

RAJIV GANDHI PROUDYOGIKI VISHWA VIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science & Information Technology, IV-Semester

CSIT 403 Analysis & Design of Algorithm

Course Objectives

Data structure includes analyzing various algorithms along with time and space complexities. It also helps students to design new algorithms through mathematical analysis and programming.

Unit-I Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, heap and heap sort. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

Unit-II Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm, etc.

Unit-III Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm, etc.

Unit-IV Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, Introduction to parallel algorithms.

Unit-V Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (In order, preorder, postorder, DFS, BFS), NP-completeness.

Course Outcomes:

At the end of the course student will be able to :

- 1 Implement sorting and searching algorithm
- 2 Experiment with techniques for obtaining maximum output with minimum efforts
- 3 Make use of dynamic programming for finding
- 4 Solve 8 queen's problem and others of the kind for application in real world scenarios .
- 5 Distinguish between NP hard and NP complete problems and develop their solutions

Reference Books:-

1. Cormen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
2. Horowitz & Sahani; Analysis & Design of Algorithm
3. Dasgupta; algorithms; TMH
4. Ullmann; Analysis & Design of Algorithm;
5. Michael T Goodrich, Roberto Tamassia, Algorithm Design, Wiley India

List of Experiments (Expandable):

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for optimal merge patterns.
6. Write a program for Huffman coding.
7. Write a program for minimum spanning trees using Kruskal's algorithm.
8. Write a program for minimum spanning trees using Prim's algorithm.
9. Write a program for single sources shortest path algorithm.
10. Write a program for Floyd-Warshall algorithm.
11. Write a program for traveling salesman problem.
12. Write a program for Hamiltonian cycle problem.