

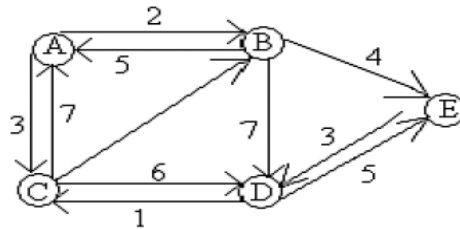
## DESIGN AND ANALYSIS OF ALGORITHMS

### (II- B. Tech. II– Semester)

Assignment-1 Questions -April-2024

#### SET-1

1. Define an algorithm. Describe the specifications of the algorithm?
2. Explain the Pseudo-code for expressing algorithms.
3. Discuss the UNION algorithm on disjoint sets with example.
4. Trace the Quick sort algorithm for the given array 65, 70, 75, 80, 85, 60, 55, 50, 45 and sort them. Also derive the average case time complexity of Quick sort.
5. Apply single source shortest path approach on the given graph and find the shortest distance from A to all the remaining nodes.

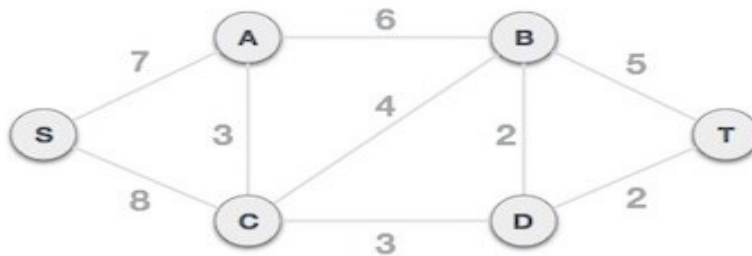


#### SET-2

1. Define Space and Time complexity. Explain the same with an example.
2. Distinguish between Priori and Posteriori analysis.
3. Discuss Simple FIND and Collapsing FIND algorithm with example
4. Describe control abstraction (General Method) of divide and conquer and write its time complexity?
5. Construct the solution for the following Job Sequencing with Deadline problem instance.  
 $n=7$ ,  $(p_1, p_2, p_3, p_4, p_5, p_6, p_7) = (3, 5, 20, 18, 1, 6, 30)$  and  $(d_1, d_2, d_3, d_4, d_5, d_6, d_7) = (1, 3, 4, 3, 2, 1, 2)$ . Also write the Job Sequencing with Deadline algorithm.

### SET-3

1. Explain Time Complexity with examples Using Counter method.
2. Discuss Space Complexity with examples.
3. Define the following with example: a) Spanning Trees b) Connected Components  
c) Bi-Connected Components d) Articulation Points
4. Write both Recursive and Non-Recursive algorithms on Binary Search. Also derive Binary Search time complexity
5. Explain (write) Prim's Algorithm. Construct the Minimum Cost Spanning Tree for the following graph using Prim's Algorithm



### SET-4

1. Discuss all the Asymptotic Notations with suitable examples.
2. Describe Performance Analysis with examples.
3. Explain Strassen's Matrix Multiplication. Also derive the time Complexity of Strassen's Matrix Multiplication.
4. Discuss the Merge Sort algorithm and sort the following list using Merge Sort: 234,261,112,203,495,315,321. Also derive its time complexity.
5. Consider the following Knapsack problem instance and Construct an optimal solution using Greedy Method. Let  $n=5$ ,  $(p_1, p_2, \dots, p_5)=(w_1, w_2, \dots, w_5)=(4,4,5,8,9)$  and  $m=15$ . Also write the algorithm for Knapsack problem