

IMPORTANT TOPICS

A. *Data structure & Algorithms:*

1. Searching Algorithm & Time Complexity
2. Recursion & Master Theorem
3. Stack & Queue: Insertion, Deletion, Problem solving, Complexity & use
4. Linked List & Tree: Different types, insertion, deletion, complexity, use, Different binary tree, B –tree, B+ tree, AVL Tree, Problem solving, Binary search tree, prefix, infix & post fix,
5. Hashing: clustering, linear & quadratic probing, Hash functions & Types, division, mid square, folding & multiplication method, SHA, CRC, MD5,
6. Graphs: MST, Planner & non planner, Prim, Krushkal, Dijkstra, Infix, prefix, postfix, Bellman Ford, Floyd Warshall, Eulerian path, Hamilton path, Planner graph, TSP
7. Algorithms: Backtracking, Dynamic, Divide & conquer, Greedy, Knapsack Huffman coding, LPP, Heuristic search, Eight state problem, A* & AO* algorithms, Hill Climbing, DFS & BFS, Linear Transportation Problem, Huffman Coding & Data compression, P/NP/CoNP/NP hard/ NP-complete.

B. *Theory of Computation & Compilers:*

1. System Design & Layer
2. Regular Expression, Chomsky Hierarchy, Regular Language , Context Free Language, Context Sensitive Language, Recursive, Recursive enumerable language, Finite Automata, Pushdown Automata, Linear bounded automata, NFA & DFA, NDPDA & DPDA, Turing Machine, Product rule, Mealy and Moore machine conversion.
3. Pumping Lemma, Operation & Language family, Decidable and un-decidable problems, Parse Tree, String and accepted language, Parsing, Unambiguous grammar & ambiguous grammar, Lexical & Syntax Analysis, LR, SLR, LALR, LL
4. Syntax & Semantic analysis: Top down parsing, recursive parsing, LL(1), Bottom up parsing, LR parser, LALR(1) parser, Type checking, dependency graph, evaluation order.
5. Activation tree, Intermediate code generation, control flow, code generation and optimization, loop optimization, peep-hole optimization.
6. Compiler, list, Lexical, Syntax, Semantic, Intermediate code, code optimization, code generation, Local & global optimization, Peep Hole optimization, token, Parse tree example, ambiguity, left & right most derivation, top down & bottom up parsing, predictive parsing, type checking, storage allocation, postfix notation, YACC, LEX, Prolog.

C. *Data Communication & Computer Networking:*

1. TCP/IP & Application, OSI Model, Layer, Class, Protocol, IP Address, Error Detection and correction, Network Devices.
2. Types of switches, MAC Sub layer protocol, Ethernet frame format, ATM, Token Ring, Congestion control, Bit stuffing, TCP /IP related protocol, IPV4 & IPV6, IP class, N/W

and Host address, Hamming code, Grey code, Application Layer, Wireless LAN, NW layer, Transport Layer

3. NW security, Cryptograph, Secret-key & public key algorithm, digital signature, VPN, Firewalls, Routing Algorithm, congestion control, Some problem and solution, Mobile computing architecture, downlink & uplink, hard & soft handoff.

4. WWW, URL, DNS, SMTP, POP, IMAP, TELNET, FTP, Mobile tech: GSM & CDMA, GPRS & SMS, Wireless LAN, E-technology, Cloud computing: Saas, PaaS, IaaS, public & private cloud, Basics of IoT.

D. Operating system:

1. Process, Processor utilization, Batch response, scheduling algorithm, multiplexing, spooling, socket.
2. Process scheduling & all types, All scheduling algorithms & example, FCFS, Shortest job first, Gang scheduling, Fair share scheduling, Round Robin, Priority scheduling, Multi level queue scheduling, Multilevel feedback scheduling, Solaris scheduling.
3. Memory management, Memory concern, space & address translation, Memory allocation, Paging, fragmentation & segmentation, page & frame, Page table & TLB, Example for memory management (MM, PS, PT, SM, Process size), Segmentation, Cache mapping- (Direct, associate, set associative), Virtual memory, Page replace algorithm.
4. Process synchronization, Process scheduling, Mutual exclusion, critical section, Race condition, Critical section problem-(Mutual exclusion, Progress & Bound wait), Using Flag variable, turn variable, Peterson solution, Semaphores, Application for managing resource, Internal & external fragment, Pipe line operation.
5. Deadlocks, deadlock prevention and avoidance, Resource allocation graph, Virtual memory management, Banker algorithm, Page replacement algorithms: FIFO, Optimal, LRU; Belady's anomaly, thrashing, seek time, rotation latency, transfer time, Secondary storage structure, Scheduling Algorithms: FCFS, SSTF, Scan scheduling, C-Scan scheduling, C-Look disk scheduling; RAID structure, overlays, dispatcher, spooling, first fit & best fit, Big Endian & Little endian, Dynamic address translation.
6. Storage management: Disk structure, scheduling & management, RAID; File I/O systems: free space management, App I/O interface, Kernal I/O , virtual machines.
7. Linux OS: Design, Kernal modules, file systems, Scheduling, interprocess communication, Process & memory management, Inter process communication, Network structure, Important Linux commands ; Win OS: terminal services, file system; Distributed system: structure & protocol, DFS

E. DBMS:

1. Database, ACID properties, functional dependencies, keys, normalization: 1 NF, 2NF, 3NF, BCNF; Lossless join decomposition, Physical & logical structure, transaction, trivial & non trivial, closer set attribute, equivalence function, canonical form, Armstrong axioms, action on database, Object base data model.
2. Types of join, relation algebra & projection, union, different operation, relation calculus, conflict serializable, Relational model, SQL and commands, relational data model, NOSQL
3. categories of SQL: DDL, DQL, DML, DCL, TCL
4. Big data system: Big data, architecture, Hadoop & Map reduce, Distributed files system, HDFS.

5. Data mining, Dataware house, OLAP & OLTP

F. Software Engineering:

1. All Life cycle models: classical & iterative waterfall model, prototype, evolution, spiral, v-model; , validation model: Agile model, Big bang model, RAD model; SRS, S/W design & coding , Type of testing and integration, Black box & white box, All types maintenance, clean-room testing.
2. Project size estimation, LOC, functional point & UDF estimation, empirical estimation, COCOMO Model and all types.
3. Object oriented design, association, aggregation & composition, domain modelling, Interaction diagram, CMM, KPI, KRA & KPA; Coad-Yourdon methodology, Jacobson method, all types cohesion & coupling, McCabe's cyclomatic complexity.
4. Software quality: ISO Types & Quality factors, quality control & assurance, Risk management, S/W reliability.
5. S/W configuration management: Reuse, re-engineering, reverse engineering, control & version.

G. Digital Logic & Computer Architecture:

1. Digital logic: Digital computer, Logic Gates, Boolean algebra, Binary-Oct-Dec-Hexa conversion, D'Morgan's theorem, Karnaugh Map, combinational circuit, Half adder & full adder, Flip-Flops, JK Master Flip flop, Sequential cct, Decoders, Multiplexer, counters: Riple & Mod 8 counter, BCD, EXCESS3, QAM16,
2. Data representation: Floating point, Error Detection, computer-addition, subtraction, multi & division;
3. Register transfer, chip packaging: EPROM, DRAM, SRAM; External memory, Instruction set of 8085, Data register of Pentium processor, shift instruction-SHL, SHR, ROL, ROR; register required for expression, RISC & CISC
4. Parallel processing, Pipeline, DMA, Priority Interrupt,
5. Main, Aux & Associative Memory, Cache, Virtual memory, Memory Management H/W, multi processor.

H. Artificial Intelligence:

1. AI, ML, DL, DS, Game playing, Min-Max search, Alpha Beta, cutoff, expert system, Knowledge representation, Goal stack, Hierarchical planning, population, sample, random variable, Gausssion distance & Normal distance, Pearson correlation co-efficient, Hyosthesis testing: Null & alternative hypothesis, critical region, Type I & II error, statistically significant, P-value,
2. NLP, Agents & objects, Agents & expert system, Fuzzy sets, Alpha cut, convex fuzzy set, member function, fuzzy control system & rule bases system, Max-min composition, Max product composition,

3. Correlation & regression, Logistic regression, Clustering, classification, Genetic algorithms, operation, fitness function, Neural network, active function, Logistic sigmoid function, Artificial Neural Network (ANN), K-nearest neighbour, supervised & unsupervised, Reinforcement learning, Single perception, Multi layer perceptron, Hopfield Network, Horn clause, CNF, Simple recurrent N/W, RNN.

I. OPDS & C++:

1. Class, object, inheritance, encapsulation, abstract class, polymorphism
2. Token, Identifier, Inline function, functions parameter passing, virtual function, construction & destruction, operator & function overloading, event handling.
3. Dynamic allocation, Pointer & Arithmetic operation, memory leaking, garbage value, dangling pointer, pointer aliasing.
4. Different codes: find out error & output,

J. Web Technology:

1. HTML: Tags, Table, Form, List, Hyperlink; CSS: Inline, Internal, external, floating, border, styling;
2. HTML5 & CSS3, Applets, Javascript, JQuery, PHP, MySQL

K. Discrete Math:

1. Mathematical Logic: Propositional and Predicate Logic; Negation, conjunction, implication, Important logic, tautology, contradiction, contingency, satisfiable & unsatisfiable, problem & solve.
2. Set & relation, set operation, empty set, kinds of relation, equivalence relation, function, domain, co-domain, range, signum function, recurrence relation, All Laws: commutative, associative, distributive, idempotent, absorption law; Group theory, Rings, homomorphism, Isomorphism, automorphism, Abelian group, Integral domain, closure property.
3. Probability: permutation & combination, pigeonhole principle, probability problem & solution, Bayes' theorem.
4. Boolean Algebra: function & representation, simplification.
5. Graph theory covered in DSA.
6. Optimization: Linear programming, simplex method, transportation & assignment model