

CS: Computer Science and Information Technology

Section 1: General Aptitude

Topic 1: Verbal Ability

Grammar, Vocabulary, Coding-Decoding & Series, Directions, Blood Relations, Arrangements, Syllogism, Inference & Assumptions, Clocks and Puzzles.

Topic 2: Numerical Ability

Fundamentals, Equations, Percentage, Averages, Ratio & Proportions, Mixture and Allegations, Data Interpretation & Data Sufficiency, Time, Speed & Distance, Time & Work, Set Theory & Venn Diagrams, Progression, Functions & Graphs, Logarithms, Permutations and Combinations, Probability, Geometry & Mensuration.

Section 2: Engineering Mathematics

Topic 1: Discrete Mathematics

Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

Topic 2: Linear Algebra

Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.

Topic 3: Calculus

Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Topic 4: Probability & Statistics

Random variables. Uniform, normal, exponential, Poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Section 3: Computer Science and Information Technology

Subject 1: Digital Logic

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Subject 2: Computer Organization and Architecture

Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Subject 3: Programming and Data Structures

Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Subject 4: Algorithms

Searching, sorting, hashing. Asymptotic worst-case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

Subject 5: Theory of Computation

Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability.

Subject 6: Compiler Design

Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimisation, Data flow analyses: constant propagation, liveness analysis, common subexpression elimination.

Subject 7: Operating System

System calls, Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Subject 8: Databases

ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Subject 9: Computer Networks

Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet, circuit and virtual circuit-switching; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, Sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.