

Object Oriented Programming

UNIT 1: Programming Basics

Introduction to Programming, Programming Paradigms, Programming Languages and Types. Introduction to C - Basic Program Structure, Execution flow of C Program, Directives, Basic Input /Output Introduction to Object Oriented Programming- OOP concepts, Advantages, Applications, Comparison of C and C++-Data Types, Control Structures, Operators and Expressions.

UNIT 2: Introduction to C++:

Structure of a C++ program, Execution flow, Classes and Objects, Access modifiers, Data Members, Member Functions, Inline Functions, Passing parameters to a Function(pass by Value, Pass by Address, Pass by Reference), Function with default arguments, Function Overloading, Object as a Parameter, Returning Object Static data members and functions, Constant Data members and functions Constructors- Default, Parameterized, Copy, Constructor Overloading, Destructors Arrays, Array as a Class Member, Array of Objects, Strings Cstyle strings and String Class

UNIT 3: Operator Overloading and Pointers

Operator Functions-Member and Non Member Functions, Friend Functions Overloading Unary operators Overloading binary operators(Arithmetic, Relational, Arithmetic Assignment, equality), Overloading Subscript operator Type Conversion Operators- primitive to Object, Object to primitive, Object to Object Disadvantages of operator Overloading, Explicit and Mutable Pointers, Pointer and Address of Operator, Pointer to an Array and Array of Pointers, Pointer arithmetic, Pointer to a Constant and Constant Pointer, Pointer Initialization, Types of Pointers(void, null and dangling), Dynamic Memory Allocation, Advantages and Applications of pointers

UNIT 4: Inheritance and Polymorphism

Inheritance Concept, Protected modifier, Derivation of Inheritance- Public, Private and Protected, Types of Inheritance-Simple, Multilevel, Hierarchical, Multiple, Hybrid, Constructors and Inheritance, Function Overriding and Member hiding Multiple Inheritance, Multipath inheritance – Ambiguities and solutions Polymorphism, Static and Dynamic Binding, Virtual Functions, Pure Virtual Functions, Virtual destructors, Abstract Classes, Interfaces.

UNIT 5: Streams and Exceptions

Files, Text and Binary Files, Stream Classes, File IO using Stream classes, File pointers, Error Streams, Random File Access, Manipulators, Overloading Insertion and extraction operators Error handling, Exceptions, Throwing and catching exceptions, Custom Exceptions, Built in exceptions

UNIT 6: Advanced C++

Casting- Static casts, Const Casts, Dynamic Casts, and Reinterpret Casts. Creating Libraries and header files. Namespaces Generic Programming, Templates, Class Templates, Function Templates, Template arguments, STL Database Programming with MySQL

Software Engineering & Project Management

UNIT 1: Introduction to software engineering and project management

Introduction to Software Engineering: Software, Evolving role of software, Three “R”-Reuse, Reengineering and Retooling, An Overview of IT Project Management: Define project, project management framework, The role of project Manager, Systems View of Project Management, Stakeholder management, Project phases and the project life cycle

UNIT 2: Software Process Models

Waterfall Model, Evolutionary Process Model: Prototype and Spiral Model, Incremental Process model: Iterative approach, RAD, JAD model, Concurrent Development Model, Agile Development: Extreme programming, Scrum

UNIT 3: Software Requirement Analysis and Specification

Types of Requirement, Feasibility Study, Requirement Analysis and Design: DFD, Data Dictionary, HIPO Chart, Warnier Orr Diagram, Requirement Elicitation: Interviews, Questionnaire, Brainstorming, Facilitated Application Specification Technique (FAST), Use Case Approach. SRS Case study, Software Estimation: Size Estimation: Function Point (Numericals). Cost Estimation: COCOMO (Numericals), COCOMO-II (Numericals). Earned Value Management

UNIT 4: Software Project Planning

Business Case, Project selection and Approval, Project charter, Project Scope management: Scope definition and Project Scope management, Creating the Work Breakdown Structures, Scope Verification, Scope Control

UNIT 5: Project Scheduling and Procurement management

Relationship between people and Effort: Staffing Level Estimation, Effect of schedule Change on Cost, Degree of Rigor & Task set selector, Project Schedule, Schedule Control, CPM (Numericals), Basic Planning Purchases and Acquisitions, Planning Contracting, Requesting Seller Responses, Selecting Sellers, Out Sourcing: The Beginning of the outsourcing phenomenon, Types of outsourcing relationship, The realities of outsourcing, Managing the outsourcing relationship.

UNIT 6: Software Quality

Software and System Quality Management: Overview of ISO 9001, SEI Capability Maturity Model, McCall's Quality Model, Six Sigma, Formal Technical Reviews, Tools and Techniques for Quality Control, Pareto Analysis, Statistical Sampling, Quality Control Charts and the seven Run Rule. Modern Quality

Management, Juran and the importance of Top management, Commitment to Quality, Crosby and Striving for Zero defects, Ishikawa and the Fishbone Diagram.

UNIT 7: Human Resource Management

Human Resource Planning, Acquiring the Project Team: Resource Assignment, Loading, Leveling, Developing the Project Team: Team Structures, Managing the Project Team, Change management: Dealing with Conflict & Resistance Leadership & Ethics.

UNIT 8: Software Risk Management and Reliability issues

Risk Management: Identify IT Project Risk, Risk Analysis and Assessment, Risk Strategies, Risk Monitoring and Control, Risk Response and Evaluation. Software Reliability: Reliability Metrics, Reliability Growth Modelling.

Computer Organization and Architecture

UNIT 1: Fundamentals of Digital Logic

Boolean Algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. Combinational Circuits : Adders, Mux, De-Mux, Sequential Circuits : Flip-Flops (SR, JK & D), Counters : synchronous and asynchronous Counter

UNIT 2: Computer System

Comparison of Computer Organization & Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections, Input / Output: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access

UNIT 3: Memory System Organization

Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory : Magnetic Discs, Optical Memory, Flash Memories, RAID Levels

UNIT 4: Processor Organization

Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU] , Processor Organization, Structure and Function. Register Organization, Instruction Cycle, Instruction Pipelining. Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors: Design Issues

UNIT 5: Control Unit

Micro-Operations, Functional Requirements, Processor Control, Hardwired Implementation, Micro-programmed Control

UNIT 6: Fundamentals of Advanced Computer Architecture

Parallel Architecture: Classification of Parallel Systems, Flynn's Taxonomy, Array Processors, Clusters, and NUMA Computers. Multiprocessor Systems : Structure & Interconnection Networks, Multi-Core Computers: Introduction, Organization and Performance.

UNIT 7: Case Study

Case study : Pentium 4 processor Organization and Architecture

IT in Management

UNIT 1: Information Technology Support and Application

Introduction to Information Technology, Business Values Of IT, Role Of Computer in Modern Business, Current Trends, Business in Digital Economy.

UNIT 2: Information System and business applications

Introduction to Information System: Information System, Classification and type of Information System, Information system Infrastructure and architecture, Role of Information systems in Business Today, Perspective on Information systems, Software and hardware platform to Improve Business Performance, Management opportunities challenges and Solutions, Business applications: Roles of IT in E-commerce, M-commerce

UNIT 3: Acquisition of Information Technology

Need to acquire technology, developing new technologies, Increasing strategic options, Gaining efficiency improvements, sources for acquiring technology, Responding to the competitive environment.

UNIT 4: Impact of Information Technology on organization and Strategic Issues of Information Technology

Impact of Information Technology on organization : Modern Organizations ,Creating New Types of Organizations Strategic Issues of Information Technology: Information Technology and Corporate Strategy, Creating and Sustaining a Competitive Edge, Integrating Technology with the Business Environment, Managing Information Technology

UNIT 5: IT for managing International business and Governance

International Business and IT technologies: International Business Strategies, Key Issues in International Environment, Managing IT Internationally. Governance concept: IT Governance, Internet governance, E-governance and internal IT processes.

UNIT 6: Information Technology Issues For Management

Management in a Technological Environment, The Changing World of Information Action Plan

UNIT 7: Societal Implications And The Future With Technology

Social Responsibilities, Ethics and Information Technology, The Future with Information Technology

Statistics And Probability

UNIT 1: Measures of Central Tendency & Measures of Dispersion

Frequency Distribution, Histogram, Stem and leaf diagram, ogives, Frequency Polygon, Mean, Median, Mode, Range, Quartile Deviation, Mean Deviation, Box whisker plot, Standard Deviation, Coefficient of Variation

UNIT 2: Skewness, Correlation & Regression

Karl Pearson's coefficient of Skewness, Bowley's coefficient of Skewness, Scatter Diagram, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, Linear Regression and Estimation, Coefficients of regression

UNIT 3: Theory of Attributes

Classes and Class Frequencies, Consistency of Data, Independence of Attributes, Association of Attributes

UNIT 4: Testing of Hypothesis

Hypothesis, Type I and Type II errors. Tests of significance – Student's t-test: Single Mean, Difference of means, paired t-test, Chi-Square test: Test of Goodness of Fit, Independence Test

UNIT 5: Introduction to Probability

Random experiment, Sample space, Events, Axiomatic Probability, Algebra of events

UNIT 6: Conditional Probability

Conditional Probability, Multiplication theorem of Probability, Independent events, Baye's Theorem

UNIT 7: Random variables

Discrete random variable, Continuous random variable, Two-dimensional random variable, Joint probability distribution, Stochastic independence

UNIT 8: Mathematical Expectation

Expected value of a random variable, Expected value of a function of a random variable, Properties of Expectation and Variance, Covariance