

GATE

Syllabus

Computer Science & Information Technology (CSE / IT)

10 Sections | Complete Topic-wise Breakdown

Contents

Section 1	Engineering Mathematics
Section 2	Digital Logic
Section 3	Computer Organization and Architecture
Section 4	Programming and Data Structures
Section 5	Algorithms
Section 6	Theory of Computation
Section 7	Compiler Design
Section 8	Operating System
Section 9	Databases
Section 10	Computer Networks

Section 1 – Engineering Mathematics

- Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Monoids, Groups. Graphs: connectivity, matching, colouring. Combinatorics: counting, recurrence relations, generating functions.
 - Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.
 - Calculus: Limits, continuity and differentiability, Maxima and minima, Mean value theorem, Integration.
 - Probability and Statistics: Random variables, Uniform, normal, exponential, Poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.
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Section 2 – Digital Logic

- Boolean algebra and minimization – algebraic technique, Karnaugh map, tabular method. Design of combinational and sequential circuits. Number representation and arithmetic (fixed and floating point).
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Section 3 – Computer Organization and Architecture

- Instruction set and addressing modes. Design of arithmetic and logic unit (ALU). Design of control unit – hardwired and microprogrammed. Memory interfacing and hierarchy: performance, cache memory mapping. I/O interface (interrupt and DMA). Instruction pipelining, pipeline hazards.
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Section 4 – Programming and Data Structures

- Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.
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Section 5 – Algorithms

- Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths.
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Section 6 – 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.
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Section 7 – Compiler Design

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

Section 8 – 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.

Section 9 – 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.

Section 10 – Computer Networks

■ Principles of Layering; Basics of switching (circuit, packet and virtual circuit) and performance metrics; Data link layer: error detection, Medium Access Control, Ethernet; Distance vector and link state routing; IPv4 - Fragmentation, CIDR Notation, Network Address Translation; TCP - flow control and congestion control, socket API; DNS and HTTP.