Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

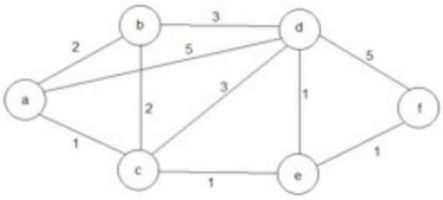
FACULTY OF ENGINEERING & TECHNOLOGY

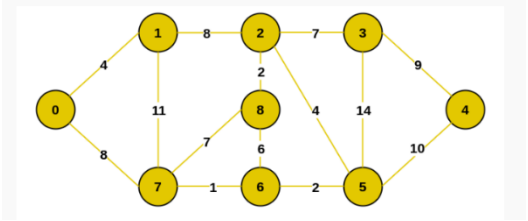
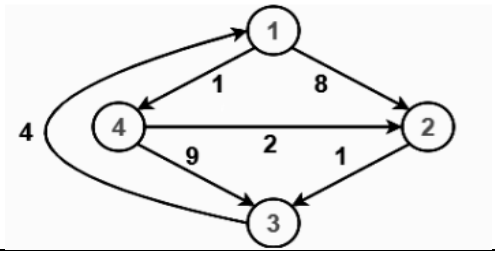
B.Tech Winter 2024 - 25 Examination

Semester: 5 **Date: 11/11/2024**
Subject Code: 203105318 **Time: 02:00 pm to 04:30 pm**
Subject Name: Design and Analysis of Algorithm **Total Marks: 60**

Instructions*:*

1. This question paper comprises of two sections. Write answer of both the sections in separate answer books.
2. From Section I, **Q.1 is compulsory, attempt any THREE from Q. 2 to Q. 5**
3. From Section II, **Q.6 is compulsory, attempt any THREE from Q. 7 to Q. 10**
4. Make suitable assumptions wherever necessary.
5. Start new question on new page.

Section-A (30 Marks)					
Q.1	**Objective Type Questions** - (State, Define, List, etc) (All are compulsory and each of two marks)	**(6)**	**CO**	**PO**	**Bloom's Taxonomy**
	1. List any two characteristics of a good algorithm.		**CO1**	**PO1**	**Remember**
	2. Define greedy Method.		**CO2**	**PO1**	**Remember**
	3. Define P and NP class problem		**CO2**	**PO1**	**Remember**
Q.2	**Answer the following questions**.				
	A) Write the control abstraction for divide and conquer technique.	**(2)**	**CO 2**	**PO1**	**Remember**
	B) Solve the following recurrence: $T(n)=4T(n/2)+n$, where $n \geq 1$ and is a power of 2.	**(6)**	**CO 4**	**PO3**	**Apply**
Q.3	**Answer the following questions**.				
	A) What you mean by Activity Selection Problem?	**(2)**	**CO 2**	**PO1**	**Remember**
	B) Explain quick short with suitable example.	**(6)**	**CO 2**	**PO1**	**Remember**
Q.4	**Answer the following questions**.				
	A) Define State Space tree.	**(2)**	**CO 1**	**PO1**	**Remember**
	B) Use Dijkstra's algorithm to find the shortest path from A to all other nodes. 	**(6)**	**CO 4**	**PO2**	**Apply**
Q.5	**Answer the following questions**.				
	A) Define order of algorithm.	**(2)**	**CO 5**	**PO1**	**Remember**
	B) Describe Masters's Theorem. Solve Following recurrence relation by using Master's theorem. i) $T(n)= 4T(n/2) + n$ ii) $T(n)= 2T(n/2) + n\log n$	**(6)**	**CO 4**	**PO2**	**Apply**
Section-B (30 Marks)					
Q.6	**Objective Type Questions** - (State, Define, List, etc) (All are compulsory and each of two marks)	**(6)**			
	1.Explain Binary Search Tree.		**CO 2**	**PO1**	**Understand**
	2.List any two properties of NP- Problem?		**CO 1**	**PO1**	**Remember**
	3. What is Backtracking?		**CO 1**	**PO1**	**Understand**

Q.7	**Answer the following questions**.				
	A) Write Short note on Randomized algorithm.	**(2)**	**CO 2**	**PO1**	**Remember**
	B) Use Prims algorithm to find the Minimum Spanning Tree. 	**(6)**	**CO 5**	**PO2**	**Apply**
Q.8	**Answer the following questions**.				
	A) List application of backtracking.	**(2)**	**CO 1**	**PO1**	**Understand**
	B) Apply Floyd-Warshall algorithm for constructing shortest path 	**(6)**	**CO 4**	**PO2**	**Apply**
Q.9	**Answer the following questions**.				
	A) Find the solution for given making change problem using dynamic programming W=13, coins= {1,2,3,7,10,20}.	**(2)**	**CO 3**	**PO3**	**Understand**
	B) Compare and Contrast BFS and DFS.	**(6)**	**CO 2**	**PO1**	**Remember**
Q.10	**Answer the following questions**.				
	A) What is longest common subsequence problem?	**(2)**	**CO 1**	**PO1**	**Understand**
	B) Solve the knapsack problem and find optimal solution using branch and bound technique. The weights and profits of each item are given below. Weights (W) = {2, 4, 6, 9}, Profits (P) = {10, 10, 12, 18) Where the sack capacity (M) = 15	**(6)**	**CO 5**	**PO3**	**Apply**