DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE&IT)

Course Code: 15CT1107

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Course Outcomes:

At the end of the course, a student will be able to

CO 1 Analyse complexity of Algorithms.

CO 2 Apply Divide & Conquer and Greedy methods.

CO 3 Apply Dynamic programming technique.

CO 4 Use backtracking.

CO 5 Discuss concepts of NP problems.

UNIT-I **(12 LECTURES)**

INTRODUCTION:

Algorithm, Psuedocode for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation-Big oh notation, Omega notation, Theta notation and Little oh notation,Probabilistic analysis, Amortized analysis.

Disjoint Sets- disjoint set operations, union and find algorithms, spanning trees, connected components and biconnected components.

UNIT-II **(10 Lectures)**

DIVIDE AND CONQUER:

General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

GREEDY METHOD:

General method, applications-Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT-III (10 Lectures)

DYNAMIC PROGRAMMING:

General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-IV (10 Lectures)

BACKTRACKING:

General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles. Branch and Bound: General method, applications- Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT-V (8 Lectures)

NP-HARD AND NP-COMPLETE PROBLEMS:

Basic concepts, non deterministic algorithms, NP - Hard and NPComplete classes, Cook's theorem.

TEXT BOOKS:

1. Ellis Horowitz,Satraj Sahni and Rajasekharam, *"Fundamentals of Computer Algorithms"*,2nd Edition,Univesity Press,2008.
2. M.T.Goodrich and R.Tomassia, " *Algorithm Design Foundations, Analysis and Internet examples"*, 1st Edition, John wiley and sons, 2006.

REFERENCES:

1. T.H.Cormen,C.E.Leiserson,R.L.Rivest,and C.Stein *"Introduction to Algorithms"*, 3rd Edition, PHI / Pearson Education, 2009.
2. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, *"Introduction to Design and Analysis of Algorithms A strategic approach"*, 2nd Edition , Tata Mc Graw Hill,2009.
3. Allen Weiss, *"Data structures and Algorithm Analysis in C++"*, 2nd Edition, Pearson education, 2009.

4. Aho, Ullman and Hopcroft, *"Design and Analysis of algorithms"*, 3rd Edition, Pearsoneducation,2008.

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/106101060/