Core References:

1. Leon, Introduction to Computers with MS-Office, TMH
2. Stephen Copestake, Office 2000 in easy steps, Wiley Dreamtech

References:

1. Personal Computer Software, EXCEL BOOKS
2. Krishnan, Windows & MS-Office 2000, SCITECH.

Software Lab 2

- 1: Familiarization of Office packages

SEMESTER 3 PAPER 3 - TRENDS IN IT

Aim: To study about different Open Source Softwares.

Objectives:

- To understand open, free softwares
- To familiarize open OS & Mobile OS
- To know about the different utilities of the internet

Unit 1:Open Source Software-Definition of open source software, essential requirements for being open, free software vs open source software, 4 degrees of freedom, FOSS examples, open source hardware

Unit 2: OpenOS-Features, Advantages, distributions, Basic Architecture, File System Introduction, File System Hierarchies, Desktop environments – KDE, GNOME. Editors-vim,emacs.Overview of Shells – BASH and other.

Unit 3:MobileOS-Introduction-open handset alliance, Android ecosystem, Advantages, Versions, Features, Architecture, Applications, Designing User interface with view- text, button, image, edit text, checkbox, toggle button, radio button, progress bar, autocomplete text view, spinner, List, grid, scroll, custom toast alert, time and date picker.Brief description of other OS.

Unit 4:Utilities- Firefox- features, versions, system requirements. Apache- features, versions, Wikipedia, Google drive, Social networking- blogging, chatting, whatsapp.

Unit 5:Googling- Introduction, Chrome, Google+, Google account, customization, doodle, search features, tips, filters, alerts, Google trends, Google beyond

Core Reference:

1. Beginning Linux Programming, Fourth edition, Wrox publications
2. Prasanna Kumar Dixit, Android, Vikas
3. Jesús M. González-Barahona et al, “Introduction to Free Software”, Free Technology Academy, Europe

References:

1. Christopher Negus, Linux Bible, Willey India publications Ltd
2. Getting Organized in the Google Era - Douglas C. Merrill and James A. Martin
3. Advanced Googling: How to Search Smarter, Faster and More Efficiently on Google (Google eBook) Garrett Wasny, MA, CMC, CITP/FIBP

Software Lab 3

1. Working with Open OS- Linux
2. Exploring different internet utilities
 - 2.1. File management using Google Drive
3. Effective usage of Google.

SEMESTER 3 PAPER4 -PYTHON

Aim: To Understand the Programming Fundamentals and the basics of the ‘Python’ Programming Language.

Objectives:

- To understand Python’s essential features
- To understand the syntax and the semantics of Python programming language

Unit 1: Introduction:Running Python, Variables and Arithmetic Expressions, Conditionals, File Input and Output, Strings, Lists, Tuples, Sets, Dictionaries, Iteration and Looping, Functions, Generators, Co-routines, Objects and Classes

Unit 2:Lexical Conventions and Syntax:Line Structure and Indentation, Identifiers and Reserved Words, Numeric Literals, String Literals, Containers, Operators, Delimiters, and Special Symbols, Documentation Strings, Decorators, Source Code Encoding

Unit 3:Operators and Expressions:Operations on Numbers, Operations on Sequences, String Formatting, Advanced String Formatting, Operations on Dictionaries, Operations on Sets, Augmented Assignment, The Attribute (.) Operator, The Function Call () Operator, Conversion Functions, Boolean Expressions and Truth Values, Object Equality and Identity, Order of Evaluation, Conditional Expressions

Unit 4:Program Structure and Control Flow:Program Structure and Execution, Conditional Execution, Loops and Iteration

Unit 5:Functions and Functional Programming:Functions, Parameter Passing and Return Values, Scoping Rules, Functions as Objects and Closures, Decorators, Generators and yield, Coroutines and yield Expressions, Using Generators and Coroutines, List Comprehensions, Generator Expressions, Declarative Programming, The lamda Operator, Recursion, Documentation Strings, Function Attributes, eval(), exec(), and compile()

Core Reference:

1. David M Beazley, Python Essential Reference, Fourth edition

References:

1. Michael Dawson, Python Programming, third edition
2. John Zelle, Python Programming: An Introduction to Computer Science, Second edition.

Software Lab 4

1. Program using variables and arithmetic expressions
2. Program using decision making and looping
3. Program using functions