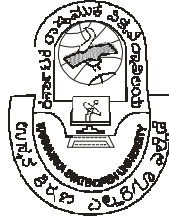


**MNPE-09425068494**



**Karnataka State Open University**  
Mysore, Karnataka – 570006

**Syllabus**  
**For**  
**Bachelor of Computer**  
**Application (BCA)**

## Bachelor of Computer Application (BCA)

### Semester I

Code	Subjects	Credits
BCA11	Computer Fundamentals and Windows based Applications	3
BCA12	Communication Skills in English	3
BCA13	Programming in C	3
BCA14	Data Structure	3
BCA15-L	C-Programming Lab	2
BCA16-L	Windows based Application Lab	2
Total		16

### Semester II

Code	Subjects	Credits
BCA21	Mathematics	3
BCA22	Computer Organization and Architecture	3
BCA23	DBMS	3
BCA24	OOPS with C++	3
BCA25-L	C++ Lab	2
BCA26-L	Data Structure Lab	2
Total		16

### Semester III

Code	Subjects	Credits
BCA31	Data Communications	3
BCA32	Operating Systems	3
BCA33	Computer Graphics	3
BCA34	Client-Server Architecture	3
BCA35-L	Graphics Lab	2
BCA36-L	DBMS Lab	2
Total		16

Semester IV

Code	Subjects	Credits
BCA41	Software Engineering	3
BCA42	Java Programming	3
BCA43	Relational Database Management System	3
BCA44	Unix and Shell Programming	3
BCA45-L	Java Lab	2
BCA46-L	Unix Lab	2
Total		16

Semester V

Code	Subjects	Credits
BCA51	Algorithm And Analysis	3
BCA52	Internet Programming	3
BCA53	Application Programming	3
BCA54	System Programming	3
BCA55-L	Web Designing/ Internet Lab	2
BCA56-L	Application Programming Lab	2
Total		16

Semester VI

Code	Subjects	Credits
BCA 61	MIS and Enterprise Resource Planning( ERP)	3
BCA62	Computer Network and Security	3
BCA63	ADA Lab	2
BCA64	System Programming Lab	2
BCA65-L	Project: System Slide or Application Slide	6
Total		16

## Detailed Syllabus

### Semester I

- Section 1      Computer Fundamentals and Windows Based Applications
- Unit- 1        Introduction to Computers, Need for Computer Literacy.
- Unit- 2        Computer: The Definition, Basic Anatomy of Computers, Characteristics of Computers, Evolution of Computers, The Computer Generations
- Section – 2    Basic Computer Organization
- Unit- 3        Introduction, Components of a Digital Computer.
- Unit-4        The Input Unit, The Output Unit, The Central Processing Unit, The Control Unit, The Main Memory Unit, Storage Unit.
- Section – 3    Number Systems
- Unit- 5        Introduction, Classification of Number System, Different Number Systems, Conversions, Arithmetic Operations in Binary Systems.
- Section – 4    Processor and Memory
- Unit- 6        Introduction, the Central Processing Unit, Registers, Instruction Sets, Program Interrupts, Processor Speed Memory, Memory Unit.
- Unit- 7        Main Memory Organization, Main Memory Capacity, Other Types of Memory.
- Section – 5    Secondary Storage Devices
- Unit- 8        Introductions, Need of Secondary Storage Devices, Characteristics of Secondary Storage Devices, Types of Storage Devices.
- Unit- 9        Magnetic Tape Systems, Magnetic Disk, Types of Disks, Optical Disk, Mass Storage Devices, Storage Hierarchy.
- Section – 6    Input and Output Devices
- Unit- 10      Introductions, Input Devices, Data Scanning Devices, Digitizer, Electronic Card Reader, Voice Recognition Devices.
- Unit- 11      Vision Input System, Output Devices, Voice Response System, Screen Image Projector.
- Section – 7    Computer Languages
- Unit- 12      Introduction, Analogy with Natural Languages, Computer Programming Languages, Low Level Languages, High Level Languages (HLL).1

- Unit- 13      Compiler Based and Interpreter based Language, Some High-level Languages, Some more High-level Languages.
- Unit- 14      User-Friendly Languages, Object Oriented Languages, Characteristics of a Good Programming Language, Selecting a Language for coding an application Subprogram.
- Section – 8      Application Software Packages and Internet
- Unit- 15      Introductions, Word Processor Packages, Database Management Packages, Spreadsheet Packages, Office Automation Packages (Microsoft Office 2000).
- Unit- 16      Desktop Publishing Software, Graphics, Multimedia and Animation Software, Application Software to Personal Assistance Package.
- Unit- 17      Uses of the Internet Basic Services of Internet, WWW Browsers, Microsoft Internet Explorer (IE).
- Unit- 18      Internet Explorer Keyboard Shortcuts, Cookies, Browser Terms in Netscape Navigator and Internet Explorer.

Reference Books:

1. Introduction To Computers By Subramanian
2. Peter Norton's Introduction To Computers By Norton, Peter
4. Pc Software Made Simple By Taxali, Ravi Kant

BCA12 Communication Skills in English

- Section– 1      Introduction
- Unit- 1      Sentence, Kinds of Sentences , Positive , Negative.
- Unit- 2      Statement , Interrogative , Exclamatory.
- Section– 2      BASIC GRAMMAR
- Unit- 3      Introduction, Subject Verb Agreement, Articles, Countable and Uncountable Nouns.
- Unit- 4      Countable Nouns, Uncountable Nouns, Nouns Used as Countable as well as Uncountable.
- Unit- 5      Writing Names with and without "the", Concepts of Vocabulary Building.
- Unit- 6      Simple Rules for Pronunciation and Intonation, Prepositions.
- Section- 3      TENSES
- Unit- 7      Present Tense-Types, Past Tense-Types, Future Tense, Modal Auxiliary Verbs:Could , Would

Section- 4	DEBATES and GROUP DISCUSSION
Unit- 8	Debates, Types of Debates, Rules for Debate ,Advantages of Debate , Disadvantage.
Unit- 9	Group Discussion, Technique of Group Discussions, Qualities Needed for Group Discussion, Strategies for Group Discussions: Do's and Don'ts, Role Playing.
Section- 5	WRITING SKILLS
Unit- 10	Paragraph and Précis writing, Business Report Writing, Resume Writing, Essay Writing, Script Writing, Business Correspondence.
Section- 6	CONNVERSATION-FACE TO FACE
Unit- 11	Formal Conversation, Informal Conversation.

Reference Books:

1. English Grammar By Thomson and Martinet
2. Essays by Samuel Smiles
3. Write Better , Read Better : Reader's Digest Publication

BCA13 Programming in C

Section- 1	Origin and Introduction
Units- 1	Programming languages About C, Evolution of C, Structure of a C Program, Compilers & Interpreters Compiling a C Program, Pseudo Codes, A Simple C Program.
Section- 2	Data Types, Variables and Constants
Unit- 2	Data Types Variables, Constants Operators, Type Modifiers and Expressions Operators Type Modifiers Expressions Type Definitions Using 'typedef'. Introduction to Input / Output Console I/O Functions Unformatted Console I/O Functions.
Section- 3	Control Constructs
Unit- 3	Control Statements, Conditional Statements, Loops in C The break Statement, The Continue Statement.
Section- 4	Arrays
Unit- 4	Introduction to Arrays One Dimensional Array Strings Two Dimensional, Array Multi-dimensional Array.
Section- 5	Functions
Unit- 5	Introduction to Functions, Function Declaration and Prototypes, Storage Classes Recursion in Function.

Section- 6	Pointers
Unit-6	Introduction to Pointers, Pointer Notation, Pointer Declaration and Initialization, Accessing Variable through Pointer, Pointer Expressions.
Unit-7	Pointers and One Dimensional Arrays, Arrays of Pointers, Pointer to Pointers, Pointers and Functions.
Section- 7	Structures and Unions
Unit- 8	Structure Definition, Structure Initialization, Arrays of Structures, Arrays within Structures, Structures within Structures, Passing Structures to Functions.
Unit- 9	Structure Pointers, Union–Definition and Declaration, Accessing a Union Member, Initialization of a Union Variable, Use of User Defined Type Declarations.
Section- 8	Linked List
Unit- 10	Dynamic Memory Allocation, Linked List, Basic List Operations.
Section- 9	File Handling in C
Unit- 11	What is a File, Defining and Opening a File, Functions for Random Access to Files.

Reference Books:

1. Programming in C By Stephen G. Kochan
2. Programming in C By M.T.Somashekara
3. Let Us C By Yashwant Kanitkar

BCA14	Data Structures
Section- 1	INTRODUCTION TO DATA STRUCTURES
Unit- 1	Basic Concepts, Algorithms, Notations, Data Structure operations.
Unit- 2	Implementations of Data Structures, Pseudo-code for Algorithms.
Unit- 3	Mathematical Notations , Functions and Procedure
Section- 2	ARRAYS
Unit- 4	Definitions, Array, Index or Subscript, Dimensions of an Array.
Unit- 5	Memory Allocation to Arrays, Memory Allocation to One-dimensional Array.
Unit- 6	Memory Representation of Two Dimensional Arrays.

- Unit- 7      Memory Allocation to Three Dimensional Array, Memory Allocation to Multidimensional Array.
- Unit- 8      Static and Dynamic Variables, Pointer Type Variables, Pointers in Pascal.
- Unit- 9      Pointers in C, Static and Dynamic Memory Allocation.
- Section- 3    LINKED LISTS
- Unit- 10     Dynamic Allocation of Memory, Representation of Linked List, Implementation of Linked List.
- Unit- 11     Insertion of a Node at the Beginning, Insertion of a Node at the End, Insertion of a Node after a Specified Node.
- Unit- 12     Traversing the Entire Linked List, Deletion of a Node from Linked List, Concatenation of Linked Lists.
- Unit- 13     Merging Linked Lists, Reversing of Linked List.
- Unit- 14     Applications of Linked List, Doubly Linked Lists, Circular Linked List, Generalized List.
- Section- 4    STACK And Queue
- Unit- 15     Implementation of Stack, Array-based Implementation, Pointer-based Implementation, Applications of Stacks, Maze Problem.
- Unit- 16     Evaluation of Expressions, Evaluating Postfix Expression.
- Unit- 17     Simulating Recursive Function using Stack, Passing Arguments.
- Unit- 18     Return from a Function, Simulation of Factorial, Proving Correctness of Parenthesis in an Expression.
- Unit- 19     Queue Implementation, Array-based Implementation, Pointer-based Implementation, Applications of Queues, Priority Queues.
- Section- 5    Trees and Graphs
- Unit- 20     Trees, N-ary Tree, Linked Tree Representation, Binary Tree Traversal, Searching a Binary Tree, Heap Tree, AVL Trees, Threaded Trees, Splay Trees, B-Trees.
- Section- 6    Searching and Sorting
- Unit- 21     Linear or Sequential Search, Binary Search, Tree Searching, Breadth First Search (BFS), Depth First Search (DFS), General Search Trees, Hashing.
- Section- 7    GARBAGE COLLECTION AND COMPACTION, DYNAMIC MEMORY ALLOCATION
- Unit- 22     Reference Counting Garbage Collection,, When Objects Refer to Other Objects, Why Reference Counting Does Not Work, Mark-and-Sweep Garbage Collection.



Unit- 23      The Fragmentation Problem, Stop-and-Copy Garbage Collection, The Copy Algorithm, Mark-and-Compact Garbage Collection.

Unit- 24      The Heap, Singly Linked Free storage, Doubly Linked Free storage, Buddy System for Storage Management.

Reference Books:

1.      Purely functional data structures By Chris Okasaki
2.      Algorithms and Data Structures :the science of computing by Chris Okasaki
3.      Data Structures and Algorithms Bu Alfred V.Aho and Jeffrey D.Ullman

Semester II

BCA21 Mathematics

Section- 1      Set Theory

Unit- 1      Sets, Relations and Functions

Unit- 2      The Concept of a Set Notations and Representation of a Set Types of Sets Theorem on Subsets,

Unit- 3      Venn Diagram Set Operations De-Morgan's Laws Applications of Venn Diagrams Ordered Pairs, Relations & Functions

Section- 2      Graph Theory

Unit- 4      Graphs, Application of Graph Theory.

Unit- 5      Trees, Application of Trees.

Section- 3      Introduction To Recurrence Relations

Unit- 6      A sequence, Recurrence relation.

Unit- 7      Solving a recurrence relation, Characteristics equations.

Section- 4      Introduction To Propositional

Unit- 8      Calculus Logic, Conditional Propositions.

Unit- 9      Quantifiers, Applications of Logic.

Section- 5      Boolean Algebra & Its Applications Introduction

Unit- 10      Boolean Expressions and Boolean Functions.

Unit- 11      Identities of Boolean Algebra Duality, Algebra of Switching Circuits

Reference Books:

1. Schaum's Outlines of Discrete Mathematics By Seymour Lipschutz, Marc Lipson
2. Mathematics for Computer Science. Eric Lehman and Tom Leighton

BCA22 Computer Organization and Architecture

Section- 1	Introduction
Unit- 1	Computer System, Components of a Computer System.
Unit- 2	Computer Organization, Data Representation, Performance Factors
Section- 2	Central Processing Unit
Unit- 3	Introduction, General Register Organization.
Unit- 4	Stack Organization, Instruction Formats.
Unit- 5	Addressing Modes, Program Control.
Unit- 6	Program Interrupt.
Section- 3	Control Unit
Unit- 7	Introduction, Control Memory.
Unit- 8	Microprogramming, Computer Configuration,
Unit- 9	Design of Control Unit, Overview of RISC/CISC
Section- 4	Memory Organization
Unit- 10	Memory Hierarchy, Main Memory or Primary Memory,
Unit- 11	Design of Main Memory, Auxiliary Memory ,Virtual Memory.
Unit- 12	Memory Management ,Associative Memory
Section- 5	Input-Output Devices
Unit- 13	Introduction, Peripheral , Asynchronous Communication,
Unit- 14	Asynchronous Serial Transfer, Asynchronous Communication Interface,
Unit- 15	Synchronous Communication, Character-Oriented Protocol,

- Unit- 16      Input-Output Interface, Modes of Data Transfer, Interrupt , Multiple Interrupts ,Direct Memory Access (DMA)
- Section- 6      Hardware Interfacing Issues
- Unit- 17      Introduction, I/O Processing, Bus Interface, I/O versus Memory Bus,
- Unit- 18      Data Transfer Techniques, Mode of Transfer, Software Routines,
- Unit- 19      Direct Memory Access (DMA), Input-output Processor (IOP), CPU-IOP Communication, Channel

Reference Books:

1. Computer organization and architecture by William Stallings
2. Essentials of Computer Organization and Architecture, Second Edition by Linda Null and Julia Lobur

BCA23 DBMS

- Section- 1      Introduction to Databases
- Unit- 1      Database and its Hierarchies.
- Unit- 2      History of Databases, Types of DBMS
- Section- 2      Database Environment
- Unit- 3      Database and DBMS Software, Database Architectural,
- Unit- 4      Three Layered Architectural/I/O Functions, Characteristics of Database Approach
  
- Section- 3      Relational Model
- Unit- 5      Logical Data Models, Relational Data Model,
- Unit- 6      Querying Relational Data, Relational Algebra, Relational Calculus
- Section- 4      SQL: Data Manipulation, Data Definition
- Unit- 7      SQL Language, SQL Database Objects.
- Unit- 8      SQL Data Types, DDL, DML and TCL Commands, Retrieving Data, Inserting Data, Updating Data, Deleting Data.
- Unit- 9      Creating and Altering Tables, Views, Sequence, Index.
- Section- 5      Database Planning, Design And Administration
- Unit- 10      Database Application Life-cycle, Alternate System Development Methodologies,

Unit- 11	Database Planning, System Definition, Requirements Collections and Analysis,
Unit- 12	Database Design, DBMS Selection, Application Design, Database Administration
Section- 6	Entity Relationship Modeling, Normalization
Unit- 13	Database Design, Entity, Attributes and Entity Sets,
Unit- 14	Relationships and Relationship Sets, ER Diagrams, Additional Features of ER Model,
Unit- 15	Conceptual Database Design with the ER Model, Anomalies in Databases, Redundancy,
Unit- 16	Inconsistency, Update Anomalies, Good Database Designing, First Normal Form (1NF),
Unit- 17	Second Normal Form (2NF), Third Normal Form (3NF), Boyce-Codd Normal Form, Fourth Normal Form (4NF)
Section- 7	Database Security
Unit- 18	Access Control, Discretionary Access Control,
Unit- 19	Mandatory Access Control, Additional Issues to Security

Reference Books:

1. Database design for mere mortals. Hernandez
2. Database management by Watson

BCA24 OOPS with C++

Section- 1	Classes And Objects
Unit- 1	Introduction, Class , Object , Nature of Class.
Unit- 2	Types of Relationships, "Kind of" Relationship, "Is a" Relationship, "Has a" Relationship/Part of Relationship.
Unit- 3	Classification of Classes, Abstraction.
Section 2	Constructors And Destructors And Operators Overloading
Unit- 4	Introduction, Constructors, Destructors.
Unit- 5	Introduction-Operators Overloading, Example, Type Conversion
Section 3	Inheritance, Polymorphism And Virtual Functions]
Unit- 6	Introduction- Inheritance, Type of Inheritance.

Unit- 7	Introduction- Polymorphism, Virtual Functions.
Unit- 8	Need for Virtual Functions, Rules for Virtual Functions.
Section 4	File Handling
Unit- 9	Introduction, files, Stream Input/Output, Buffering and Flush,
Unit- 10	Exception Handling, String Handling, Sequential Fixed Length Structure.
Unit- 11	Linked List Fixed Size Nodes, Strings Manipulations,
Unit- 12	Character String Output Functions , String Handling Functions Postfix Expression, Simulating.
Section- 5	Arrays
Unit- 13	Introduction, Arrays, Array Declaration.
Unit- 14	Important Points about Arrays , Multidimensional Arrays.

Reference Books:

1. Object Oriented Programming With C++ - E Balagurusamy
2. Object Oriented Programming Using C++, Sanjeev Sofat, Cyber Tech. Publication

Semester III

BCA31 Data Communications

Section- 1	Basic Concepts
Unit- 1	Introduction, Data Communication Concepts, Data Communication Systems.
Unit- 2	Networks Network Models, Protocols and Standards.
Unit- 3	Introduction- Open Systems Interconnection (OSI) Reference Model, Layers in OSI Model, TCP/IP Reference Model
Section- 2	Physical Layer and Media Data and Signals
Unit- 4	Introduction, Analog and Digital Signals, Periodic Analog Signal, Digital Signal.
Unit- 5	Transmission Impairments, Data Rate Limits, Performance.
Unit- 6	Physical Media: Transmission Media, Introduction, Transmission Concepts and Terms, Bounded Media, Unbounded Media.

- Section- 3      Analog Transmission
- Unit- 7          Introduction, Modem Modulation Techniques.
- Unit- 8          Telephone Modems, Modulation of Analog Signal
- Section- 4      The Data Link Layer
- Unit- 9          Introduction, Data Link Layer Design Issues,
- Unit- 10        Error Detection and Correction, Types of Errors, Elementary Data Link Protocols.
- Unit- 11        Sliding Window Protocols, Protocol Verification, Example Data Link Protocols, Point-to-Point Protocol (PPP), Multiple Access Protocols.
- Section- 5      Local Area Networks
- Unit- 12        Introduction-Local Area Network (LAN), Baseband versus Broadband.
- Unit- 13        IEEE Standards for Local Area Networks, IEEE 802.3 Ethernet Technologies.
- Unit- 14        LAN Hardware, IEEE 802.4 Token Bus, IEEE 802.5 Token Ring,
- Unit- 15        IEEE 802.6 Distributed Queue Dual Bus, Connecting LANS And Backbone Networks.
- Unit- 16        Switching In Networks, Internetworking and Routing.

Reference Books:

1. Data communications and networking by Behrouz A. Forouzan
2. Data and computer communications by William Stalling

BCA32 Operating Systems

- Section- 1      An overview of Operating System
- Unit- 1          Introduction, History of computer operating systems.
- Unit- 2          Mainframe systems, Desktop systems, Multiprocessor systems.
- Unit- 3          Distributed systems, Clustered systems, Real Time systems.
- Section- 2      System's components and Operating System Services
- Unit- 4          Systems components, Process Management, Main-Memory Management.
- Unit- 5          File Management, I/O System Management, Secondary-Storage Management.
- Unit- 6          Networking, Protection System, Command Interpreter System, Operating System Services.

Section- 3	System Calls and System Programs
Unit- 7	Introduction, System calls, System Calls for Process Management,
Unit- 8	System Calls for Signalling, System Calls for File Management,
Unit- 9	System Calls for Directory Management, System Calls for Protection, System Calls for Time Management.
Unit- 10	System Calls for Device Management, System Programs
Section- 4	Operating System Structure
Unit- 11	Introduction, System Structure, Monolithic Systems.
Unit- 12	Layered Systems, Virtual Machines, Exokernel , Client-server Model.
Section- 5	Process Management
Unit- 13	Process Management, Process Concept.
Unit- 14	Thread, Processes vs Threads, Benefits of Threads, Process state.
Unit- 15	Primary process states, Additional process states, Process Control Block.
Unit- 16	Process State Transitions, Process Scheduling-Types of Scheduling, Operations on process, CPU Scheduling, Deadlock.
Section- 6	Memory Management
Unit- 17	Introduction, Memory Management, Background.
Unit- 18	Binding of Instructions and Data to Memory, Dynamic Loading, Dynamic Linking, Overlays, Logical vs Physical Address Space.
Unit- 19	Memory-Management Unit (MMU), Mono programming, Multiprogramming, Memory Allocation, Virtual Memory
Section- 7	Mass-Storage Structure
Unit- 20	Introduction- Disk structure, Disk scheduling, Disk Management.
Unit- 21	Swap Space Management, File-System Interface, File System Implementation.

Reference Books:

1. Operating Systems: Internals and Design Principles by William Stallings
2. Operating Systems by Manick

## BCA33 Computer Graphics

Section- 1	Overview of Computer Graphics
Unit- 1	Introduction, Computer Graphics System, Interactive Graphics.
Unit- 2	Passive Graphics, Application of Computer Graphics.
Section- 2	Display Devices
Unit- 3	Introduction, Display Devices, Cathode Ray Tube.
Unit- 4	Bit-Mapped Graphics, Graphics Attributes, Refresh Cathode Ray Tubes.
Unit- 5	Random Scan Displays, Raster-Scan Displays , Color CRT Monitors.
Unit- 6	Direct-View Storage Tubes (DVST), Plasma Panel Displays, Thin Film Electroluminescent displays.
Unit- 7	Light Emitting Diode (LED) ,Liquid Crystal Displays (LCDs), Hard Copy Output Devices.
Section- 3	2-D Graphics
Unit- 8	Introduction, Scan Conversion, Digital Differential Analyzer.
Unit- 9	Bresenham's Algorithm, Integer Bresenham's Algorithm.
Unit- 10	General Bresenham's Algorithm, Circle Generation Algorithms , Bresenham's circle generation algorithm, Midpoint Circle Algorithm,
Unit- 11	Ellipse Generation algorithms, Midpoint Ellipse Algorithm, Arc Generation algorithms, Fill Algorithms.
Unit- 12	Fundamentals of Antialiasing, Dithering, 2-D Graphics Transformations, Geometric and Coordinate Transformations.
Unit- 13	Transformation Composition, 2-D View and Clipping, Exterior and Interior Clipping, Viewport Transformation, Polygon Clipping , Text Clipping.
Section- 4	3-D Graphics
Unit- 14	Introduction, 3-D Graphics Transformations.
Unit- 15	Coordinate Transformations, 3-D Projections, Perspective Projection on a Plane with $C(0,0,0)$ , Perspective Projection on a Plane with $C(a,b,c)$ , Parallel Projections, 3-D Viewing and Clipping, Hidden Lines and Surfaces Scan line Entries (a) (b) (c) (d).
Unit- 16	Importance of Wireframe Models, Demerits of Wireframe Models, Representing a Polygonal Net Model, Bezier Curves and Surfaces, B-Splines.



Section- 5      Multimedia

Unit- 17      Introduction, Multimedia Hardware, Multimedia Software Tools, Application Areas for Multimedia, Multimedia Components Hypermedia, Multimedia Technology

Reference Books:

1. Computer graphics: principles and practice-James D. Foley
2. Computer Graphics C Version-Donald Hearn, M. Pauline Baker

BCA34 Client-Server Architecture

Section- 1      Introduction To Client/Server

Unit- 1      Aims and Objectives, Introduction, Client/Server Computing, Server Computer.

Unit- 2      Client Computer, Client/Server Model

Section-2      2 Client/Server Models

Unit- 3      Aims and Objectives, Introduction, Types of Servers.

Unit- 4      Fat Server and Client Server Building Blocks.

Section- 3      Client/Server Operating System

Unit- 5      Aims and Objectives, Introduction, Need of Operating System (OS) ,Anatomy of the Server Program, Characteristics of Client/Server Architecture.

Unit- 6      What does Client/Server Need from an OS, Extended Services, Server Scalability, Hybrid Client-Server Architecture.

Section- 4      Network Operating System

Unit- 7      Aims and Objectives, Introduction, Single System Image, Peer - to – Peer, Benefits of a Peer - to - Peer Network, Remote Procedure Call (RPC), RPC Message Queuing.

Unit- 8      Message-oriented Middleware (MOM), Advantages of MOM, Disadvantages of MOM, MOM vs RPC

Section- 5      Client/Server Transaction Processing

Unit- 9      Aims and Objectives, Introduction, Types of Transaction Processing System, Features of Transaction Processing Systems, ACID Properties.

Unit- 10      Transaction Models, TP Monitor, Transaction Management Standards: X/OPEN DTP and OSI- TP, Groupware.

Reference Books:

- 1) Client/server architecture by Alex Berson
- 2) High-Performance Client/Server by Chris Loosley, Frank Douglas, Alex Mimo

## Semester IV

### BCA 41 Software Engineering

Section- 1      Software Process and Development Models

Unit- 1          Introduction, SDLC Models, What is a Software Process?, Data Flow Diagrams.

Unit- 2          Petri Net Models, Object Models, Use Case Diagrams, Scenarios, Sequence Diagrams, Hierarchy Diagrams, State Diagrams, Lattice Models.

Section- 2      Software Project Management

Unit- 3          Introduction, Management Approaches, Team Approaches, Critical Practices.

Unit-4          Capability Maturity Model, Personal Software Process.

Unit- 5          Earned Value Analysis, Error Tracking, Postmortem Reviews.

Section- 3      Software Project Planning

Unit- 6          Project Planning, Software Scope, Cost Estimation.

Unit- 7          PERT - Program Evaluation and Review Technique, Software Cost Estimation, Software Estimation Risks, Software Metrics, Software measurement Theory.

Section- 4      Risk Analysis and Management

Unit- 8          Introduction, Risk Identification.

Unit- 9          Risk Exposure, Risk Management Plans.

#### Reference Books:

1. Software Engineering (9th Edition) by Ian Sommerville
2. Software Engineering: A Practitioner's Approach by Roger S. Pressman

### BCA42 Java Programming

Section- 1      Fundamentals

Unit- 1          Introduction, Basic Concepts of Object-oriented, Programming .

Section- 2      Evolution of Java

Unit- 2          Introduction, History of Java, Features of Java.

Unit-3          How Java differs from C and C++?, Java and Internet, Java and world wide web.

Unit- 4          Web Browsers, Hardware and Software,

- Unit- 5            Requirements, Java Support Systems, Java Environment, Java Standard Library.
- Section- 3        Java Classes
- Unit- 6            Introduction, Data Types in Java, Variable Declaration.
- Unit- 7            Type Casting, Vectors, Java Control Statements, What is a Class?, What are Methods?.
- Unit- 8            Method Overloading, Constructor Overloading.
- Unit- 9            Instantiating Objects of a Class, Access Modifiers, Java Applications and Applets.
- Section- 4        Interface and Packages
- Unit- 10          Introduction, Defining Interface, What is a Package?.
- Unit- 11          ClassPath Variable, Access Protection.
- Section- 5        Inheritance
- Unit- 12          Introduction, Inheritance Basics, Member Access and Inheritance.
- Unit- 13          SuperClass Variable and Sub Class Object.

Reference Books:

1. Head First Java, 2nd Edition by Kathy Sierra and Bert Bates
2. Effective Java (2nd Edition) by Joshua Bloch

BCA 43 Relational Database Management System

- Section- 1        Database System
- Unit- 1            Introduction, Definitions, Characteristics of the Database Approach.
- Unit- 2            Database Users, Advantages of Using a DBMS, When Not to Use a DBMS.
- Unit- 3            Database System Concepts and Architecture, Entity-relationship Model, ER Diagrams.
- Section- 2        Relational Data Model
- Unit- 4            Introduction, Relational Model Concepts, Characteristics of Relation.
- Unit- 5            Relational Model Notation, Relational Constraints and Relational Database Schemas, Operations on Relations.
- Unit- 6            The Relational Algebra, Structured Query Language.

Section- 3	Relational Database Design
Unit- 7	Introduction, Anomalies in Databases, Informal Design Guidelines for Relational Schemas.
Unit- 8	Functional Dependencies, Normalization, First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form (3NF), Boyce-codd Normal Form.
Unit- 9	Multivalued Dependencies, Fourth Normal Form (4NF), Database Design Process.
Section- 4	Query Processing
Unit- 10	Introduction, Mechanism of Query Processing.
Unit- 11	Query Execution Algorithms, Heuristics in Query Optimization.
Section- 5	Concurrency Control Techniques
Unit- 12	Introduction, Locking Techniques for Concurrency Control.
Unit- 13	Dealing with Deadlock and Starvation, Concurrency Control based on Timestamp Ordering.
Unit- 14	Multi-version Concurrency Control Techniques, Optimistic Concurrency Control.
Section- 6	Database Recovery Techniques
Unit- 15	Introduction, Types of Failure, Database Recovery, Recovery Techniques

Reference Books:

1. Database Management Systems by Raghu Ramakrishnan, Johannes Gehrke, Raghu Ramakrishnan, and Johannes Gehrke
2. Databases Demystified (Demystified) by Andrew J. Opperl

BCA 44 Unix and Shell Programming

Section- -1	Introduction To Unix
Unit- 1	Architecture of Unix, Features of Unix.
Unit- 2	Unix Commands – PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip. Unix Utilities, Introduction to unix file system, vi editor.
Unit- 3	file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, login. Text processing utilities and backup utilities.
Unit- 4	detailed commands to be covered are tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

Section- 2	Introduction To Shells
Unit- 5	Unix Session, Standard Streams, Redirection, Pipes.
Unit- 6	Tee Command, Command Execution, Command-Line Editing, Quotes.
Unit- 7	Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.
Section- -3	Filters
Unit- 8	Filters and Pipes, Concatenating files.
Unit- 9	Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters.
Unit- 10	Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.
Section- 4	Awk
Unit- 11	Execution, Fields and Records, Scripts, Operations.
Unit- 12	Patterns, Actions, Associative Arrays, String Functions, String Functions.
Unit- 13	Mathematical Functions, User – Defined Functions.
Unit- 14	Using System commands in awk, Applications, awk and grep, sed and awk.
Section- 5	Interactive C Shell And C Shell Programming
Unit- 15	C shell features, Two Special Files, Variables, Output, Input.
Unit- 16	Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts, Basic Script concepts, Expressions.
Unit- 17	Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Reference Books:

1. UNIX and Shell Programming by Richard F. Gilberg and Behrouz A. Forouzan
2. Unix Shell Programming by Stephen G. Kochan and Patrick Wood

Semester 5

BCA51 Algorithm and Analysis

Section- 1	Divide & Conquer Method
Unit- 1	Introduction, Divide and Conquer Method, Binary Search, Finding Maximum.

Unit- 2	Finding Minimum, Merge Sort, Quick Sort, Strassen's Matrix Multiplication.
Section- 2	Greedy Method
Unit- 3	Introduction, Greedy Algorithm, Optimal Storage on Tape,
Unit- 4	Knapsack Problem, Making change(Money), Minimum Spanning Trees.
Unit- 5	Single Source Shortest Path Problem, Dijkstra's Algorithm.
Section- 3	Dynamic Programming
Unit- 6	Introduction, Dynamic Programming, All Pair Shortest Path
Unit- 7	Optimal Binary search Trees, I/O Knapsack, The Traveling Salesperson Problem, Flow Shop Scheduling
Section- 4	Backtracking
Unit- 8	Introduction, Backtracking, The 8 Queens Problem.
Unit- 9	Sum of Subsets, Knapsack Problem, Optimizing Backtracking, Graph Colouring.

#### Reference Books:

1. Introduction to the Design and Analysis of Algorithms (2nd Edition) by Anany Levitin
2. Data Structures and Algorithm Analysis in Java (2nd Edition) by Mark Allen Weiss

#### BCA52 Internet Programming

Section- 1	Introduction To The Internet And Internet Browsers
Unit- 1	Introduction, Computers in Business.
Unit- 2	Networking ,Internet, Electronic Mail (E-mail), Resource Sharing.
Unit- 3	Gopher, World Wide Web, Usenet, Telnet, Bulletin Board Service.
Unit- 4	Wide Area Information Service, Introduction to Internet Explorer, Netscape Navigator.
Unit-5	Designing a Home Page, History of HTML , HTML Generations , HTML Documents , Anchor Tag, Hyperlinks , Further Readings.
Section- 2	Head and Body Sections and Ordered And Unordered LISTS
Unit-6	Introduction, Header Section , Title , Prologue , Links, Colorful Web Page , Comment Lines.
Unit-7	Heading Printing, Aligning the Headings, Horizontal Rule, Paragraph.

Unit-8	Tab Setting, Images and Pictures, Embedding PNG Format Images ,
Unit-9	Introduction, Lists , Unordered Lists , Headings in a List, Ordered Lists, Nested Lists
Section- 3	Table Handling and DHTML And Style Sheets
Unit-10	introduction, Tables , Table Creation in HTML , Width of the Table and Cells,
Unit-11	Cells Spanning , Multiple Rows/Columns, Coloring Cells, Column Specification,, Defining Styles,
Unit-12	Elements of Style Linking a Style Sheet to an HTML Document , In-line Styles, External Style Sheets, Internal Style Sheets, Multiple Styles.
Section- 4	Frames
Unit-13	Introduction, Frameset Definition, Frame Definition,
Unit-14	Nested Framesets Forms, Introduction, Action Attribute , Method Attribute, Enctype Attribute.
Section- 5	Vbscript – Working With Variables
Unit-15	Introduction, What is a Variable? , Data Types.
Unit-16	What does it Mean to Declare a Variable?, Why Use Explicit Declarations in VBScript?,
Unit-17	How do you Name a Variable?, Constants, Arrays,
Unit-18	How do you Determine your Variable's Type?, VBScript Operators.
Unit-19	What is a Control Structure?, Types of Controls, Examples of Control Structure
Section- 6	Introduction To Active Server Pages
Unit-20	Introduction, What are Active Server Pages?.
Unit-21	Understanding the Client Server Model, How ASP Differs from Client-side Scripting Technologies.
Unit-22	Setting Up Personal Web Server, Setting Up Internet Information Server, Running ASP Pages,
Unit-23	Using ASP without IIS or PWS, Creating your First ASP Pages, What are Objects?.
Unit-24	The Building Blocks of Objects, Built-in ASP Objects, Collections, Working with Objects,Events

Reference Books:

1. Internet & World Wide Web: How to Program (4th Edition) by P.J. Deitel
2. Programming for TV, Radio & The Internet, Second Edition: Strategy, Development & Evaluation by Lynne Gross, Brian Gross, and Philippe Perebinosoff

## BCA53 Application Programming

Section- 1	Introduction to VB.Net
Unit-1	Aims and Objectives, Introduction, Welcome to VB.Net.
Unit-2	Evolution of VB.Net, Features of VB.Net, Opening and Closing Windows.
Section- 2	Control Customization
Unit-3	Aims and Objectives, Introduction,
Unit-4	Toolbars, Adding a Toolbar, Selecting the Images for the Buttons, Adding the Buttons, Writing the Button Code, Other Toolbar Features.
Unit-5	Existing Project, Open an Existing Project, Save an Existing Project , Import an Already Existing Form to a Project, Add User Control to the Existing Project, Inheriting a Form from an Existing Project, ,Auto Hide, Customizing Windows Placing Control on a Form
Section- 3	Variables
Unit-6	Aims and Objectives, Introduction, VB.Net Variables, Naming Variables, Data Types.
Unit-7	The Variant Data Type, Type Conversions, Data Type Constant.
Unit-8	Building Project, Creating a Project, Writing Code, Opening a Project, Compiling and Executing a Project, Displaying Output, Formatting Currency, Formatting Numbers, Formatting Percentages, Formatting Dates and Times, The Format() Function
Section- 4	Decision Making
Unit-9	Aims and Objectives, ,IntroductionConditional Statement.
Unit-10	If-then, Select-Case, Looping, Do, While...End While, For Next, Nested loops.
Unit-11	The MsgBox Function, Input Box, Function, User Defined, Calling Functions.
Unit-12	Built Functions, Controls, Text Box Controls, Label Controls, Frame Controls, Command Button, Check Box
Section- 5	Array, V Vb.Net – Programming and Object Properties
Unit-13	Introduction, Array,
Unit-14	Menus and Dialog Boxes, Dialog Boxes, Introduction.
Unit-15	Structured Programming, File-Level Programming Elements,
Unit-16	Namespace-Level Programming Elements, Module-Level Programming Elements, Procedure-Level Programming Elements.



- Unit-17      Object-oriented Programming, A Namespace, A Class, An Object, Modules, Access Types, Encapsulation
- Unit-18      Data Hiding or Abstraction, Shared Functions, Overloading, Inheritance, Various Object Properties, Constructing Property Pages, Adding a Property Sheet Object, CPropertyPage Member Functions, Modeless Property Sheets, Message Maps, Document/View Architecture,
- Unit-19      The View, The Document, The Frame, The Document/View Approach, Overview of the Single Document Interface (SDI)

Reference Books:

1. Web Programming: Building Internet Applications 3e by Chris Bates
2. Internetworking with TCP/IP, Vol. III: Client-Server Programming and Applications, Linux/Posix Sockets Version by Douglas E. Comer and David L. Stevens

BCA54 System Programming

- Section- 1      Introduction to Problem Solving
- Unit-1          Introduction, Problem Definition, Problem Solving, Programming, Programming Paradigm.
- Unit-2          Need for Computer Languages , Classification of Programming Languages, Selection Criteria of Programming Language
- Section- 2      Introduction to C
- Unit-3          Introduction, Know more about C,
- Unit-4          Historical Development of C, Why is C Language Popular?,
- Unit-5          C Standards, Characteristics of C, Getting Started with C, Developing C Program with Turbo C Compiler.
- Unit-6          Compiling and Linking, Debugging, Types of Error, General Debugging Guidelines, General Structure of C Program, Application Areas of C
- Section- 3      Control Flow Statements and Loops and Jumps
- Unit-7          Control Flow Statements, Selection Statements,
- Unit-8          The Switch Statement, The for Loop, The while Loop, The Do-while Loop, Nested Loops, The Jump Statements, The Break Statement, The Goto Statement
- Section- 4      Arrays And Structures And Unions
- Unit-9          Introduction, Array in C, Array Declaration, Important Points about Arrays, Variations in Array Declarations, One Dimensional Array, Two Dimensional Array, Passing Arrays to Functions

- Unit-10      What is a Structure?, Declaring Structures, Defining Structure Variables, Referencing Structure Members, Initializing a Structure, Structure within a Structure.
- Unit-11      Arrays in Structure, , Arrays of Structures, Structure and Functions, Functions Returning Structures, Unions, , Declaring Unions, Defining Union Variables
- Section- 5    Pointers
- Unit-12      Introduction, Pointer Arithmetic, Pointers and Arrays, Arrays of Pointer, Pointer of Pointer, Pointers and Functions, Pointers and Structure.

Reference Books:

1. System Programming with C and Unix by Adam Hoover
2. windows System Programming (4th Edition) by Johnson M. Hart

Semester 6

BCA61 MIS And Enterprise Resource Planning (ERP)

- Section- 1    Introduction to Management Information System
- Unit-1        Introduction, Background,
- Unit-2        Meaning of Management Information System,
- Unit-3        Nature of Management Information System,
- Unit-4        Characteristics, Myths Regarding Management Information System,
- Unit-5        Requirements of Management Information System,
- Unit-6        Problems and Solutions In Implementing Management Information System,
- Unit-7        Benefits of Management Information System,
- Unit-8        imitations of Management Information System,
- Unit-9        Significance of Management Information System
- Section- 2    Conceptual Framework of Information System
- Unit-10      Introduction,
- Unit-11      Concept of System,
- Unit-12      Definition of System, Characteristics of System,
- Unit-13      System Stakeholders—Major Players of System,

Unit-14	Types of System, Evolution of Information System,
Unit-15	Approaches to Management Information System Design,
Unit-16	Components of Management Information System,
Unit-17	How Management Information System Works? ,
Unit-18	Classification of Information System
Section- 3	Management Information System for Business Operations Concept of Decision Making and MIS
Unit-19	Finance Information System,
Unit-20	Accounting Information System,
Unit-21	Marketing Information System, Human Resource Information System,
Unit-22	Product Engineering, Research & Development Information System,
Unit-23	Decision Making and Managers, Classification of Managerial Decisions,
Unit-24	Model for Decision Making Process, Management Information System and Decision Making, Concept of Balance
Section- 4	Development of Management Information System
Unit-25	Introduction,
Unit-26	Principles for Information System Development,
Unit-27	Management Information System Development Process,
Unit-28	Cross Life-Cycle Activities, Implementation,
Unit-29	Evaluation and Maintenance of MIS, Introduction,
Unit-30	Implementations of Management Information System,
Unit-31	Methods of Implementing Management Information System,
Unit-32	Implementation Steps of Management Information System,
Unit-33	Evaluation of Management Information System,
Unit-34	Structure for Evaluation of Management Information System, Maintenance

## Section- 5 Introductions to Erp

Unit-35 Introduction,

Unit-36 Enterprise Resource Planning,

Unit-37 Meaning of ERP, Characteristics of ERP,

Unit-37 Components of ERP, Integrated Management Information Seamless Integration,

Unit-38 Supply Chain Management.

### Reference Books:

1. Enterprise Resource Planning: Implementation and Management Accounting Change in a Transitional Country by Ahmed Kholeif, Magdy Abdel -Kader, and Michael Sherer
2. Introduction to Information Systems: Supporting and Transforming Business by R. Kelly Rainer, Efraim Turban, and Richard E. Potter

## BCA62 Computer Network and Security

### Section- 1 Data Communication And System

Unit-1 Introduction, Purpose, Source,

Unit-2 Transmitter or Sender, Transmission System,

Unit-3 Receiver Destination, Evolution of Communication,

Unit-4 Technologies, Components, Data Transmission,

Unit-5 Analog and Digital Data Transmission,

Unit-6 Data and Signal, Analog Signaling, Digital Signaling,

Unit-7 Frequency Spectrum and Bandwidth,

Unit-8 Time and Frequency Domain Concepts,

Unit-9 Space-division Multiplexing

### Section- 2 Transmission Media

Unit-10 Introduction, Magnetic Media,

Unit-11 Twisted-pair Cables, Baseband and Broadband Coaxial, Cables, Fiber Optics

### Section- 3 Computer Networks

- Unit-12 LAN Applications and Benefits, Media Access Control,
- Unit-13 Centralized Control, Decentralized Control,
- Unit-14 Deterministic Access, Nondeterministic Media Access Control,
- Unit-15 LAN Hardware, Network Interface Card, LAN Operating systems,
- Unit-16 Transmission Media, LAN Topologies, Bus Topology, Access Method and Collisions,
- Unit-17 Local Talk, Ring Topology, Reliability Mechanisms, Star Topology, ATM for LANs

### Section- 4 Networking

- Unit-18 Introduction, Networking, Benefits of Networks,
- Unit-19 Different LAN and WAN Connections, Local Area Networks (LANs),
- Unit-20 Wide Area Networks (WANs),  
Connecting to a Network, Setting the Computer Network, Networking Technologies,  
Connecting your Network to the Internet, Testing Connection

### Section- 5 Access Control And Denial Of Service

- Unit-21 Access Control Overview, Access Control Objectives, Identification and Authentication, Techniques, Access Control Techniques,
- Unit-22 Passwords, Memory Card, Smart Card, Hand-held Password Generators, Biometrics, Encryption, Token, Encrypted Keys, Access Control Methodologies, Discretionary Access Control (DAC), Mandatory Access Control (MAC), Role Based Access Control (RBAC),
- Unit-23 Access Control Implementation, Security Administration Cost Reductions, Denial of Service Attack, Methods of Attack,
- Unit-24 Types of Denial of Service Attacks, Distributed Denial of Service Attack, How to Avoid the Problem, Firewalls and Intrusion Prevention Systems
- Unit-25 Security Management and Risk Assessment, Symmetric Encryption and Message Confidentiality,
- Unit-26 Internet Security Protocols and Standards, Internet Security Applications

### Reference Books:

1. Corporate Computer and Network Security (2nd Edition) by R. R. Panko
2. Security+ Guide to Network Security Fundamentals by Mark D. Ciampa

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