Prasad V. Potluri Siddhartha Institute of Technology, Kanuru, Vijayawada.

Department of ECM   **PVP12**

3/4 B.Tech. FIFTH SEMESTER

EM5T5   **DESIGN AND ANALYSIS OF ALGORITHMS**   **Credits: 4**

Lecture: 4 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

Course Objectives:

- To discuss the development of efficient algorithms for simple computational tasks and reasoning and their correctness.
- To familiarize the time order analysis for an algorithm, the space needs for the implementation of an algorithm and prove the correctness of an algorithm.
- To provide the complexity measures, different range of behaviors of algorithms

Learning Outcomes:

Student will be able to:
- Design good algorithm to solve the problem.
- Analyze the algorithms and estimate their worst-case, average-case and best-case behavior.
- Solve the problems using Divide and Conquer ,greedy algorithm, dynamic programming ,back tracking and branch and bound technique
- Know some standard NP-Complete problems and know the basics of an NP-hardness

UNIT I
Introduction: Algorithm,Psuedo code for expressing algorithms,Performance Analysis-Space complexity, Time complexity, Asymptotic Notation-Probabilistic analysis, Amortized analysis.

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

UNIT III
Divide and conquer: General method , applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

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

UNIT V
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 VI

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT VII

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 VIII

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

Learning resources

TEXT BOOKS :

1. Fundamentals of Computer Algorithms, Ellis Horowitz,Satraj Sahni and Rajasekharam,Galgotia publications pvt. Ltd.
2. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia,John wiley and sons.

REFERENCES :

1. Introduction to Algorithms, secondedition,T.H.Cormen,C.E.Leiserson, R.L.Rivest,and C.Stein,PHI Pvt. Ltd./ Pearson Education
2. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
3. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education.