

Advanced Data Structure

Syllabus

Unit 1: Review of Basic Concepts

Abstract data type, Data Structure, Algorithm, Asymptotic notations: time and space complexity, time analysis of recursive algorithms, amortized analysis, [Recurrence relation: Master theorem, recursion tree, substitution method](#). [4HRS]

Unit 2: Search trees

Binary search tree, Balanced Binary search trees-(AVL trees, red-black tree, splay trees), Multi-way search trees-(B-trees, 2-3 trees), specialized search trees-(treaps, skip list), Multidimensional search trees-(K-D trees, segment trees). [8HRS]

Unit 3: Heaps

Overview, Leftist heap, skew Heap, Binomial Heap, Fibonacci Heap, Applications-(Priority Queue, Graph algorithms, Huffman coding) [7 HRS]

Unit 4: Data structures for strings

Introduction to string data structures, Tries, Compressed Tries, Suffix Trees, Suffix Arrays, Applications-(Search Engines, Bioinformatics, Pattern Matching: [KMP algorithm](#)) [7 HRS]

Unit 5: Hash Table

Introduction, Internal working of Hashing, Collision resolution techniques, Hash functions, Load factor and resizing, Applications [7 HRS]

Unit 6: Advanced Graph and problems

Disjoint set union problem, Maximal flow problem: [Ford Fulkerson Algorithm](#), Shortest path problem- ([Dijkstra algorithm](#), [Floyd Warshall Algorithm](#)), Hamiltonian Path and circuit problem, Introduction to Hypergraphs, Applications-Social Network Analysis, A* for AI path finding) [7 HRS]

