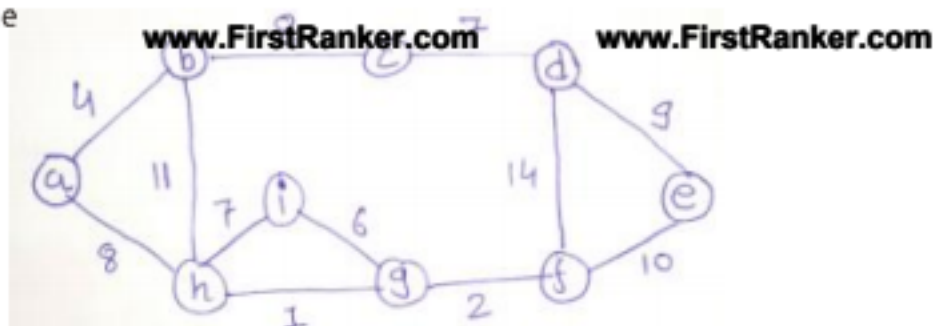


GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- V EXAMINATION – SUMMER 2020
Subject Code: 2150703
Date: 26/10/2020
Subject Name: ANALYSIS AND DESIGN OF ALGORITHMS
Time: 02:30 PM TO 05:00 PM
Total Marks: 70
Instructions:

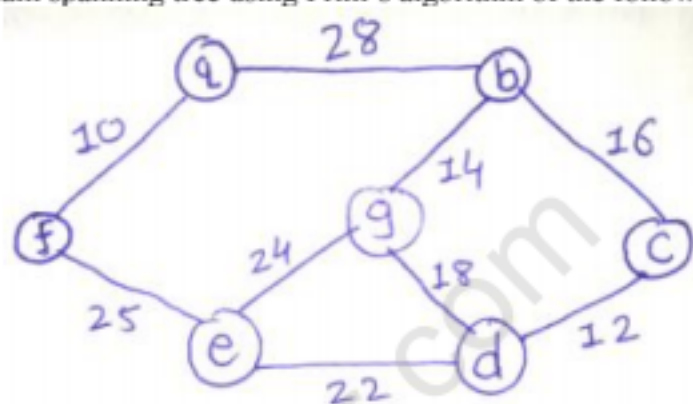
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Define the terms: 1) Principal of Optimality 2) Feasible solution 3) Quantifier	03
	(b) Analyze Binary search algorithm in best and worst case.	04
	(c) Define Asymptotic notation. Arrange the following functions in increasing order of growth. 2^n , n^2 , 1, $\log n$, $n \log n$, 3^n and n .	07
Q.2	(a) Define the function types: 1) One-to-One 2) Into (Injective) and 3) Onto (Surjective)	03
	(b) What is the smallest value of n such that an algorithm whose running time is $100n^2$ runs faster than an algorithm whose running time is 2^n on the same machine?	04
	(c) Analyze Quick sort algorithm in best and worst case.	07
	OR	
	(c) Analyze insertion sort algorithm in best and worst case.	07
Q.3	(a) Differentiate divide and conquer approach with dynamic programming approach.	03
	(b) Solve the following recurrence using Master Theorem. $T(n) = 9T(n/3) + n$.	04
	(c) Write equation for Matrix Chain Multiplication using Dynamic programming. Find out optimal sequence for multiplication: $A_1 [5 \times 4]$, $A_2 [4 \times 6]$, $A_3 [6 \times 2]$, and $A_4 [2 \times 7]$. Also give the optimal solution.	07
	OR	
Q.3	(a) Differentiate greedy programming approach with dynamic programming approach.	03
	(b) Solve the following recurrence using Master Theorem. $T(n) = T(2n/3) + 1$.	04
	(c) Using greedy algorithm find an optimal schedule for following jobs with $n=6$. Profits: $(P_1, P_2, P_3, P_4, P_5, P_6) = (20, 15, 10, 7, 5, 3)$ Deadline: $(d_1, d_2, d_3, d_4, d_5, d_6) = (3, 1, 1, 3, 1, 3)$.	07
Q.4	(a) Define and explain P and NP problems with suitable example.	03
	(b) Solve the following Knapsack Problem using greedy method. Number of items = 7, knapsack capacity $W = 15$, weight vector = $\{2, 3, 5, 7, 1, 4, 1\}$ and profit vector = $\{10, 5, 15, 7, 6, 18, 3\}$.	04
	(c) Find minimum spanning tree using Krushkal's algorithm of the following graph.	07



OR

- Q.4**
- | | | |
|-----|--|-----------|
| (a) | Define and explain NP-complete and NP-hard problems with suitable example. | 03 |
| (b) | Explain Dijkstra's algorithm to find the shortest path. | 04 |
| (c) | Find minimum spanning tree using Prim's algorithm of the following graph. | 07 |



- Q.5**
- | | | |
|-----|---|-----------|
| (a) | Explain the naive string matching algorithm | 03 |
| (b) | Differentiate between depth first search and breadth first search. | 04 |
| (c) | Working modulo $q = 11$. How many spurious hits does the Rabin-Karp matcher encounter in the text $T = 3141592653589793$ when looking for the pattern $P = 26$? | 07 |

OR

- Q.5**
- | | | |
|-----|---|-----------|
| (a) | Explain polynomial-time reduction algorithm. | 03 |
| (b) | Prove that if G is an undirected bipartite graph with an odd number of vertices, then G is non-Hamiltonian. | 04 |
| (c) | Explain Backtracking Method. What is N-Queens Problem? Give solution of 4 Queens Problem using Backtracking Method. | 07 |
