

**ANAND INTERNATIONAL COLLEGE OF ENGINEERING, JAIPUR**  
**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**  
**CSE & AI Syllabus (STAT-2026)**

Section	Topics
<b>Section 1:</b> Engineering Mathematics	<ul style="list-style-type: none"> <li>Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Monoids, Groups.</li> <li>Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.</li> <li>Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition</li> </ul>
<b>Section 2:</b> Digital Logic	<ul style="list-style-type: none"> <li>Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).</li> </ul>
<b>Section 3:</b> Computer Organization and Architecture	<ul style="list-style-type: none"> <li>Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).</li> </ul>
<b>Section 4:</b> Programming and Data Structures	<ul style="list-style-type: none"> <li>Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.</li> </ul>
<b>Section 5:</b> Algorithms	<ul style="list-style-type: none"> <li>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</li> </ul>
<b>Section 6:</b> Theory of Computation	<ul style="list-style-type: none"> <li>Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability. .</li> </ul>
<b>Section 7:</b> Compiler Design	<ul style="list-style-type: none"> <li>Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimisation, Data flow analyses: constant propagation, liveness analysis, common subexpression elimination.</li> </ul>
<b>Section 8:</b> Operating System	<ul style="list-style-type: none"> <li>System calls, processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.</li> </ul>

<b>Section 9:</b> Databases	<ul style="list-style-type: none"> <li>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.</li> </ul>
<b>Section 10:</b> Computer Networks	<ul style="list-style-type: none"> <li>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.</li> </ul>
<b>Section 11:</b> Artificial Intelligence	<ul style="list-style-type: none"> <li>AI Fundamentals &amp; Search: Intelligent agents, AI approaches, Uninformed and informed search techniques, constraint satisfaction, Hill Climbing.</li> <li>Game Playing: Minimax, alpha-beta pruning, and classical problems.</li> <li>Knowledge &amp; Learning: Logic (propositional, first-order, etc), reasoning, planning, probabilistic models (Bayesian networks), machine learning (supervised, unsupervised, neural networks).</li> <li>Applications: Natural language processing, expert systems, robotics.</li> </ul>
<b>Section 12:</b> Machine Learning	<ul style="list-style-type: none"> <li>Supervised &amp; Unsupervised Learning: Linear Regression, Logistic Regression, Naive Bayes, Decision Tree, KNN, SVM, Random Forest, Clustering (k-means, hierarchical, probabilistic, Gaussian mixture), association rule mining (Apriori, FP-growth).</li> <li>Feature Engineering &amp; Model Evaluation: Feature extraction (PCA, SVD), feature selection methods, model evaluation and selection.</li> <li>Advanced Learning Methods: Semi-supervised learning, reinforcement learning (MDP, Bellman equations, Q-learning, SARSA, policy/value iteration).</li> <li>Neural Networks &amp; Applications: Recommender systems (collaborative, content-based), neural networks (perceptron, multilayer, backpropagation), introduction to deep learning.</li> </ul>