Design and Analysis of Algorithms – I

CSE 2202

Lectures	Topics
1-4	Graph Traversal: • Review of Breadth first search (BFS), Depth first search (DFS), • Topological Sort • Strongly Connected Components, Euler Path • Articulation Point, Bridge, Bi-connected Components.
5-7	Shortest Path Algorithms: • Dijkstra's Shortest Path Algorithm • Bellman-Ford algorithm and negative cycle detection • Floyd-Warshall all pair shortest path algorithm, Johnson's Algorithm • shortest path in Directed Acyclic Graph.
8-10	Greedy Algorithms: • Elements and properties of Greedy algorithms • fractional knapsack, job scheduling with deadline • Minimum spanning tree: Prim's algorithm and Kruskal's algorithm.
11-13	Complexity analysis and Recurrence Relation Asymptotic notations, growth of a function, methods to solve recurrence relation: • Substitution method • Recursion tree method • Master method
14-18	Dynamic Programming: • Basic idea, properties and comparison with Divide & Conquer and Greedy Algorithms • General form of Dynamic Programming and Memorization • coin related problems, Longest Increasing subsequence (LIS), Longest Common Subsequence (LCS) • 0/1 Knapsack, Matrix Chain Multiplication Applications of Dynamic programming.
19-21	Divide & Conquer (DC): • Counting Inversion using merge sort • Closest pair of points, finding Ak mod M using DC method • Finding median (in general k-th smallest element) in a set using DC in expected linear time.
22-25	Network Flow • Flow Networks • Max-Flow Min-cut theorem • Ford Fulkerson method and its limitation • Edmonds Karp algorithm • Maximum bipartite matching • Minimum path cover, edge cover.