

Code: CS Computer Science and Information Technology

Engineering Mathematics

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.

Linear Algebra: Matrices, Determinants, System of Linear Equations, Eigen values and Eigen vectors, LU Decomposition.

Calculus: Limits, Continuity and Differentiability, Maxima and Minima, Mean Value Theorem, Integration.

Probability: Random Variables: Uniform, Normal, Exponential, Poisson and Binomial Distributions. Mean, Median, Mode and Standard Deviation. Conditional Probability and Bayes Theorem.

Computer Science and Information Technology

Digital Logic: Boolean Algebra, Combinational and Sequential Circuits: Minimization, Number Representations and Computer Arithmetic (Fixed and Floating Point Representations).

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).

Programming and Data Structures: Programming in C, functions, Parameter Passing, Recursion, Arrays, Stacks, Queues, Linked Lists, Trees: Binary Trees, Binary Search Trees, Tree Operations, Binary Heaps, Graph terminology and representation, Graph traversal techniques.

Algorithms: Searching, Sorting, Hashing, Asymptotic Notations, Time and Space Complexity. Algorithm Design Techniques: Greedy, Dynamic Programming and Divide-and-Conquer. Graph traversal techniques, Minimum Spanning Trees, Shortest Path algorithms.

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.

Compiler Design: Lexical Analysis, Parsing, Syntax-Directed Translation, Runtime Environments, Intermediate Code Generation, Basics of code optimization.

Operating System: Processes, Threads, CPU Scheduling, Inter-Process Communication, Concurrency and Synchronization, Deadlock, Memory Management and Virtual Memory, File Systems.

Databases: ER-Model, Relational Model: Relational Algebra, Tuple Calculus, SQL, Integrity Constraints, Normal Forms, File Organization: Indexing, B Trees and B+ Trees, Transactions and Concurrency Control.

Computer Networks: Concept of Layering, LAN Technologies (Ethernet), Flow and Error Control Techniques, Switching, IPv4/IPv6, Routers and Routing Algorithms (Distance Vector, Link State). TCP/UDP and Sockets, Congestion Control. Application Layer Protocols: DNS, SMTP, POP, FTP, HTTP. Basics of Wi-Fi, Network Security: Authentication, Basics of Public Key and Private Key Cryptography, Digital Signatures and Certificates, Firewalls.

Software Engineering: Software Process Models, Data Flow Diagram, UML Diagrams, Life Cycle, Design, Coding, Testing, Implementation, Maintenance.
