UNIT I

1. Explain various asymptotic notations used in algorithm design in detail.
2. Use Back Substitution Method to show the time complexity taken for the above Recurrence Relation

T(n) = 1 n=0

2T(n-1) +1 n>0

1. List out the advantages and disadvantages of Divide and Conquer
2. Explain Divide and Conquer technique with its Control abstraction
3. Write an algorithm for Binary Search and analyze its time complexity with an example
4. Discuss the working strategy of merge sort and illustrate the process of merge sort algorithm for the given data: 43, 32, 22, 78, 63, 57, 91 and 13.

7. Write an algorithm to implement merge sort technique.

8. Explain in detail quick sorting method. Provide a complete analysis of Quick sort .

9. Apply Quick sort to sort the list 24,9,29,14,19,27 in ascending order. Analyze the Best, Average and Worst-case time complexities.

10. If matrices A =

|  |  |  |  |
| --- | --- | --- | --- |
| 9 | 4 | 6 | 7 |
| 7 | 8 | 1 | 4 |
| 4 | 3 | 2 | 6 |
| 5 | 3 | 0 | 2 |

B =

|  |  |  |  |
| --- | --- | --- | --- |
| 7 | 6 | 2 | 1 |
| 3 | 9 | 0 | 3 |
| 4 | 3 | 2 | 6 |
| 5 | 3 | 0 | 2 |

Implement Strassen’s matrix multiplication.

11. Explain Strassen’s Matrix Multiplication with an example and calculate its time complexity.

UNIT II

4. Explain in detail Sum of Subsets Problem with a suitable example

6. Describe Backtracking technique to m-coloring graph

Describe Backtracking technique to m-coloring graph.

3. Briefly explain n-queen problem using backtracking.

7. Write an algorithm to implement 8-Queens Problem. Analyze the algorithm for its space & time complexity.

1. Define Strongly Connected components and explain their properties.
2. Explain the general method of Backtracking.

5. What is Graph coloring? Write an algorithm and explain with an example.

8. What is a Hamiltonian cycle? Explain Hamiltonian cycle algorithm

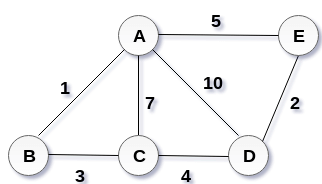
UNIT III

1. Find the feasible and optimal solutions for the following knapsack problem.

Let n = 3, m = 20, (p1, p2, p3) = (25, 24, 15) and (w1, w2, w3) = (18, 15, 10).

1. Find the feasible solutions and optimal solution for the following knapsack instance n=7, m=15, (p1, p2,…,p7) = (10,5,15,7,6,18,3) and (w1,w2,…,w3) = (2,3,5,7,1,4,1).
2. Explain the concept of job sequencing with deadlines by Greedy technique. With Example
3. Discuss briefly about the minimum cost-spanning tree.
4. Define and explain Prim’s Algorithm, give pseudo-code and trace it with a suitable example.

6. Write the Kruskal’s Algorithm for the Minimum Spanning Tree. Analyze its Time complexity. Compute the Minimum Cost Spanning Tre and it’s cost for the following tree.



UNIT IV

1. State Chained Matrix Multiplication Problem and explain it considering the following matrices

Matrix size

A1 5X4

A2 4X7

A3 7X6

A4 6X2.

Device an algorithm for the above problem

1. Design an algorithm for All Pairs Shortest Path Algorithm. Mention its complexity.
2. Calculate the shortest paths between all pairs of vertices using dynamic programming strategy for the following graph.



1. Construct an optimal binary search tree for the given set. Keys = {10,20,30,40} Pi={3,3,1,1} Qi = {2,3,1,1,1}
2. State travelling salesperson problem. Apply Branch and Bound algorithm to solve the TSP instantiated by the following cost matrix. 
3. Explain Travelling salesman problem. Give an algorithm and explain the algorithm with suitable example.

UNIT V

1. Write a short notes on FIFO Branch and Bound
2. Explain 0/1 Knapsack Problem using branch and bound technique

3. State 0/1 Knapsack problem and design an algorithm of LC Branch and Bound.

Find the solution for the 0/1 knapsack instance of n = 4, (p1, p2, p3, p4) = (10,10,12,18), (w1, w2, w3, w4) = 2,4,6,9) and M = 15.

5. Write short notes on non-deterministic algorithms.

6. Explain the classes of NP- H & NP-C

7. Explain the following

A. Satisfiability B. Decision Problem

1. State and prove 3-satisfiablity problem is NP-Complete**.**

9. State and prove Cook’s theorem.