# SRI DHARMASTHALA MANJUNATHESHWARA COLLEGE, UJIRE-574240

**(Autonomous)**

**(Re-Accredited by NAAC at 'A' Grade with CGPA 3.61 out of 4)**

# DEPARTMENT OF COMPUTER SCIENCE

*Syllabus of*
**Bachelor's Degree in**
**BCA**

**(CREDIT BASED SEMESTER SCHEME)**
**2016 – 2017 onwards.**

Approved by the :BOS meeting held on 04-09-2015
Approved by the Academic Council meeting, held on **05.03.2016**

# BCA  AS A DISCIPLINE

## Course Objectives

- To provide sound academic base from which an advanced career in Computer Applications can be developed.
- Conceptual grounding in computer usage as well as its practical business application
- To making candidates suitable for IT sector entry level jobs..

## PAPER DESCRIPTION

| Sl.No | Semester | Paper | Title |
|---|---|---|---|
| | I | Paper I | Fundamental of Information Technology |
| | I | Paper II | Fundamentals of C |
| | I | Paper III | Mathematics |
| | I | Lab | Lab-Fundamental of Information Technology |
| | I | Lab | Lab – Fundamentals of C |
| | II | Paper I | Advanced C and C++ |
| | II | Paper II | Database Management System |
| | II | Paper III | Computer Organization and Architecture |
| | II | Lab | Lab – Advanced C and C++ |
| | II | Lab | Lab – Database Management System |
| | III | Paper I | Programming in VB.Net |
| | III | Paper II | Data Structure using C++ |
| | III | Paper III | Computer Networking |
| | III | Paper IV | Operating System and Unix concepts |
| | III | Paper V | E-commerce |
| | III | Lab | Lab – Programming in VB.Net |
| | III | Lab | Lab - Data Structure using C++ |
| | IV | Paper I | Web Development in .Net |
| | IV | Paper II | Programming in Java |
| | IV | Paper III | Microprocessor System |
| | IV | Paper IV | Data Mining |

| | IV | Paper V | TCP/IP |
|---|---|---|---|
| | IV | Lab | Lab - Web development Lab |
| | IV | Lab | Lab - Programming in Java |
| | V | Paper I | Management and Entrepreneurship |
| | V | Paper II | Computer Graphics |
| | V | Paper III | Software Engineering |
| | V | Paper IV | Java Server Pages |
| | V | Paper V | Distributed Computing |
| | V | Paper VI | Elective: 1. Artificial Intelligence 2. LAMP |
| | V | Lab | Lab – JSP Lab |
| | V | Lab | Lab - Computer Graphics |
| | VI | Project | Project |

# SCHEME OF EXAMINATION

| Sl.No | Semester | Paper | Credits | Marks | | |
|---|---|---|---|---|---|---|
| | | | | IA | Sem End | Total |
| | I | Paper I | | 20 | 80 | 100 |
| | I | Paper II | | 20 | 80 | 100 |
| | I | Paper III | | 20 | 80 | 100 |
| | I | Lab | | 20 | 80 | 100 |
| | I | Lab | | 20 | 80 | 100 |
| | II | Paper I | | 20 | 80 | 100 |
| | II | Paper II | | 20 | 80 | 100 |
| | II | Paper III | | 20 | 80 | 100 |
| | II | Lab | | 20 | 80 | 100 |
| | II | Lab | | 20 | 80 | 100 |
| | III | Paper I | | 20 | 80 | 100 |
| | III | Paper II | | 20 | 80 | 100 |
| | III | Paper III | | 20 | 80 | 100 |
| | III | Paper IV | | 20 | 80 | 100 |
| | III | Paper V | | 20 | 80 | 100 |
| | III | Lab | | 20 | 80 | 100 |
| | III | Lab | | 20 | 80 | 100 |
| | IV | Paper I | | 20 | 80 | 100 |
| | IV | Paper II | | 20 | 80 | 100 |
| | IV | Paper III | | 20 | 80 | 100 |
| | IV | Paper IV | | 20 | 80 | 100 |
| | IV | Paper V | | 20 | 80 | 100 |
| | IV | Lab | | 20 | 80 | 100 |
| | IV | Lab | | 20 | 80 | 100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| V | Paper I | | 25 | 100 | 125 |
| V | Paper II | | 25 | 100 | 125 |
| V | Paper III | | 25 | 100 | 125 |
| V | Paper IV | | 25 | 100 | 125 |
| V | Paper V | | 25 | 100 | 125 |
| V | Paper VI | | 25 | 100 | 125 |
| V | Lab | | 25 | 100 | 125 |
| V | Lab | | 25 | 100 | 125 |
| VI | Project | | 160 | 640 | 800 |

# Fundamental of Information Technology
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- course provides a foundation in information science, particularly for those without a formal information background.
- It serves as an introduction to key concepts of information science, and shows their relationship to professional practice
- engages students with issues relating to the application of technology to the information world

Unit I

Introduction to computers: Introduction to computers, characteristics of computers, advantages & disadvantages of Computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Supercomputers, Network computer

**(4 Hours)**

Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Memory- RAM, ROM, PROM, EPROM, EEPROM, Flash Memory

**(3 hours)**

Auxiliary Storage Devices: Introduction, Magnetic Tape, Winchester Disk, Hard Disk, Floppy Disk, Zip Disk, Jaz Disk, Superdisk, Optical Disk, CD-ROM, Magneto-Optical Drives.

**(3 Hours)**

Unit II

Input and output Devices: Introduction, Keyboard, Mouse, Trackball, Joystick, Digitizing Tablet, Scanners, Digital Camera, Bar Code Reader, Speech Input Devices, Touch Screen, Touch pad, Light Pen, Monitor, Printers, Plotters, Sound Cards & Speakers

**(5 Hours)**

Introduction to Computer Software: Introduction, Operating Systems, Utilities, Compilers & interpreters, word processors, spreadsheets, presentation graphics, database management systems, image processors. **(3 Hours)**

Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems.

**(2 Hours)**

Unit III

Programming Languages: Introduction, machine language, assembly language, high level language, types of high level languages.

**(3 hours)**

Introduction to Computer Security: Types of computer crimes, Computer security, Emerging security solutions, crime & security, computer Crime by authorized users, computer crime through unauthorized access, potentially malicious computer programs, Introduction to cryptography.

**(5 Hours)**

Computer Viruses, Trojan horse & Worms: Introduction, types & categories of viruses, Virus vaccines

**(2 hours)**

Unit IV

Introduction to office automation

Word Processing: Introduction, Basic Capabilities of Word Processors, Advanced Features of Word Processors

Electronic spreadsheets: Introduction, Electronic Spreadsheets, Characteristics of a Spreadsheet, Spreadsheet Packages

Presentation software: Introduction, Presentation Basics, The ingredients of a Good Presentation, Presentation Packages.

**(10 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Alexis Leon & Mathews Leon, Computers Today

**Additional Reading List**

1. Peter Norton's, Introduction to Computers, Second Edition
2. Vikas Gupta, Comdex Computer Course Kit

# Fundamentals of C

**Rationale /Learning Objectives:**

- This course is designed to provide a comprehensive study of the C programming language.
- It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code.
- The nature of C language is emphasized in the wide variety of examples and applications.
- To learn and acquire art of computer programming.To know about some popular programming languages and how to choose
- Programming language for solving a problem.

Unit I

Problem Solving Technique : Problem Definition, Problem Analysis, Design of problem solutions and use of design tools, Algorithms- Steps involved in developing an algorithm, Advantages and disadvantages of Algorithms, Example Algorithms. Flowcharts- Steps involved in developing an Flowcharts, Advantages and disadvantages of Flowcharts. Coding, Debugging, Program Documentation, Program Maintenance, program Development.

**(7 hours)**

Basic Programming Constructs for Computer Programming: Sequence construct, Selection construct- Simple-if statement, if-else statement, if-else –if statement, Multiple Selection Statement. Iteration construct- While statement, do-while statement, for statement.

**(5 Hours)**

Unit II

Introduction to C : History and features of C, Character set, C token, Keywords & identifiers, Constants, Variables, data types, Declaration of variables, assigning values to variables, defining symbolic constants.

**(5 Hours)**

Operators and Expression: Arithmetic, Relational, logical, assignment, increment &

decrement, conditional, bit wise & special operators, evaluation of expressions, Precedence of arithmetic operators, type conversions in expressions, operator precedence & associatively, mathematical functions. Example programs.

**(5 Hours)**

Managing Input and Output operations: Reading & writing a character, formatted input and output. Example programs

**(2 Hours)**

Unit III

Decision making and branching: Decision making with if statement, simple if statement, the if else statement, nesting of if … else statements, the else if ladder, the switch statement, the ?: operator, the go to statement

**(4 Hours)**

Decision making and looping: The while statement, the do statement, for statement, exit, break, jumps in loops

**(2 Hours)**

Arrays: Declaration, initialization & access of one dimensional & two dimensional arrays, Programs.

**(4Hours)**

Unit IV

Searching Technique: Linear Search, Binary Search, Bubble Sort

**(4 Hours)**

Handling of character strings: Declaring & initializing string variables, reading strings from terminal, writing strings to screen, Arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings

**(5 Hours)**

User defined functions: Need for user defined functions, Advantages and Disadvantages of functions.

**(3 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1.  H.K Gungurao, N.S Manjunath, M.N Nachappa, Programming in C
2.  E Balagurusamy, Programming in ANSI C

**Additional Reading List**

1.  Yashwanth Kanitkar, Let us C

# Mathematics
**Teaching Hours : ……… per week**

**Rationale /Learning Objectives:**

- The Mathematics program promotes mathematical skills and knowledge for their intrinsic beauty, effectiveness in developing proficiency in analytical reasoning, and utility in modeling and solving real world problems.
- To responsibly live within and participate in the transformation of a rapidly changing, complex, and interdependent society, students must develop and unceasingly exercise their analytical abilities.
- Students who have learned to logically question assertions, recognize patterns, and distinguish the essential and irrelevant aspects of problems can think deeply and precisely, nurture the products of their imagination to fruition in reality, and share their ideas and insights while seeking and benefiting from the knowledge and insights of others.

Unit I

Sets,Relations and functions- Recapitulation of sets, subsets, cardinality of a set, Cartesian product of two sets. Mathematic Logic: Proposition and truth values, Connectives, their truth tables, Inverse, converse, contra-positive of an implication.

Tautology and Contradiction- logical equivalence, Standard theorems, examples from Switching circuits, truth table and problems.

**(12 Hours)**

Unit II

Matrices and Determinants- Definition of matrices, types of matrices, addition, Scalar multiplication and multiplication of matrices-Problems.

Determinants- Definition of determinants, second, third order, solving a system of equations using cramer's rule.

Trigonometry- Radian measures, conversion of degree into radians and radians into degrees.

Trigonometric functions-Definition of trigonometric functions, problems.

**(12 Hours)**

Unit III

Analytical geometry-Points, distance formula with proof, problems. Statements of the following formulae. Section formula, Mid point formula

Area of a triangle, centroid of the triangle. Problems.

Locus- definition of the problem involving circle,perpendicular bisector and area of triangle.

Circles-definition , typ4es of circles, $x^2+y^2=r2$,$(x-h)^2+(y-k)^2=r^2$. General form of a circle (without proof),problem s to find centre, radius. Touching circles, equation and the length of tangent(without proof), problems.

**(12 Hours)**

Unit IV

Elementary Graph theory-Recapitulation of polyhedral and networks

Definition of a graph and related terms like vertices, degree of a vertex, odd vertex, even vertex, edges, loops, multiple edges, (u, v) walk, trivial walk, closed walk, trail, path, closed path, cycle, even and odd cycle, cut vertex and bridges.

Types of graphs-finite graph ,infinite graph, multiple graph, simple graph, (pq) graph, null graph, complete graph, bipartite graph, regular graph, self complementary graph, sub graph, super graph, connected graph, Eulerian graph, and trees.

Theorems-In a graph with p vertices and q edges , degree of vertices is always the twice the number of edges. Vi=2q.

**(12 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. T Prakash Prabhu  and others, A Classic text book of mathematics for II PUC, S D M excellent publication.
2. T Prakash Prabhu  and others, A Classic text book of mathematics for I PUC, S D M excellent publication.

# Advanced C and C++
**Teaching Hours : 4 per week**

**Rationale /Learning Objectives:**

- C\C++ is the base of today's most preferred programming languages. Even the most popular Operating Systems like Linux, Unix, Solaris & Windows are all designed in C\C++ or in their higher versions.
- Companies demand the same from the candidates at the time of interview.
- C\C++ is taken as the basic eligibility criteria not only for the jobs but also for further technical studies.
- Both of these languages have their scope not only in computers studies but also in Electronics, Mechanical, Instrumentations, Accounts and even in management.
- This training module is an effort to cover the basic to advance features of C\C++.
- The main focus is that the budding software developers can be friendly with this Software package and can explore it up to the maximum possible depth.

Unit I

User Defined Functions: multi functions program, The form of C functions, return values & their types, calling a function, category of functions, handling of non integer functions, nesting of functions, recursion, functions with arrays, the scope & lifetime of variables in functions.

**(5 hour)**

Structures and union: Structure definition, giving values to members, structure initialization, comparison of structure variables, arrays of structures, arrays within structures, structures within structures, structures & functions, unions, size of structures, bit fields.

**(5 Hours)**

Pointers: Understanding pointers, accessing the address of a variable, declaring & initializing pointers, accessing a variable through its pointer, pointer expression, pointer increments & scale factor, pointers & arrays,  malloc(), calloc(), free() and realloc()

**(4 Hours)**

Unit II

Principles of Object Oriented programming:  basic Concepts, benefits,  application.

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**(2 hours)**

Beginning with C++: Program features, comments, cin, cout, return statement, Structure of a C++ program.Dynamic initialization of variables, reference variables, the operators::, ::*, .*, delete, endl, new, setw

**(3 hours)**

Classes and objects: structures, specifying a class, creating objects, accessing class members, defining member functions, making outside functions inline, nesting of member functions, private member functions, arrays with in a class, memory allocation for objects, static data members, static member functions, arrays of objects, objects as function arguments, friends functions, returning objects, const member functions, pointers to members.

**(7 hours)**

Unit III

Constructors and destructors: Parameterized constructors, multiple constructors, constructors with default arguments, dynamic initialization of objects, copy constructor, dynamic constructors, constructing 2 dimensional arrays, destructors.

**(5 Hours)**

Operator overloading: defining, overloading unary and binary operators, overloading binary operators using friend functions, manipulation of strings using operator overloading, type conversions – basic to class, class to basic, one class to another class.

**(7 hours)**

Unit IV

Inheritance: Defining a derived class, single inheritance, protected members, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes, abstract classes, constructors on derived classes, nesting of classes.

**(7 Hours)**

Pointers, virtual functions, polymorphisms: Pointers to objects, this pointer, pointers to derived classes, virtual functions, pure virtual functions.

**(5 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. E Balagurusamy, Programming in ANSI C
2. E  Balagurusamy, Object Oriented Programming in C++

# Database Management System
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- Understand the role of a database management system in an organization.
    - Understand basic database concepts, including the structure and operation of the relational data model.
    - Construct simple and moderately advanced database queries using Structured Query Language (SQL).
    - Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
    - Design and implement a small database project using Microsoft Access.
    - Understand the concept of a database transaction and related database facilities, including concurrency control, journaling,backup and recovery, and data object locking and protocols.

Unit I

Database System Concepts and Architecture, History of Database Systems, Database Systems versus File Systems. Data Abstraction, Data independence, Schemas and Instances, Data models, Database Languages, Database Users, DBA. Structure of Database Systems,

**(5 Hours)**

Data Modeling using E-R model, Entity types, sets, Attributes, Keys, Relationships, Relationship Types, Roles, and Structural Constraints, Weak Entity sets, E-R Diagrams. Different types of database models and their advantages and disadvantages.

**(7 Hours)**

Unit II

Basic structure of Oracle System: Database Structure and its manipulation in Oracle, Storage organization in Oracle.

**(2 Hours)**

Creation of Database: Creating, changing and dropping the tables. Integrity Constraints specification, maintaining reference integrity constraints, Data insertion, deletion and modification.

**(5 Hours)**

Querying the database: Information retrieval using SELECT statement, Various features of SELECT statement , Aggregate functions, ORDER BY clause, Working with expressions and sub queries Handling of multiple tables. Views : Creation of views, modification, data insertion and limitations of views.

**(5 Hours)**

Unit III

PL/SQL Basics: Introduction, character set, reserve words, Block structure, Data types, Conditional statements, looping statements.

**(12 Hours)**

Unit IV

Stored procedures and functions.Cursors - Implicit and explicit cursors, cursor attributes, triggers, packages.Exceptions.

**(12 Hours)**

**Student Activities:**
Calss seminars
Group discussions
Quiz

**Books for Reference- Basic Reading List**

1. Silberschatz and Korth, Database systems concepts, McGrawHill Publication. (Chapter 1)
2. Elmasri and Navathe, 4<sup>th</sup> Edition , Fundamentals of Database systems, Pearson Education Asia publication. (chapter 2,3)
3. Ivan Bayross, Commercial application Development using Oracle D2k, BPB publications. (chapter 1,2,3,4,5,6)

**Additional Reading List**

1. Ivan Bayross, SQL, PL/SQL The Programming Language, BPB publications.
2. Scott Urman, Oracle 8 PL/SQL Programming, Tata McGrawhill Edition

**II SEMESTER - Paper III**
# Computer Organization and Architecture
**Teaching Hours : 4 per week**

**Rationale /Learning Objectives:**

- To  become familiar in following topics:
- How Computer Systems work &  its basic principle
- How to analyze the system performance.
- Concepts behind advanced pipelining techniques.
- The current state of art in memory system design
- How I/O devices are being accessed and its principles
- To provide the knowledge on Instruction Level Parallelism
- To impart the knowledge on nano programming

Unit I

Digital Computer System: Introduction to Number system, Decimal number, Binary number, Octal and Hexadecimal numbers, Number base conversion, Complements, Binary codes, Binary logic, Integrated Circuits, Binary arithmetic's, Addition and Subtraction in the 1's and 2's complement system, Addition and Subtraction in the 9's and 10's complement system. Boolean algebra :Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Venn diagram.

**(12 Hours)**

Unit II

Digital logic gate : Boolean functions, Canonical and Standard forms, other logic operations, Digital logic gates, Universal gate. Simplification of Boolean function: The map method, Two and three variable maps, Four - variable maps, Don't Care conditions, Product of sum Simplification, NAND implementation, NOR implementation. Implementation of EX-OR, EX-NOR using NAND and NOR gate.

**(12 Hours)**

Unit III

Adder and Subtractor : Half Adder, Full Adder, Half Subtractor, Full Subtractor, Binary parallel adder, BCD adder. Combinational Logic: Some common combinational circuits

used in digital systems. Code converter, Exclusive-OR and Equivalence functions. Magnitude comparator, Decoders, Encoders, Multiplexers, Demultiplexers.

**(12 Hours)**

Unit IV

Sequential Logic : Introduction, Flip flops, RS-FF, D-FF. T-FF, and JK-FF. Triggering of flip-flops, Master slave Flip flop, state table, and State diagram. State equations, Flip Flop excitation tables, Sequential circuits design. Registers, Counters: Synchronous Counters design using RS, JK, D, & T flip flops. Ripple counters Introduction, Registers, Shift registers, Timing sequences, Bidirection shift register.

**(12 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. M.Morris Mano, Digital Logic and Computer Design, PHI

**Additional Reading List**

1. Thomas L Floyd, 2011, Digital Fundamentals, 10th Edition, Pearson.
2. Thomas .C. Bartee, Digital Computer Fundamentals, 6th edition, TMH

# Programming in VB.NET
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- Design, formulate, and construct applications with VB.NET
- Integrate variables and constants into calculations applying VB.NET
- Determine logical alternatives with VB.NET decision structures
- Implement lists and loops with VB.NET controls and iteration
- Separate operations into appropriate VB.NET procedures and functions
- Assemble multiple forms, modules, and menus into working VB.NET solutions
- Create VB.NET programs using multiple array techniques
- Build integrated VB.NET solutions using files and structures with printing capabilities
- Translate general requirements into data-related solutions using database concepts

Unit I

Module 1: Overview of the Microsoft .NET Platform

What Is the Microsoft .NET Platform?, What Is the .NET Framework?, What Are the .NET Framework Components?, What Are the Visual Basic .NET Enhancements?

Module 2: Development Environment Features, Describing the Integrated Development Environment – start page, menu system, tool bars, new project, graphical designers, code designers, intellisense, object browser, tool box, solution explorer, class view window, properties window, component tray, server explorer, output window, task list command window.

Module 3: Constants, variable declaration, Data Types, array and strings

**(12 Hours)**

Unit II

Module 4: Making decisions with if…else, select case, switch, choose, loop statements: Do, For, ForEach…Next, while, with

Module 5: Sub procedures and functions, passing variable number of arguments, optional procedure arguments, static variables

Module 6: Exception handling – structured, unstructured

**(12 Hours)**

Unit III

Module 7: Windows forms – TextBox, RichTextBox, Labels, link Labels

Module 8: Windows forms – Buttons, Check Boxes, radio buttons, panels, group boxes.

Module 9: Windows forms – List boxes, checked list boxes, combo boxes, picture box

**(12 Hours)**

Unit IV

Module 10: Object oriented programming methods, classes and objects, members, abstraction, encapsulation, inheritance, polymorphism, overloading, overriding, constructors, destructors, access modifiers, interfaces.

Module 11: Data access with ADO.Net, database basics, creating connections and connection provide data adaptors, creating data set, binding controls to database, navigating in dataset – add, delete, update data

Module 12: Handling database in code, OLEDB connection class, SQL connection class, Oracle Connection class, OLEDB command, SQL command, Oracle Command, OLEDB Adapter, SQL Data adaptor, OLEDB date reader, Creating date connection in code, date reader.

**(12 Hours)**

**Student Activities:**
Calss seminars
Group discussions
Quiz

**Books for Reference- Basic Reading List**

1. Steven Holzner, Visual Basic .Net programming Black book, dreamtech press.

**Additional Reading List**

1. Jeffrey R Shapiro, Complete Reference Visual Basic .Net, Macgraw-hill.

## III SEMESTER - Paper II
# Data Structure using C++
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**
- impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks,queues,lists,trees and graphs
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Unit I

Linear Data Structures and sequential storage representation: Concept and terminology for non-primitive data structures, storage structures for arrays, structures and arrays of structures, Stacks definitions and concepts, operation on stacks, applications of stacks, Recursion, infix to postfix, evaluating postfix expressions, queues, priority queues.

**(10 Hours)**

Unit II

Linear Data Structures and Linked storage representation: Pointers and linked allocation, linked linear lists, operations on linear lists using singly linked storage structures, Circularly linked linear lists, Doubly linked linear lists.

**(12 Hours)**

Unit III

Nonlinear Data Structures: Trees –definition and concepts, operations on binary trees, linked storage representation of binary trees, tree creation and traversal.

**(9 Hours)**

Graphs- Matrix representation of graphs, breadth first search, depth first search.

**(3 Hours)**

Unit IV

**Sorting and searching:**- Sorting, selection sort, bubble sort, merge, quick, searching, sequential and binary searching.

**(10 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. J.P.Trembly and Sorenson, 2001, 2$^{nd}$ Edition, An Introduction to Data Structures with Applications McGraw Hill.

**Additional Reading List**

1. Yedidyah Langsun, Moshe J Augenstein, Tenenbaum, Data Structures using C & C++ , PHI LTD

2. Niklaus Wirth, 1976, Algorithms + Data Structures = Programs, PHI

3. Aho, A.V.Hopcroft and Ullman, 1980, Data Structures and Algorithms, Addison Wesley

4. Horowitze and Sahni, Fundamentals of Data Structures, Gogotia Bookstore

5. Robert, L Krunse, Data Structures and Program Design, PHI

6. Mary Lunis, Data and File Structures, PHI

7. Seymour Lipshutz, Theory and problems of Data Structures, McGraw Hill

# Computer Networking
**Teaching Hours : 4 per week**

**Rationale /Learning Objectives:**

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Unit I

Networking Basics –:Introduction, Uses of Computer Networks,

Network Hardware-LAN, MAN, WAN, Wireless networks.

Network Software, Protocol hierarchies, Design issues for the layers, Interfaces and services, Connection oriented and connectionless services,

LAN Technologies :  Direct, Point to point communication, shared channels, Topologies, Ethernet, ATM,CSMA, CSMA / CD, Wireless LANs

Client Server Interaction : Introduction – client server  paradigm , characteristics –client, server  programs and server class computers – Requests, responses and direction of data Flow, Transport protocols and client-server interaction

**(12 Hours)**

Unit II

Basics  of  Data  Transmission  :Transmission  Media,  Need  for  Asynchronous Communication – using Electric current to send bits – standards for communication – Baud  rate,  framing,  errors – Full  duplex  Communication – Hardware  limitations – Bandwidth – noise – Long distance communication – introduction, sending signals and Modem  hardware  used,  Carrier  frequency  and  multiplexing,  Base  and  Broad  band technologies.  Packet Transmission – Concept of  packets, Packets and TDM, Packets and Frames – Byte stuffing – Transmission errors – Parity bits, cyclic Redundancy check

**(12Hours)**

Unit III

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Protocols and layering : Need – protocol suites – OSI Model – Seven layers – Basis for layering.

**(2 Hour)**

Internetworking : Concepts, Architecture – Introduction -  Concept – Internetworking, Physical Network Connection with Routers – Internet Architecture – Protocols for Internetworking  - Layering And TCP / IP Protocols.  IP addresses – Virtual Internet, IP address scheme, - classes – Computing the class of an address – Dotted decimal notation – Authority for addresses – special IP Addresses – Routers and IP address.

**(6 Hours)**

ARP :Protocol addresses and Packet Delivery – Address Resolution – techniques – Table lookup – closed form computation – Message exchange – ARP message delivery – format – send, identify, cache and processing ARP.

**(4 Hours)**

Unit IV

IP Datagrams and Forwarding : connectionless service – virtual packets – IP Datagram – Forwarding – IP address and Routing Table Entry – Mask field and Datagram forwarding – IP Datagram – Header format.  IP encapsulation and Fragmentation – Datagram Transmission and Frames, Encapsulation, Transmission across an Internet MTU, Datagram size and encapsulation – Reassembly – Fragment loss

**(7 Hours)**

TCP :Reliable Transport Service – Need for Reliable transport – TCP – Services provided – End to end  Service, Packet loss and Retransmission , Retransmission times, Buffers, Flow control and windows, Three-way handshake, congestion control, TCP Segment format.

**(5 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Douglas E. Comer, Computer Networks and Internets ,2$^{nd}$ Edition, Pearson Education

**Additional Reading List**

1. Douglas E Comer, Internetworking with TCP /IP   Volume I II and III, PHI
2. Andrew S. Tanenbaum , Computer Networks – 3$^{rd}$ Edition, PHI

**III SEMESTER - Paper IV**
# Operating System and Unix Concepts
**Teaching Hours : 4 per week**

**Rationale /Learning Objectives:**

- To learn the fundamentals of Operating Systems
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
- To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recove ry and commit protocols
- To know the components and management aspects of Real time, Mobile operating Systems.

Unit I

Introduction: Operating System, simple batch systems, Multi-programmed batched system, time sharing systems, real-time systems, system components, Operating system services

**(3 Hours)**

Process: Process concept, process scheduling, Cooperating  processes, threads

**(5 Hours)**

CPU Scheduling: Basic concepts, scheduling criteria,  scheduling algorithms.

**(4 Hours)**

Unit II

Process synchronization: Critical section problem, synchronization (algorithms excluded), semaphores, classical problems of synchronization

**(5 Hours)**

Dead Locks: Deadlock characterization, methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, recovery from Deadlock.

**(7 Hours)**

Unit III

Memory Management: Logical verses physical address space, swapping, contiguous allocation, paging, segmentation.

**(5 Hours)**

Virtual Memory: Demand paging, page replacement , page replacement algorithms, allocation of frames

**(5 Hours)**

File System: File Concept, access methods, directory structure, file system structure, allocation methods

**(2 Hours)**

Unit IV

Introduction to Unix: History, System- V release, Kernel and shell, Features of Unix

**(2 Hours)**

Commands and Utilities & Unix File System: Locating commands, Internal and external commands, arguments, options and filenames, flexibility of usage, Help. General Utilities: cal, date, who, tty, passwd, echo, bc, script, spell, uname, wc, zip, tar, sort, Unix File System:-Categories, names, parent-child relationship, absolute path name, changing, creating, removing directories, listing files & directories, relative path names. Handling files-displaying, creating, copying, deleting, renaming files, printing, ,comparing files.

**(3 Hours)**

Shell Programming: Shell, pattern matching and  quotations. Redirection, pipes. Vi editor-modes, working with Text. File ownership-permissions, octal notation. Shell scripts, command line arguments. Operators and conditional execution-if-else, case, Looping-while, for. Expression computations

**(4 Hours)**

UNIX/LINUX Practical demonstrations –

**(3 Hours)**

**Student Activities:**
Calss seminars
Group discussions
Quiz

**Books for Reference- Basic Reading List**

1. Abraham Sliberschartz & Peter Galvin, Operating System Concepts – 5$^{th}$ edition, McGraw Hill

2. Sumitabha Das, Unix – Concepts and ApplicationS, Tata McGraw Hill

**Additional Reading List**

1. Milan Milenchivic, Operating systems, McGraw Hill

2. Bryan Kernighan and Rob Pike, Unix Programming Environment, PHI

3. Colin Ritchie, Operating systems incorporating Unix and Windows- 3$^{rd}$ edition, BPB Publications

# E COMMERECE
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- Explain to students why information systems are so important today for business and management
- Evaluate the role of the major types of information systems in a business environment and their relationship to each other;
- Assess the impact of the Internet and Internet technology on business-electronic commerce and electronic business;
- Identify the major management challenges to building and using information systems and learn how to find appropriate solutions to those challenges;

Unit I

E-Commerce:Introduction, Brief history of E-Commerce, Definition, Features of E-Com, Benefits or advantages of E-Commerce, Disadvantages of Traditional Business Application, B2B business, B2B E-Commerce diagram, Advantages of B2B, Disadvantages of B2B, B2C E-Commerce (B. Pradhan)

Networking & Internet Technologies:Networking, Advantages, Disadvantages, types of computer networks, Network Topologies, Transmission media, VSAT , OSI reference model, TCP/IP, wireless network, e-mail, MIME (B. Pradhan)

**(12 Hours)**

Unit II

Electronic Data Interchange (EDI)

EDI, Benefits, How EDI process works, EDI software, EDI Standards, EDI requirements, EDI Standards (154), steps to successful EDI (B. Pradhan)

Security E-Commerce: Introduction, Meaning and Definition, Internet Security Concepts (Confidentiality/Integrity/Authentication), Issues regarding security on Internet, Remedies to product the e-environment, tools to protect Data Security, the firewall concept, components of the firewall, Cryptography (170-175), Encryption of Decryption (176 – 180) (Bhupati) Digital Signature, (172-174), (M.C. Trivedi)

**(12 Hours)**

Unit III

Electronic Payment System: Introduction, EPS, features, types of e-payment, e-cash, e-cheque, Advantages of e-cheque, disadvantages, smart card, credit card, advantages/disadvantages of credit card, security threats (Puja walia) E-wallet (222 – Bibhuti)

E-Services (275 – 304) (B. Pradhan): Introduction, E-learning, E-education, Web enabling services, matchmaking, information selling, entertainment, auctions, internet banking, security and privacy issues in i-banking, attacks and compromises, authentication techniques, payment gateway, e-stock, travel services, e-employment/e-jobs, e-governance.                                              **(12 Hours)**

Unit IV

M-Commerce/Mobile Computing: (Puja Walia): Introduction, meaning of wireless and mobile computing mobile service typology and fundamentals (M.C. Trivedi) (53,54)

Mobile computing frame work, mobile information access devices (M.C. Trivedi) (56 – 57) (portable computers) (PDA), Applications of mobile computing, Application of mobile & wireless computing to distinguish fields, advantages of m- computing, disadvantages of m-computing.

Education & Training online: Introduction, meaning of education, meaning of training, edutainment, online education and training, advantages of online education and training, disadvantages of online-education and training, tools and techniques for virtual classes/training programme

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. CSV Murthy, E-Commerce concepts, models and strategies, 1$^{st}$ edition, Himalayan publications (Selections 10.21 to 10.28, 13.19 to 13.25, Chapter 19, Chapter 21.17 to 21.22)

2. KoaKota and Wintson, 2001, Frontiers of E-Commerce, Indian edition, Chapter 5.4, 6.1 to 6.4, 8, 22.2 to 22.5

3. by Kamalesh Bajaj and Debjani, E-Commerce the cutting edge of business.

# WEB DEVELOPMENT IN .NET
**Teaching Hours : 4  per week**

**Rationale /Learning Objectives:**

- to get familiarize with Microsoft.Net, C#, VB.NET and ASP.NET technologies.
-  The .Net online training course is designed to understand the different concepts and features of .NET coding, debugging and developing of Windows and web applications.
- The advanced learner can opt for advanced ASP.Net Modules.

Unit I

Html – Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head and Body Sections Building HTML documents, Inserting texts, images, hyperlinks, backgrounds and colour controls, different html tags, table layout and presentation, use of font size and attributes. List types and its tags, use of frames and forms in web pages, ASP & HTML Forms.

**(12 Hours)**

Unit II

Introduction to JavaScript: JavaScript in web pages, advantages, Basic Programming techniques-data types and literals, type casting, variables, operators and expressions, programming constructs- conditional checking, looping. Functions, placing text in a browser, Dialog boxes, Document Object Model-Introduction, DOM, objects in HTML, properties and methods. Browser objects, html object hierarchy. Handling events in JavaScript, other built-in objects in JavaScript-string, math, date, user defined objects.

**(12 Hours)**

Unit III

 Adding controls to a web form, buttons, text box, labels, checkbox, radio buttons, list box. Adding controls at runtime. Running a web application, creating multiform web project. Form validation: Clint side validation, server side validation, validation controls: required field comparison range. Calendar control, ad rotator control, internet explorer control.

Introduction to ADO.Net

XML in .NET, XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, the XML Data Document.

Web services - Introduction, state management – view state, session state, application state. SOAP, web service description language, building and consuming a web service. Web application deployment. Caching. Threading concepts

**(12 Hours)**

Unit IV

An introduction to HTML 5, HTML 4 Doctype Declaration, HTML 5 is open to Interpretation, 4 Doctype Declaration, WAI – ARIA and HTML 5, drawing with the canvas element, Video on the Web, Geo Locations in HTML5, Working Offline in HTML5, Building Forms in HTML5, Using CSS today, understanding CSS Transitions, Hover Crafting with CSS, Enriching Forms Using CSS3 Properties, Transforming the Message, CSS3 – In Conclusion.

**(12 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Neha Kotecha, Sonal Mukhi, Vijay Mukhi, 2011, ASP.NET with C# The basics, BPB publishers.

2. Ivan Bayross, 2011, HTML 5 and CSS 3 made simple, BPB publications.

3. E. Balagurusamy, Programming in C#.

**Additional Reading List**

1. Kogent solutions Inc, 2011, ASP.Net 3.5 in simple steps, Wiley,

2. Mark Pilgrim, 2010, HTML5: Up and Running, O'Reilly

3. Laura Lemay, Rafe Colburn, Denise Tyler, Sams Teach yourself web publishing with HTML and XHTML in 21 days, 3rd Edition, SAMS,

## IV SEMESTER - Paper II
# Programming in Java
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- To model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism
- Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections
- How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
- How to test, document and prepare a professional looking package for each business project using javadoc.

Unit I

Java Evolution ,Java history, Java features, Hardware and Software requirements, Java support systems, Java environment.

**(2Hours)**

Overview of Java Language: Introduction, Simple Java program, More of Java, An application with two classes, Java program structure, Java Tokens, Java Statements, Implementing a Java program, Java Virtual Machine, Command line arguments.

**(2Hours)**

Constants, Variables and Data types: Introduction, Constants, variables, Data types, Declaration of variables, giving values to variables, Scope of variables, Standard default values.

**(4Hours)**

Operators and Expressions: Introduction, Arithmetic operators, Relational Operators, Logical operators, Assignment operators, Increment and decrement operators, conditional operator, Bitwise operators, special operators, Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, operator precedence and associativity, Mathematical functions.

**(4Hours)**

## Unit II

Decision making and branching-Introduction, Decision making with If statement, simple IF statement, the IF ....ELSE statement, Nesting of IF ....ELSE statements. The ELSE ....IF....ladder, the Switch statement, the ?: operator.

**(5Hours)**

Decision making and Looping     -Introduction, The While statement, the Do statement, the For statement, Jumps in loops, labeled loops.

**(5Hours)**

Arrays, Strings and Vectors-Arrays, One-dimensional arrays, creating an Array, Two Dimensional Arrays, Strings, Vectors, Wrapper Classes.

**(2Hours)**

## Unit III

Classes Objects and Methods Introduction, Defining a Class, Adding variables, Adding Methods, Creating   Objects, Accessing Class members, Constructors, Methods Overloading, Static   Members, Nesting of Methods, Inheritance, Overriding Methods, Final   variables and Methods, Final classes, Finalizer Methods, Abstract methods and Classes, Visibility control.

**(5Hours)**

Interfaces: Multiple Inheritance-Introduction, Defining Interfaces, Extending interfaces, Implementing interfaces, Accessing interface variables.

**(3Hours)**

Packages: Putting Classes Together-Introduction, Java API packages, Using System Packages, Naming conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a package, Hiding Classes.

**(4Hours)**

## Unit IV

Multithreaded Programming  -Introduction, Creating Threads, Extending the Thread Class, stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread methods, Thread Exceptions, Thread priority, synchronization, Implementing the 'Runnable' Interface.

**(4Hours)**

Managing Errors and Exceptions-Introduction, Types of Errors, Exceptions, Syntax of

Exception Handling Code, Multiple Catch Statements, Using finally statement, throwing our own exceptions, Using Exceptions for Debugging.

**(4Hours)**

Applet Programming-Introduction, How Applets differ from Applications, preparing to write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Applet Tag, Adding Applet to HTML page, Running the Applet, Passing parameters to Applets, aligning the Display.

**(4Hours)**

**Student Activities:**
Calss seminars
Group discussions
Quiz

**Books for Reference- Basic Reading List**
1. E. Balaguruswamy, Programming with JAVA – A Primer Second Edition –, Tata McGraw- Hill Publishing Company Limited.

**Additional Reading List**
1. Ivor Horton, Beginning Java 2 – JDK 1.3 Edition –Wrox Press Limited.
2. Patrick Naughton, Herbert Schildt, The Complete Reference Java 2 – Third Edition –Tata McGraw Hill Publishing Company Limited.

# Microprocessor System
**Teaching Hours : 4 per week**

**Rationale /Learning Objectives:**

- Developing of assembly level programs and providing the basics of the processors
- To provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems
- To assist the students with an academic environment aware of excellence guidelines and lifelong learning needed for a successful professional carrier

Unit I

Introduction and Architecture of 8086: Historical evolution of microprocessors, microprocessor based computer system, computer data formats, internal microprocessor architecture, the programming model, types of registers, flags and segment registers.

**(4 Hours)**

Addressing Modes: Register, immediate, direct, register indirect, base plus index, program memory addressing modes, stack memory addressing modes.

**(8Hours)**

Unit II

Data Movement Instructions: MOV instruction-various types, push, pop, LEA, string data transfer, miscellaneous data transfer instructions-XCHG, XLAT, segment override prefix, IN and OUT

**(7Hours)**

Assembler Details: Directives, memory organization(tiny, small, large)

**(5Hours)**

Unit III

Arithmetic and Logic instructions:Add, subtract, multiply and divide instructions, BCD and ASCII arithmetic, basic logic instructions, shift and rotate, string comparison

**(8Hours)**

Interrupts:Introduction, interrupt vectors, instructions, controlling carry fag bit, WAIT, HLT, LOCK, ESC, BOUND, ENTER and LEAVE.

Unit IV

Program Control Instructions:Jump- various types(conditional and un conditional), Loop-do while and repeat until loops in MASM 6.x, Procedures and parameter passing CALL and RET instructions

**(12Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Burry M Brey, Intel Microprocessors 4<sup>th</sup> edition, PHI

**Additional Reading List**

1. K R Venugopal and Rajkumar, Microprocessor X86 programming, BPB
2. Schaums Series Assembly language programming
3. DV Hall, Microprocessors and Interfacing , Tata McGraw Hill

# Data Mining
**Teaching Hours : 4 per week**

### Rationale /Learning Objectives:

- Understanding of the value of data mining in solving real-world problems.
- Understanding of foundational concepts underlying data mining.
- Understanding of algorithms commonly used in data mining tools.
- Ability to apply data mining tools to real-world problems.

Unit I

Introduction : Data Mining as a Subject

Data warehousing Introduction, Definition, Multidimensional Data Model, OLAP Operations, Warehouse Schema, Data Warehousing Architecture, Warehouse Server, Metadata, OLAP Engine, Data Warehouse Backend Process, Other Features

Data mining Introduction, Data Mining Definitions, KDD vs. Data Mining, DBMS vs. DM, Other Related Areas, DM Techniques, Other Mining Problems, Issues and Challenges in DM, DM Application Areas, DM Applications-Case Studies

**(12Hours)**

Unit II

Association rules Introduction, Association Rule, Methods to Discover Association Rules, Priori Algorithm, Partition Algorithm, Pincer-Search Algorithm, Dynamic Itemset Counting Algorithm, FP-tree Growth Algorithm.

Clustering techniques Introduction, Clustering Paradigms, Partitioning Algorithms, k-Medoid Algorithms, CLARA, Hierarchical Clustering, DBSCAN, Categorical Clustering Algorithms, STIRR.

**(12Hours)**

Unit III

Decision trees Introduction, Decision Tree, Tree Construction Principle, Best Split, Splitting Indices, Splitting Criteria, Decision Tree Construction Algorithms, CART, ID3

Rough set theory Introduction, Definition, Example, Rough Sets and Fuzzy Sets.

Other techniques Introduction, Neural Network, Learning in NN, Unsupervised Learning, Data Mining using NN: A Case Study, Genetic Algorithm, Support Vector Machines.

**(12Hours)**

Unit IV

Web mining Introduction Web Mining, Web Content Mining, Web Structure Mining, Web Usage Mining, Text Mining, Unstructured Text, Episode Rule Discovery for Texts, Hierarchy of Categories Text Clustering

Temporal and spatial data mining Introduction, Temporal Data Mining, Temporal Association Rules, Sequence Mining, The GSP Algorithm, Episode Discovery, Event Prediction Problem, Time-Series Analysis, Spatial Mining

**(12Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Arun K Pujari, 2010, Data Mining Techniques, 2nd Edition, Universities Press India.

**Additional Reading List**

1. Jiawei Han, Micheline Kamber, 2010, Data Mining Concepts And Techniques, 3nd Edition, Elsevier.

# TCP/IP
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Unit I

Evolution of open Networks, Layering of Communication process, TCP/IP Layering, standardization, Internetworking concept and architectural model, Internet addresses.

Link Layer Encapsulation, physical addresses, IEEE & MACs. ARP – Operations, Cache & time outs, RARP – Overview, Operations, Primary and Backup RARP Servers, Loopback Interface.                                    **(12Hours)**

Unit II

IP Routing Principles, Routing IP Datagrams, RIP, OSPF, HELLO, BGP, Trace route program, CIDR – Subnetting, VLSM, Supernetting

**(12Hours)**

Unit III

UDP Header, UDP Checksum, Multiplexing, Demultiplexing & ports, Maximum Datagram Size, Sliding Windows, TCP – Passive and Active Opens, RTT Estimation, TCP Connection Establishment and Termination, Delayed Acknowledgement and Nagles Algorithm, TCP Timers, Multicasting – IP Multicast addresses, IGMP.

DNS – Basics, Resolution, Caching, DNS Message Format, TELNET Protocol, Rlogin – Protocol.                                    **(12Hours)**

Unit IV

FTP – Protocol, Process Model. TFTP, NFS, SMTP – protocol. POP, IMAP, MIME.

IPV6 – Features, Datagram format, Use of Multiple Headers, IPV4 Vs IPV6.

**(12Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Commer Douglas E, 2010, Internetworking with TCP/IP: Principles, Protocols, And Architecture, Vol. I, 5th Edition, Phi Learning.

**Additional Reading List**

1. Peter Loshin, 1999, TCP/IP Clearly Explained, Elsevier India
2. Behrouz A Forouzan, 2003, TCP/IP Protocol Suite, 2nd Edition, Tata Mc-Grow Hil Publication.

# Management and Entrepreneurship

## Teaching Hours : 4  per week

**Rationale /Learning Objectives:**

- Identify and apply the elements of entrepreneurship and to entrepreneurial processes;
- Recognize the importance of entrepreneurship and identify the profile of entrepreneurs and their role in economic growth;
- Use the entrepreneurial mind-set and behave responsibly and ethically in their roles as entrepreneurs.

Unit I

Management: Introduction, meaning, nature and characteristics of management, scope and functional areas of management, management as a science, art of profession, management and administration, roles of management, levels of management.

**(6 Hours)**

Planning: Nature, importance and purpose of planning process, objectives, types of plants(meaning only), decision making, importance of planning, steps in planning and planning premises, hierarchy of plans.

**(6 Hours)**

Unit II

Organizing and Staffing::Nature and purpose of organization, principles of organization, types of organization, departmentation committees, centralization vs. decentralization of authority of responsibility, nature and importance of staffing, process of selection and recruitment(in brief)

**(6 Hours)**

Direction & controlling: Meaning and nature of directing styles, communication – meaning and importance, coordination – meaning and importance and techniques of coordination, meaning and steps in controlling.

**(6 Hours)**

Unit III

Entrepreneur: Meaning of entrepreneur, evolution of the concept, functions of and entrepreneur, types of entrepreneur, entrepreneur – emerging class, concept of entrepreneurship, evolution of entrepreneurship, development of entrepreneurship, stages

in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India, entrepreneurship its barriers.

**(6 Hours)**

Small scale industries: Definition, characteristics, need and rationale, objectives, scope, role of SSI in economic development, advantages of SSI, government policy towards SSI, Different polices of SSI, impact of liberalization, privatization and globalization on SSI, ancillary industry and tiny industry (definition only).

**(6 Hours)**

Unit IV

Preparation of Project: Meaning of project, project identification, project selection, project report, need and significance of report, contents, formulation, guidelines by planning commission for project report, network analysis, errors of project report, project appraisal, identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study.

**(12 Hours)**

Student Activities:

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. P.C. Tripathi, P.N. Reddy, Principles of management,Tata McGraw Hill
2. Vasant Desai, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House
3. Poornima M Charantimath, Entrepreneurship Development, 2006, small business enterprises – person education. (2 & 4)

**Additional Reading List**

1. Robert Lusier, Thomson, Management Fundamentals – Concepts, Application, Skill Development.
2. S.S. Khanka, Entrepreneurship Development , S. Chand & Co
3. Stephen Robbins, 2003, Management, Pearson Education / PHI, 17th Edition

# Computer Graphics
**Teaching Hours : 4  per week**

**Rationale /Learning Objectives:**

- Understand the structure of modern computer graphics systems.
- Understand the basic princinples of implementing copmputer graphics primitives.
- Be able to conbstruct inbteractive computer graphics programs using OpenGL

Unit I

Raster Graphics Algorithm for 2D primitives: Introduction-Output Technology-Raster and Vector display system, Software portability and Graphics Standards, Conceptual Framework of Interactive Graphics.

Scan converting-lines, circles and ellipses, Filling rectangles, polygons, ellipse arcs, pattern filling, Thick primitives, Line Style, Pen Style, Clipping in a Raster World, Clipping lines, circles, ellipses and polygons, Generating characters.

**(12 Hours)**

Unit II

2D Graphics: 2D transformations, Homogenous coordinates, Matrix representation of 2D transformation, Composition of 2D transformation, Window to Viewport transformation.

**(12 Hours)**

Unit III

3D Graphics: Matrix representation of 3D transformation, Composition of 3D transformation, Transformations as change in coordinate systems

**(12 Hours)**

Unit IV

Multimedia: Introduction, Multimedia data streams, sound and audio file formats, images and graphics file formats, data compression and optical storage media

**(12 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Foley J.D Van Dan A. Fundamentals of interactive computer Graphics, Addison Wesley.
2. Rolfsteinmetz, Multimedia Computing, communication and application, Redson Education

**Additional Reading List**

1. Hearn D Baker P.M, COMPUTER GRAPHICS, PHI
2. Rogers D.F Adam J, Mathematical Elements for Computer Graphics, McGrawHill
3. Harrington D, Computer Graphics-A programming approach, Tata McGraw Hill
4. Foley, J.D Van Dam A, Feiner S.K and Hughes, Computer Graphics principles and practice, Addison Wesley
5. Giloi W K, Interactive computer graphics, prentices Hall
6. Newman W, Sproul R.F, Principles of Interactive computer Graphics, McGrawHill
7. Rogers D.F, Procedural Elements of Computer Graphics.
8. Satish Gupta, 1993, Main Stream Multimedia, Van No stand
9. Robert Jennings, 1992, Windows 3.1 Multimedia, Que Corporation

# Software Engineering
**Teaching Hours : 4 per week**

**Rationale /Learning Objectives:**

- Be employed in industry, government, or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility;
- Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment; and
- Progress through advanced degree or certificate programs in computing, science, engineering, business, and other professionally related fields.

**Unit I**

Introduction :The Software Problem, Software Engineering Problem, The Software Engineering Approach

**(4 Hours)**

Software Processes :Software Process, Characteristics of a Software Process, Software Development Process, Waterfall Model, Prototyping, Iterative Enhancement, Spiral Model, Project Management Process, Phases of management process, Metrics, Measurement, and Models, Software Configuration Management Process, Configuration Identification, Change control, Status accounting and auditing, Process Management Process, Building estimation models, Process Improvement and maturity,

**(8 Hours)**

**Unit II**

Software Requirements Analysis and Specification :Software Requirements, Need for SRS, Requirement process, Problem Analysis, Analysis Issues, Informal Approach, Structured Analysis, Prototyping, Requirements Specification, Characteristics of an SRS, Components of an SRS, Specification Languages, Structure of a Requirements Document, Validation, Requirement Reviews

**(6 Hours)**

Preliminary Design :Design Principles, Module-Level Concepts, Design Notation and Specification, Data Flow Diagrams, Structured Design Methodology, Verification

**(6 Hours)**

**Unit III**

Detailed Design **:**Module specification, Specifying functional module, Detailed design, PDL, Logic/Algorithm Design, Verification, Design Walkthroughs, Critical Design Reviews, Consistency checkers

**(7 Hours)**

Coding **:**Programming Practice, Top-Down and Bottom-Up, Structured Programming, Information Hiding, Programming Style, Internal Documentation, Verification, Code Reading, Static Analysis, Proving Correctness, Code Inspections or Reviews, Unit Testing

**(5 Hours)**

**Unit IV**

Testing and Maintenance**:** Testing Fundamentals, Error, Fault, and Failure, Top-Down and Bottom-Up Approaches, Test Cases and Test Criteria, Psychology of Testing, Functional Testing, Equivalence class partitioning, Boundary value analysis, Cause-effect graphing, Structural Testing, Control flow based criteria, Data flow based testing, Preventive and Corrective Maintenance activities

**(12 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Jalote Pankaj,Integrated Approach to Software Engineering

**Additional Reading List**

1. Roger Pressman, Software Engineering, McGrawHill Publication

# Java Server Pages
### Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- Explain the JSP technology, its features and advantages
- Explain Web development process and various server-side technologies
- Develop JSP applications using JSP Tags, JSP Script lets and JavaBeans
- Explain JSP Application Models
- Develop JSP applications implementing Session Management and Database Connectivity

Unit I

The J2EE Platform: Introduction , Enterprise Architecture styles :Two - Tier Architecture Three Tier Architecture and N - Tier Architecture .The J2EE Platform Introduction to J2EE APIs (Servlet, JSP, EJB, JMS, JavaMail, JSF, JNDI) Introduction to container Apache Tomcat as a Web Container .

`Introduction and Need for JDBC Database Drivers JDBC APIs for database Connectivity (Java. sql Package) Connection Statement  Prepared statement    Callable statement Result set  Other JDBC APIs Database Meta Data    Result Set Meta Data

**(12 Hours)**

Unit II

**Servlet Programming**

Introduction to Servlets  Servlets Implementation    The servlet interface    The Generic Servlet class The single thread Model interface     The Http Servlet class      Service( ) doGet( ) doPost( ) doDelete( )  doOption( ) doPut( ) doTrace( ) Servlet Exceptions  The Servlet Exception class, The unavailable Exception class, Servlet Lifecycle ,Servlet Request and Response, The Http Servlet Request interface, GetAttribute( ) setAttribute( ) , getAttributeNames( ) getparameters( ) getParendernames( ) getParameterValues( ) getRemoteHost( ) getRemoteAddr( ) getCookies( ) getHeaders( ) getQueryString( ) getSession( ) The Http servlet Response Interface getWriter( ) getcontentType( ) addCookie( ) encodeURL( ) sendRedirect( ) setHeader( ) setStatus( )

Session Tracking Approaches URL Rewriting

Hidden Form Fields Cookies ,Session API ,Session Tracking with Servlet API The Http Session interface ,GetAttribute( ) GetAttributeNAmes( ) GetCreationTime( ) GetId( ) GetlastAccessedTime( ) IsNew( ) RemoveAttribute( ) SetAttribute( ) SetMaxInactiveinterval( )

Invalidate( ) Servlet Collabration Request Dispatching with Request Dispatcher interface Forward( ) Include( ) Servoet Context The servlet Context interface getContext( ) getRequestDispatcher( ) getServerInfo( )

**(12 Hours)**

Unit III

JSP Programming

Introduction to JSP JSP , development Basic JSP ,LifeCycle, JSP Elements ,Directive Elements Page Directive ,Include directive Scripting elements Declaration Scriptlets Expressions Action elemtns Standard action <jps : param> <jsp : include> <jsp : forward> <jsp : plugin> Comments and template data Scope of JSP variables Page Request Session Application Using implicit objects The request object The response object The out object The session object The config object The exception object The application object Handling Errors and Exception Dealing with exception in the page directive Dealing with exception in the Deployment Descriptor

Adding exception handling in JSP pages Including and forwarding from JSP pages

Include Action Forward Action, getInitParameter( ) getInitParameterNames( ) getAttribute( )

setAttribute( ) removeAttribute( )JSP Expression Language: EL Introduction, EL Implicit Objects EL Operators , EL Functions JSP Standard Tag Library**:** JSTL Introduction core tags xml tags sql tags fmt tags Core tags <c : out> <c : set> <c : if>

SQL tags <sql : query> <sql : update> Fmt tags <fmt : formatNumber> <fmt : formatDate>

**(12 Hours)**

Unit IV

Database Connectivity with Javax.sql.* ,Javax.sql.* - Interfaces , CommonDataSource, ConnectionPoolDataSource, DataSource,PooledConnection, RowSet, RowSetMetaData, XAConnection DataSource - methods Connection getConnection() ,

Connection getConnection(String UserName , String Password) Connection Pooling and Statement Pooling ,Connection Pools,Connection pooling - interfaces - ConnectionPoolDataSource ,PooledConnection ,ConnectionPoolDataSource , ConnectionPoolDataSource – Methods PooledConnection getPooledConnection() PooledConnection getPooledConnection (String user, String Password), PooledConnection - PooledConnection - Methods ,Connection getConnection(), void close () ,Distributed Transactions, XADataSource ., XAConnection ,XADataSource ,,RowSet ,RowSet - Methods ,

Javabeans Introduction,,Features of JavaBeans,Using <jsp:useBean> ,<jsp:setProperty>, Using <jsp:getProperty>Accessing Database from JSP ,<sql:setDataSource>, <sql:query> <sql:update> , Application-Specific Database Actions

Struts Introduction to Struts Framework ,Struts Architecture , –MVC Model- ,Action Servlet ,ActionMappings , , ActionForm, ActionForm – Input Validation ,Action Class Action,ActionError Class , ,Advantages of Struts

**(12 Hours)**


**Student Activities:**

Calss seminars

Group discussions

Quiz


**Books for Reference- Basic Reading List**

1. Jim Keogh,J2EE-The Complete Reference, Mc Grawhill Education
2. Java Server Programming, Java EE6 Black Book, DreamTech Publication

**Additional Reading List**
1. Herbert Schildt, Java2 the complete Reference, Mc Grawhill Education

# Distributed Computing
**Teaching Hours : 4 per week**

**Rationale /Learning Objectives:**

- Understanding the major tools and techniques that allow programmers to effectively program the parts of the code that require substantial communication and synchronization;
- Studying the core ideas behind modern coordination and communication paradigms and distributed data structures;
- Introduce a variety of methodologies and approaches for reasoning about concurrent and distributed programs;
- Realizing not only the basic principles but also the best practice engineering techniques of concurrent and distributed computing;
- Presenting techniques to formally study the safety and progress properties of concurrent and distributed algorithms;
- Analyzing the performance of current multi-core and future many-core systems.

Unit I

Principles of DC and Distributed Databases Introduction to Principles of DC, Distributed Databases: An Overview,-Features of Distributed versus Centralized Databases,-Why Distributed Databases?,-Distributed Database Management Systems (DDBMSs)

Review of Databases: The Relational Model, Database Applications, Programs and Transactions

Levels of Distribution Transparency,-Reference Architecture for Distributed Databases,-Types of Data Fragmentation.

Query Processing and Concurrency Control in DBMS: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions , Serializability: Conflict Serializability, Recoverability,-Lock-Based Protocols:->Locks, Granting of Locks, The Two-Phase Locking, Protocol,-Timestamp-Based Protocols

**(12 Hours)**

Unit II

Distributed Database concept, Distributed Concurrency Control, Commit Protocols

Fault Tolerance:,-Introduction - Issues - Atomic Actions and Committing - Commit Protocols - Nonblocking Commit Protocols- Voting Protocols->Static Voting,Commit Protocols

**(12 Hours)**

Unit III

Distributed deadlock detection and resolution –Introduction, Preliminaries :Deadlock Handling Strategies in Distributed Systems - Issues in Deadlock Detection and ResolutionControl Organizations for Distributed Deadlock Detection - Centralized Deadlock-Detection Algorithms - Distributed Deadlock Detection Algorithms->A Path-Pushing Algorithm - Hierarchical Deadlock Detection Algorithms->The Menasce-Muntz Algorithm-Perspective- Distributed Algorithms

Distributed Mutual Exclusion -Introduction - The Classification of Mutual Exclusion Algorithms - Preliminaries - A Simple Solution to Distributed Mutual Exclusion - Non-Token-Based Algorithms - Lamport's Algorithm

Agreement Protocols-Introduction - The System Model - A Classification Of Agreement Problems- Solutions to the Byzantine Agreement Problem * The Upper Bound on the Number of Faulty Processors * An Impossibility Result

**(12 Hours)**

Unit IV

Distributed Programming:Developing distributed applications using Servlets and JSP -Development of Enterprise-wide applications.

**(12 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Ceri.S and Pelagatti S, Principles and Systems, McGrawHill

2. Abraham Silberschatz, Henry K Forth and S.Sudarshan, Database System Concepts

3. Desai, An Introduction to Databases.

4. Mukesh Singhal and Niranjan Shivaratri, Advanced Concepts in Operating System,

5. Simon Brown, Robert Burdick, Jayson Falkner, Ben Galbraith, Rod Johnson, Larry Kim, Casey Kochmer, Thor Kristmundsson, Sing Li, Professional JSP 2$^{ND}$ Edition, Wrox Publication

# LAMP Technology
## Teaching Hours : 4 per week

**Rationale /Learning Objectives:**

- Comprehend installation of Linux
- Comprehend Service Management
- Comprehend Dynamic Content
- Comprehend Error Handling
- Understand MySQL Table Types
- Manage User privileges
- Comprehend Proxies
- Comprehend Package Management with YUM

Unit I

Linux Operating System: Linux Operating System Concepts and Architecture; Overview of the Linux Kernel, User Space, Kernel Space; Processes and Daemons, Process Control; Overview of Linux Administration; Linux File system, User, Group and Resource Management; Configuration Files Overview; File system Permissions, Access Permissions and Security, Common Filesystem Commands, Recursion Option in Commands, Find, Grep, Cat, More, Less and Sort Commands

**(12 Hours)**

Unit II

Apache Web Server: Linux distribution Apache Installation; Starting and stopping Web Server Apache Configuration files; Apache Directives – Server Con figuration, Directory level configuration: htaccess and <Directory>, Access Control, URL Pathnames, MIME types, CGI files, Automatic directory Indexing, Authentication, Log files; Virtual Hosting – IP Add ress Virtual Host, Name Based Virtual Host, Dynamic Virtual Hosting; Server Side includes; Apache GUI Configuration Tools ậ Comanche and linuxconf; Web Server Security –SSL; Apache Web Server Configuration files

**(12 Hours)**

Unit III

HTML/XHTML and HTTP: basics review, PHP and the web server Architecture model, Overview of PHP capabilities, CGI vs. Shared Object Model, PHP HTML Embedding Tags and Syntax, simple PHP script example; PHP and HTTP environment variables

MYSQL Database Server: Installation- precompiled packages, post installed configuration, post installed troubleshooting; MySQL Administration; Commands – m yisamchk, mysql, mysqladmin, mysqlbug, mysqlimport, mysqlshow; Creating users and granting them permissions; Creating databases; Data types; Creating a table; Graphical tools

PHP: Obtaining, Installing and configuring PHP; obtaining PHP Source code; Installing PHP from Binary Packages; PHP and security considerations; PHP configuration parameters and the php.ini File; Language Options, Register Globals and Security Resource limits parameters, Error Handling and Logging parameters; Data handling parameters, Paths and Directories, Dynamic Extensions, Checking install with phpinfo function.

**(12 Hours)**

Unit IV

PHP Language core: Variables, Constants and Datatypes, and Operators; Decision making, Flow control and loops; Arrays and Array operations, Two dimensional and multidimensional arrays, Strings and strings operations; Functions, Function Declaration and parameter passing; Outputting data, include and require statements; file and Directory Access Operation; Error Handling and Reporting Considerations; Processing HTML From Input from the User ; Creating a Dynamic HTML Form with PHP; Login and Authenticating Users; Using GET, POST, SESSION and COOKIES variable; Session management and Variables; Working with Cookies, Sending Emails; Object Oriented PHP: Classes and Constructors

Database Operation With PHP: Built-in Database Function ,Connecting to a MySQl Database; Selecting a Database, Building and Sending the Query to Database; Engine, Retrieving Result â¢€ Retrieving, Updating and Inserting Data; Sample Database Routines and Code Segments, Logging Database; Operations for Troubleshooting

**(12 Hours)**

**Student Activities:**

Calss seminars

Group discussions

Quiz

**Books for Reference- Basic Reading List**

1. Lee , 2006, Open Source Development with LAMP : Using Linux, Apache, MySQL, Perl and PHP, Pearson Education

2. Timothy Boronczyk, et al, 2009, Beginning PHP6, Apache, MySQL Web Development, Wiley India Pvt Ltd

3. Julie C Meloni, 2008, Teach Yourself  PHP, MySQL and Apache All-in-One, SAMS

**Additional Reading List**

1. W. Jason Gilmore, 2010, Beginning PHP and MySQL: From Novice to Professional, 4th Edition, Apress

2. Aleksa Vukotic, James Goodwill, 2011, Apache Tomcat 7, Apress

3. Richard Petersen, Linux Complete Reference, 6th Edition, Tata McGraw Hill Education Private Limited

# Question Paper Pattern

**Scheme of Examination**
**For 1st, 2nd, 3rd and 4th Semester BCA**

**Theory: 80 Marks**                                    **Duration of Examination: 3 Hours**

This theory paper consists of two parts A and B

# Part A

Part A contains 12 questions of 2 marks each from all the units of the syllabus and 10 questions to be answered out of 12.                                                                **10x2=20 marks**

# Part B

Part B contains the 4 units in the following format:

## UNIT I:

Questions from UNIT I of the syllabus: Question No.s 2 and 3 (Answer any one)          **5X3=15**
2. a
   b
   c

                                                                Or

3. a
   b
   c

## UNIT II:

Questions from UNIT II of the syllabus: Question No.s 4 and 5 (Answer any one)          **5X3=15**
4. a
   b
   c

                                                                Or

5. a
   b
   c

## UNIT III:

Questions from UNIT III of the syllabus: Question No.s 6 and 7 (Answer any one)       **5X3=15**
6. a
   b
   c

                                                                Or

7. a
   b
   c

## UNIT IV:

Questions from UNIT IV of the syllabus: Question No.s 8 and 9 (Answer any one)          **5X3=15**
8. a
   b
   c

                                                                Or

9. a
   b
   c

**Theory: 100 Marks**                    **Duration of Examination: 3 Hours**

This theory paper consists of two parts A and B

# Part A

Part A contains 12 questions of 2 marks each from all the units of the syllabus and 10 questions to be answered out of 12.                              **10x2=20 marks**

# Part B

Part B contains the 4 units in the following format:

**UNIT I:**

Questions from UNIT I of the syllabus: Question No.s 2 and 3 (Answer any one)**(7+7+6=20)**

2. a
   b
   c

<div align="center">Or</div>

3. a
   b
   c

**UNIT II:**

Questions from UNIT II of the syllabus: Question No.s 4 and 5 (Answer any one)          **(7+7+6=20)**

4. a
   b
   c

<div align="center">Or</div>

5. a
   b
   c

**UNIT III:**

Questions from UNIT III of the syllabus: Question No.s 6 and 7 (Answer any one) **(7+7+6=20)**

6. a
   b
   c

<div align="center">Or</div>

7. a
   b
   c

**UNIT IV:**

Questions from UNIT IV of the syllabus: Question No.s  8 and 9 (Answer any one) **(7+7+6=20)**

8. a
   b
   c

<div align="center">Or</div>

9. a
   b
   c