MTCE 605A

ANALYSIS & DESIGN OF ALGORITHMS

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Credits : 4

Unit 1: Analyzing Algorithms & Problems
Introduction to algorithms, Time and Space Complexity, Basic elements of data structures like linked lists, stacks and queues, trees, graphs, recursion. Different types of sorting algorithms and their complexities.

Unit 2: Dynamic Sets, Searching and Graphs
Introduction, Array, amortized time analysis, red black trees, hashing, heaps, dynamic equivalence relations and union-find programs, priority queues with decrease key operations, traversing graphs, DFS, strongly connected components, biconnected complaints, minimum spanning tree algo., single source shortest paths, all pair shortest paths.

Unit 3: Greedy and Dynamic Methods
Intro. To greedy and dynamic methods, their algorithms, and comparative study

Unit 4: Backtracking and Branch-and-Bound
General backtracking and Branch and Bound Methods, 8 queen, sum of subset, graph coloring, Hamilton cycles, 0/1 knapsack problem.

Unit 5: NP – Hard and NP Complete problems
Basic Concepts, cooks theorem, NP-Hard graph problems, NP hard Scheduling.

Unit 6: Parallel Algorithms
Introduction, parallelism, PRAM and other models, some simple PRAM algorithms, handling write conflicts, Merging and Sorting, Finding Connected Components.

Unit 7: Approximation Algorithms
Introduction, Absolute Approximation, e-approximation, polynomial time approximation schemes, fully polynomial time approximation schemes, String matching algorithms

References:

Fundamentalsof Computer Algorithms	Sartaj Sahni, Ellis Horowitz]
Design & Analysis of Algorithms`	A.V. Aho, JE Hoproft, JD Ullman
Fundamental Algorithms (The Art of Computer Programming Vol I)	DE Kruth
A Discipline of Programming	ED Digkstra
Writing Efficient Programs	Jon DL Bently