

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. A llen 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/>