

04. COMPUTER APPLICATIONS

Computer Fundamentals and Applications

Generation of Computers, PC Family of Computers, Different I/O devices; Introduction to Operating System, Overview of different Operating Systems, Functions of Operating System; Introduction to Windows, Working with Accessories (Notepad, WordPad and Paint); Personalizing Windows, Installing and Removing Applications, Boot Options and Concept of Registry.

Introduction to Office Tools: Word Processing, Advantages of Word Processing, fundamentals of MS-Word, Working with Menus and Toolbars, Introduction to Macros. Overview of Excel, Working with Cells, Creating Worksheets, Working with Formulae Bar. Introduction to PowerPoint, Creating and Designing Slides, Working with Hyperlinks & Animation.

Data and File Structures

Introduction: Introduction to Data Structures; Primitive and non-primitive data structure; Linear and non-linear data structure; Recursion Function and its examples. String Manipulation, String Matching Techniques & Applications.

Concept of Stack and Queue. Single and Doubly – Linked Lists. Circular linked List, their implementation and comparison. Array based and Linked List based Implementation of stack and Queues and their applications.

Searching: Sequential and Binary Search on Array – based ordered lists. Sorting Techniques: Insertion Sort, Selection Sort, Quick Sort, Heap Sort. External Sorting: K-way Merge Strategy. File Structures: Sequential Files, Indexed Files, Direct Files.

Binary Trees, their implementation and traversals. Binary Search Tree: Searching, Insertion and Deletion of nodes.

Database Management Systems

Elementary Database Concepts. Relational model – Concept, Algebra and Constraints, Use of SQL as a Relational database language in data definition and query formulation. ER Model, Normalization: First, Second, Third Normalizations. Database backup, recovery.

Programming concepts in C/C++

C Language fundamentals, Data types, Variables, Operators. Functions, Parameter passing techniques, storage classes, Recursion. Arrays: Declaration; initialization; 2-dimensional and 3-dimensional array, passing array to function, strings and string functions, and character arrays. File I/O.

Introduction to classes and objects; Constructor; destructor; Operator overloading; Function Overloading; function overriding; friend function; copy constructor;

Inheritance: Single, Multiple and Multilevel Inheritance; Virtual functions and Polymorphism: Dynamic binding, Static binding; Virtual functions; Pure virtual function; Concrete implementation of virtual functions; Dynamic binding Call mechanism, Implementation of Polymorphism, virtual destructors.

Templates: function Templates, Class Templates, Member function Template and Template Arguments, Exception Handling, Standard Template Library; Containers, Algorithms, Iterators and Function Objects.

Software Engineering

Introduction: Software Engineering, Evolving role of Software, Concept of Software, Changing nature of Software, Software Myths, Software Importance, Characteristics, Software Components, Software crises, Software engineering Challenges (Scale, Quality Productivity, Consistency and Repeatability, Change), Software standard, Software Engineering Approach.

Introduction to Software Requirement Analysis and Specification: Software requirement, (need for SRS requirement process), problem analysis (informal approach, data flow modelling, Object oriented modelling, prototyping), requirement specification (characteristics, components), Concept of Use Cases, Concept of validation

Design Engineering: Function oriented design, Design principles, Coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology.

Operating Systems

Overview of an Operating System, Resource Management, Operating System Interface, Process Management concepts, Inter-Process Communication, Process Scheduling, Synchronization, Deadlocks.

Memory Management, Linking, Loading, Memory Allocation, Design Issues and Problems, Virtual Memory, Fragmentation, Implementing Virtual Memory Paging, Segmentation, Virtual Memory Design Techniques, Buffering Techniques, Spooling.

File Management- File Systems & I/O Device Drivers, Access Strategies, File Systems, File System Organization, Design Techniques.

Case Studies, Unix/Linux Operating Systems, Users View, design Principles, Implementation, Process Management, File System, I/O System, Windows 2003.

Java Programming

An overview to Java, Comparison with other languages (C & C++), Java and Internet, Features of Java, Introduction to Java Virtual Machine, Object Oriented Programming concepts (Abstraction, Encapsulation, Inheritance, Polymorphism). Data types, Variables, Operators.

Arrays: Single and Multidimensional. Input, output, Error Statements, Control Statements and Looping Structures. Typecasting, Classes & Objects: Class Fundamentals, Declaring Objects, Constructors, Overloading, Access specifiers, static, the final modifier, Command Line arguments & Argument passing. Inheritance : Basics of Inheritance, Super class, Member Access, Creating a Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch & Abstract Class.

Packages and Interfaces, Exception Handling; fundamentals of Exceptions, Exception types, using Try and Catch, Throwing Exceptions, Multithreaded Programming: Java Thread Model, Creating & working with threads, String handling functions.

File Handling, File Class, Streams: Stream Classes, Reading & writing to Console, Accessing Files & Directories, File Input and Output Stream, Byte Array Input & Output Stream. Character streams.

Applets: Overview, Life cycle of an Applet, HTML tag, Parameter Passing, Applet vs Applications. Introduction, working with AWT Controls and Layout Manager, Event Handling. Introduction to Swings, JDBC.