

# Design and Analysis of Algorithms (DAA) — Syllabus (2025)

Unit	Course Topics	Hours
1	<b>Introduction to Algorithms:</b> Characteristics of algorithms, algorithm specification, performance analysis, time & space complexity, asymptotic notations (Big-O, $\Omega$ , $\Theta$ ), recurrence relations	4L
2	<b>Divide and Conquer:</b> General method, recurrence relations, master theorem, algorithms for binary search, merge sort, quick sort, selection problem, Strassen's matrix multiplication	6L
3	<b>Greedy Method:</b> General strategy, characteristics of greedy algorithms, optimality, applications — fractional knapsack, job sequencing with deadlines, minimum cost spanning trees (Prim's and Kruskal's), Dijkstra's shortest path algorithm	6L
4	<b>Dynamic Programming (DP):</b> Characteristics, overlapping subproblems, optimal substructure, DP vs recursion, applications — matrix chain multiplication, 0/1 knapsack, all-pairs shortest path (Floyd-Warshall), longest common subsequence	6L
5	<b>Backtracking &amp; Branch-and-Bound:</b> Backtracking strategy, N-Queens problem, subset sum, graph coloring, Hamiltonian cycle; Branch-and-Bound: least cost (LC) search, FIFO and LIFO branch-and-bound	5L
6	<b>Graph Algorithms:</b> BFS, DFS, connected components, topological sorting, biconnectivity, articulation points, minimum spanning tree review, shortest path algorithms	4L
7	<b>NP Theory &amp; Approximation Algorithms:</b> P, NP, NP-hard, NP-complete concepts, reductions, SAT problem, travelling salesman problem (TSP), vertex cover, approximation algorithms and performance ratios	4L