

Syllabus-Computer Application

Section- C

Unit-I

Computer Organisation and Architecture

Computer organization: Digital and Analog computers, CPU, Hardware, Software and firmware. Number Systems: Binary Numbers, Number Base conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes: BCD code, Gray Code, ASCII Code, Excess 3 Code, Error detecting Code.

Computer Arithmetic, Logic gates, Integrated Circuits, K-Map, AND, OR, NAND and NOR implementations, Exclusive-OR function.

Combinational Logic: Combinational Circuits, Binary adder, subtracter, multiplier, Decoders, Encoders, Multiplexes and Demultiplexers.

Sequential circuits, Latches, Flip Flops: SR, D, JK, T. Master Slave JK Flip Flop. Characteristic equations and Excitation tables of flip-flops. Shift Registers, Counters.

Computer organization: The memory unit, the input and output subsystem, the bus structures, ALU. Program development tools: Compiler, interpreter and assembler.

8085/86 micro processor architecture, Instruction set. Integer division. BCD arithmetic, Design of ALU.

Memory address and addressing modes. RISC and CISC processors. Instruction pipelining, Parallel processing and pipelining, pipelining in RISC and CISC processors. Super scalar processors. VLIW processors. Cache memory and its types. Input Output organization, accessing I/O devices, Interrupts. Memory mapped I/O and I/O mapped I/O. Programmed I/O.

Unit-II

Operating System

Evolution of operating systems, operating system concepts, Process Management: Concepts, Algorithms. Memory Management: Concepts, single user memory management. Partition memory allocation, Virtual memory management using paging and segmentation techniques.

Concurrent Processes: Mutual exclusion and synchronization, Techniques of inter process communication, Deadlock handling.

File Management: Operations on a file, structure of a file system, Free block list, keeping track of blocks allocated to a file, directory structure, sharing and protection of files, file system Reliability, Unix file system.

Device Management: Goals of input/output software design, Structure of device hardware and software, Layers of I/O software, structure of device drivers, Disk driver, disk arm scheduling algorithms, terminal driver, clock driver etc.

Introduction to network and distributed operating systems Case Studies: Unix/Linux, Windows operating system, Unix/Linux commands.

Mobile operating System: file system, Process, Task, Thread, ISR and IST.

Unit-III

Computer Networks

Computer Network, Goals and Applications, Reference models- OSI and TCP/IP. LAN, MAN and WAN and topologies, LAN components - File server, Workstations, Network Adapter Cards. Connection Oriented and Connection less services, Switching Techniques- Circuit Switching, Packet Switching, Transmission media.

Data Link Layer: Design Issues, Framing, Error Detection: Parity Check, Check Sum and Cyclic Redundancy Check (CRC); Correction Technique: Hamming code. Flow Control: Elementary Data link Protocols, Data link layer in the Internet: SLIP and PPP.

Aloha, CSMA Protocols, Collision- Free Protocols, IEEE MAC Sublayer Protocols: 802.3 802.4, 802.5 and their management. High speed LANs- Fast Ethernet, FDDI, Wireless LANs

Network Layer: Routing Algorithms, Internet addressing and Internet Control Protocols.

Transport Layer :Connection Establishment, Connection Release, Multiplexing. UDP, TCP.

Application Layer: Client Server Architecture, DNS, WWW and HTTP, Cookies, Proxy Server. E-mail Protocols. Network Security: Cryptography, Symmetric-Key Algorithms, Public-key Algorithms, Digital Signatures.

Characteristic of Cellular Systems, Mobility support in cellular telephone networks, personal communications Systems/Personal Communications Networks, Mobile applications, Limitations, Health Concerns, Cordless phone.

Wireless Personal Area Network, Wireless Local Area Network and Internet Access. Mobility management, Security. Cellular telephony, Mobile communication, Satellite Systems, Mobile IP, goals, assumptions requirements, entities & terminology, IP packet delivery, tunnelling and encapsulation, Feature & format IPv6, DHCP, TCP over Wireless. Ad Hoc networks, CODA, HTTP versus HTML, WML, XML application for wireless handheld devices. UWB systems characteristics, Signal propagations, technology, Mobility management for integrated systems, Current approaches for security.

Unit-IV

Programming Languages

Classification of programming languages, Programming Environment {Assemblers, compilers, interpreters, linkers and loaders}.

Programming Concepts with Flowcharting and algorithms, Developing and debugging flowcharts for Programming Problem.

Introduction to C: Data types, Constants and Variables, Expressions and Operators and Decision Control Structures in C. Loop Control Structures, Case Control Structures. One dimensional and multidimensional array. Pointers and their Applications, String Handling Functions: Standard and User defined Function, Parameter passing, Scope

Rule. Recursion, Structures and Union, Arguments to main, Enumerations and bit fields.
Pre-Processors: {Def, include, macro's, ifdef etc.}, File Handling.

Introduction to C++ : Structures, Variables in C++, References, Functions, Function Overloading, Default Values for Formal Arguments of Functions, Inline Functions.

Class and Objects: Introduction to Classes and Objects

Constructors, destructors, friend function, dynamic memory allocation, Inheritance, Overloading, Polymorphism, Templates.

Introduction to JAVA: Features of Java, Object-oriented programming overview, Introduction of Java technologies, How to write simple Java Programs, Data Types, Variables, Memory concepts, decision making operators, Naming Conventions.

Introduction to Class, Objects Methods and Instance Variables, Primitive type Vs Reference Type, Initializing Objects with Constructors.

Static Method, Static field, String Handling in JAVA, Arrays, Using Command-line Arguments final Instance Variables, this reference, static import, overloaded Constructors, Garbage collection and method finalize. Overloading methods, parameter passing.

Inheritance, Polymorphism, Packages and Interfaces, Exception Handling, Streams and Files. Multithreading, GUI in JAVA, Applets, Generic and Collection API, Database connectivity: JDBC

Unit-V

Database Technologies

Various Views of data, data independence, schema & sub-schema, primary concept of data models, database languages, transaction management, database administrator & user, data dictionary, database architectures. ER model, Reduction of ER schema to tables, candidate, primary, alternate & foreign keys. EER model, Relational Algebra, SQL: DDL, DML, DCL Queries, Relational Database, Programming concepts of PL/SQL, Stored procedure, Database connectivity with ODBC/JDBC. SQL Extensions. Functional dependencies, Normalization, Database Integrity, Transaction Management, Concurrency & Recovery, Query Processing, Query optimization, File Organization: File organization, Organization of records in files, basic concept of Indexing, ordered indices: B⁺ tree & B tree index files. RAID.

Fundamental of data mining , Data Mining Query Languages. Data Mining application Association Rule, clustering classification, Genetic Algorithm. Web Mining, Web content mining, Web Structure mining, Text mining, Temporal Data Mining, Spatial Data Mining.

Data Warehouse, Warehouse Schema, Data Warehouse Architecture, Data Warehouse Server, Data Warehouse Implementation, Metadata, OLAP operations.

Object Oriented Databases, Spatial Databases.

Unit-VI

Internet of Things

Internet of things: Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view. Technology involved- Server-end Technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT.

Unit -VII

Data Structures and Algorithms

Data Structures: Definition, Arrays, Stacks, Queues. Dequeues. Linked Lists, Singly and Doubly linked list, **Trees:** Definition, Tree types and their and Implementation. Preorderpostorder, inordertraversal, Graphs: Definition and implementation.

Hashing, Hash function, Collision Resolution Techniques, Hashing Applications, Standard Template Libraries.

Time Complexity, Big- Oh- notation, Running Times, Best case, Worst case, Average Case Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Evaluating time Complexity.

Straight Sequential Search, Binary Search, Interpolation Search.

Sorting: Introduction, Sorting by exchange, selection insertions. Bubble sort, Selection sort, Insertion sort, Efficiency of above algorithms, Merge sort, Quick sort Algorithm, Heap sort, Radix sort,

Order Analysis: Objectives of time analysis of algorithms; Big-oh and Theta notations, Master Theorem and its proof, solution of divide and conquer recurrence relations, Dynamic Programming: methodology and examples. Graph Algorithms: Basics of graphs and their representations. BFS. DFS. Topological sorting.

Minimum spanning trees (Kruskal and Prim' salgorithms and brief discussions of disjoint set and Fibonacci heap data structures). Shortest Paths (Dijkstra, Bellman-Ford, Floyd- Warshall). Hard problems and approximation algorithms. Problems classes P, NP, NP-hard and NP complete, deterministic and nondeterministic polynomial-time algorithms. Approximation algorithms for some NP- complete problems. Backtracking, Branch and Bound technique, String Matching, Knave algorithms, KMP algorithm, Parallel Algorithms.

Unit -VIII

Theory of Machine Learning

Introduction to Machine Learning, Its applications, issues & challenges, KNN, Clustering algorithms, perceptron & Artificial Neural Networks, Bayesian Learning

Unit -IX

Intelligent Systems

Artificial Intelligence and its Application. Knowledge Representation Techniques: Symbolic Approaches, Representation of knowledge using propositional logic (PL), First Order Predicate Logic (FOPL) Conversion to clausal form, Inference Rules, The Resolution principle non- deductive inference methods.

Associative networks and Frame Structures. Conceptual Dependencies and Scripts. Introduction to LISP and PROLOG. Search and Control Strategies: Introduction, Classical All problems:

The Eight Puzzle, Travelling salesman Problem, Breadth- First Search & Depth first Search, Heuristic Search Techniques, Neural Network Computing, Activation and synaptic dynamics, learning methods, stability and convergence in ANN, Functional units of an ANN for pattern recognition, Expert Systems, Building an expert system using LISP/ PROLOG. Embedded systems.

Unit -X

Cyber Security

Internet ISPs, Types of Internet connection, Internet connection configuration-sub netting, Firewalls, Internet phone, Chatting, Search Engines.

W3 an introduction, Web site and Web page, Web server, Web cache, Principles of web designing planning a web site. Principles and patterns of Good design. Publishing and maintaining a web site.

Introduction to security, cryptography, security at application, database & network level, digital signatures, public & private keys, authentication & authorisation, anti-virus, worms, threats & risk management, privacy& security