

Subject: Computer Science :

UNIT-1

Number System – Different number systems, Conversion from one system to another, signed numbers representation, complements, BCD codes, Alphanumeric codes, Logic gates Boolean algebra laws, Demorgan's theorem, SOP and POS, Simplification using K map.

Combinational and sequential logic circuits- Adders, Subtractors, parallel adders, Multiplexer and De-multiplexers, Encoder&decoder, Flip Flops-Different types of FLIP FLOPs with their design, Counter – Synchronous and Asynchronous, Up and down synchronous counters, cascaded counters, Shift registers

C Language-Features, General structure, Data types, Operators in C, Expressions , Input/output in C, Decision making and looping statements, Arrays-Declaration and initialization of one and two dimensional array,

Strings, Functions, Structure and union -String declaration and initialization, string handling functions, Functions – Need for functions, categories of functions, recursion, function with arrays and strings, scope and life time of variables, structures and unions

Pointers and Files– Pointer declaration, pointer arithmetic, pointers and functions, array of pointer and pointer to an array, Preprocessor and Files – Macro substitution, file inclusion, command line arguments, file handling functions

UNIT-2

Object oriented programming - Object oriented concepts, C++ as an Object oriented programming, C v/s C++, C++ special operators, reference variable, data types , expressions, functions - Default arguments, function overloading, inline functions, friend functions

Classes and Object – Defining class, class member function definition, nesting member functions, Member function with object as arguments and return type, static data members, array of objects, constructors and destructors – constructor overloading, copy constructors, Dynamic constructors, 2d array constructions

Operator overloading and Inheritance – Operator function, overloading unary and binary operators, non-overloaded operators in C++, Inheritance – Need for inheritance, access specifiers, Types of inheritance

Pointers – Pointer to objects, this pointer, and virtual functions, virtual base class , type conversion, stream classes, formatted and unformatted i/o functions, Stream classes, unformatted i/o operations, formatting of output-ios class functions and flags, manipulators,

Files and Templates: Introduction to files, file creation, file types, file handling functions, error handling in file operations, class template, function template, template with parameters.

UNIT-3

Data structure – Introduction, categories, Algorithm notation and complexity, Linear data structures – Array, Stack, Queues, Linked List, Dynamic memory management, Types of linked list- Linear, circularly and doubly linked lists, Applications of different linear data structures

Trees and Graphs – Tree definition, terminology, Tree traversal, B tree, B+ tree, Binary search tree, Graph – Graph terminologies, Graph representation, Graph Traversal-DFS and BFS, Warshall's algorithm,

Searching and Sorting – Searching– Binary and linear search, different sorting techniques- Bubble, insertion, selection, quick sort, shell sort, merge sort with their time complexity, hashing techniques

System software – Functions of various system software, Assembler design. Different loading schemes with their advantages and disadvantages. Subroutine Linkage, Macroprocessor – Macro instruction, macro with arguments, conditional macro expansion, macro calls within macro, Specification of databases and formats, algorithm for macro definition processing

Compiler – Introduction, Compiler Phases, code optimization techniques – Machine independent and dependent code optimization techniques, Parsing Techniques – Top down parse – LL, Recursive descent, Operator precedence, LR parsers

UNIT-4

Operating system – Functions and Services, Types of Operating system – batch, multiprogramming, time sharing, Process – Process state, Scheduling criteria, Scheduling policies, Threading concepts and Multithreading

Memory management – Functions, non virtual memory management techniques – Contiguous, partitioned, paging techniques, virtual memory management techniques, page replacement algorithms – FIFO, LRU, tuple coupling, overlays

Process Synchronization, Critical section problem, Bakery Algorithm, Semaphores, Synchronization problems- Bounded Buffer Problem, Readers-Writers problem and Dining Philosophers problem.

Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance and recovery, Banker algorithms, Disk scheduling – disk scheduling policies, file management – file concept, file allocation and access, directory structures

UNIX –Features of UNIX, Architecture, Different types of shell, File and directory related command, file system, filters in UNIX, UNIX editor, shell programming, administrative commands

UNIT-5

Software Engineering – Introduction, Challenges, different software development process model with their merits and demerits, Characteristics of software process, Software Metrics

Software planning :Estimation of efforts, cost estimation model, project scheduling and staffing, risk assessment and management, project monitoring and planning

Problem analysis, SRS – Components and characteristics, Specification language, validation, design principles and methodology – Modular, Top down and bottom up, Object oriented, DFD,

Coding and Testing – Programming guidelines and characteristics, Structured programming, information hiding, Testing – Levels of testing, Block box and white box testing, verification and validation

Software quality assurance, Software Maintenance – Need for maintenance, maintenance activities, Different types of maintenance,

UNIT-6

DBMS - Introduction , Database Architecture , Database users, Data Models, Abstractions, ER Model,Relational Data Model – Relational algebra and Relational calculus, Relational model Constraints, Transaction, Concurrent executions, Serializability

Normalization- 1NF, 2NF, Functional Dependencies, Transitive and Multivalued dependency- 3NF, BCNF, Advantages of RDBMS- Codd'sRules.SQL –data types, DDL, DML and TCL and DCL commands, Set Operations, Aggregate functions, Views, Joins

Data communication – Components of communication systems, Topologies, Transmission modes, Network classification, Signal transmission – Analog and Digital transmission, Encoding techniques, Guided and unguided communication media,

OSI model – Services of various layers, Internetworking devices, Protocols –TCP, UDP, IP, IPV4, IPV6, TCP/IP Suite, SMTP, Datagram and virtual circuits.

Switching networks – Circuit, Packet and message switching, ALOHA, Routing algorithm – Shortest path, congestion control, 802 LAN standards, Multiplexing and Demultiplexing, RPC, TCP, UDP, Cryptography

UNIT-7

Set theory – Notations, set operations, power set, set identities, Relations and ordering – Relations, Properties of Binary relation, Matrix representation of relations, Closures of relations, Equivalence relations, Partial order relation.

Functions – Introduction, Composition of Functions, Inverse Functions, Groups & Subgroups, Mathematical Logics - Connectives, Negation, Conjunction, Disjunction, Statement Formulas and Truth Tables, Conditional and Bi-conditional.

Tautologies, Equivalence of Formulas, Tautological Implications, Theory of Inference and deduction. Predicate Calculus, Mathematical Induction.

Computer Graphics – Applications, Graphical input and output devices, Scan conversion - Scan conversion method, Line and Circle drawing algorithm – DDA, Brenham's and Mid-point method

2D and 3d geometrical transformations – Basic and Composite 2d transformation, transformations in homogeneous notation, Basic 3D transformation, Projection –parallel projection, orthographic projection, axonometric projection, oblique projection, perspective projection, viewing an clipping, clipping algorithms

UNIT-8

Java – Features, applications, Java API, SDK, Java class and objects – Defining and creating objects, Interface and Packages, Multithreading: Threading concepts, thread methods and exceptions,

Error handling – Different types of exceptions , Java Applets –Life cycle and applet methods, graphics and networking application with applets

Web Technology - HTTP & FTP Protocols, Tier architecture, XML, DTD's, Style sheets and Transformation: CSS, SAX, and DOM.

Web Server Concept, Creating Dynamic Content, Sessions and State, Error handling and Authentication

Multimedia communication - Multimedia data representation, Compression techniques for different multimedia data – text, audio, image and video, Compression standard, Multimedia editing tools

UNIT-9

Algorithm – Characteristics, Performance analysis, asymptotic notation, analysis of recursive and iterative algorithm, Divide and Conquer– Binary search, Quick sort, merge sort, Finding maximum and minimum, Greedy method.

Dynamic programming and traversal techniques - 0/1 Knapsack, travelling salesman, all pair shortest path, Breadth first search and Depth first search techniques.

Branch and bound and backtracking – 0/1 knapsack, travelling salesman, 8 queens problem, graph coloring, hamiltonian cycle problem

Computer oriented numerical techniques – Computer arithmetic, Floating point arithmetic, errors, root finding methods – Bisection, Regulafalsi, Newton raphson and Secant method, Order of convergence

Differential equation and Numerical integration - Euler's method, modified euler, Taylor series method, Range Kutta II and IV order methods, predictor corrector methods, Simpson's 1/3 and 3/8 rule, Trapezoidal rule.

Simultaneous equations – Gauss elimination, Gauss seidel, Gauss Jordan, LU decomposition, Interpolation techniques - Lagrange interpolation, Difference Tables- Newton-Gregory Forward and Backward interpolation

UNIT-10

Data mining – Introduction to data mining and data warehousing, data mining stages : preprocessing - Data cleaning, Data integration and reduction, different reduction techniques, data transformation.

Association and Correlation –Basic Concept, Frequent Item set mining methods, pattern evaluation methods

Classification - Decision tree Induction, Attribute Selection Measures, Tree Pruning, Bayesian classification, back propagation, SVM.

Clustering – Introduction to cluster analysis, Data types, clustering methods- Hierarchical and partitional clustering, Density based, model based, grid based clustering methods, K means clustering, high dimensional data clustering.

Security issues – Security attack, issues, Encryption and decryption, encryption techniques, firewalls – concepts, hardware and software firewalls, virus and antivirus