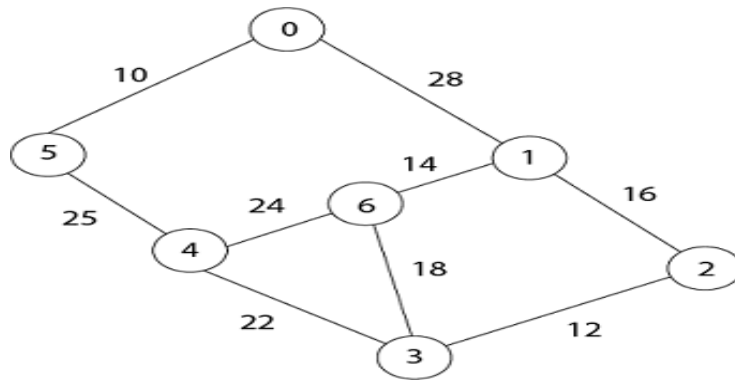


GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- V EXAMINATION-SUMMER 2023****Subject Code: 3150703****Date: 03/07/2023****Subject Name: Analysis and Design of Algorithms****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

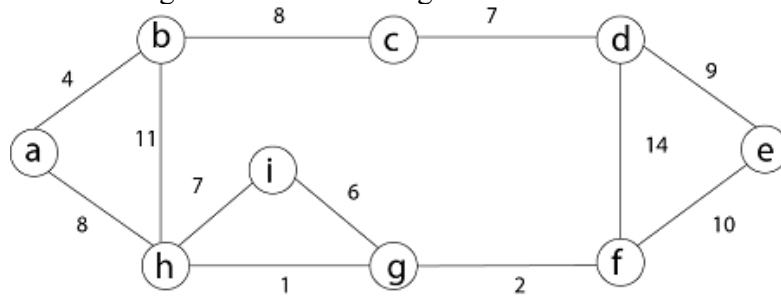
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define following terms: (i) Big O Notation, (ii) Big Theta Notation, (iii) Big Omega Notation.	03
	(b) Perform Bucket sort for following sequence: 30, 12, 22, 66, 48, 27, 35, 43, 47, 41.	04
	(c) Explain the bubble sort algorithm and derive its best case, worst case, and average case time complexity.	07
Q.2	(a) Define Algorithms and characteristics of algorithms.	03
	(b) What is a recurrence? Solve recurrence equation for $T(n) = T(n-1) + 1$ using substitution method.	04
	(c) Discuss Binary search algorithm, also write and solve its recurrence relation.	07
OR		
	(c) Explain Merge Sort algorithm with suitable example.	07
Q.3	(a) Explain principle of optimality with suitable example.	03
	(b) Explain advantages and disadvantages of dynamic programming.	04
	(c) Given the denominations: $d_1=1, d_2=4, d_3=6$. Calculate for making change of Rs. 8 using dynamic programming.	07
OR		
Q.3	(a) Explain Weighted Graph, Undirected Graph, Directed Graph.	03
	(b) Discuss advantages and disadvantages of greedy algorithm.	04
	(c) Consider weights $w=(3,4,6,5)$ and profit $v=(2,3,1,4)$ and Knapsack capacity $W=8$. Find the maximum profit using dynamic approach.	07
Q.4	(a) Find an optimal Huffman code for the following set of frequency. a : 40, b: 20, c: 15, d: 30, e: 10.	03
	(b) Explain depth first traversal using suitable example.	04
	(c) Draw the minimum spanning tree correspond to following graph using Prim's algorithm and find the MST weight:	07



OR

- Q.4** (a) Differentiate between Kruskal's algorithm and Prim's algorithm for finding MST. **03**
 (b) Explain the need of topological Sort with example. **04**
 (c) Draw the minimum spanning tree correspond to following graph using Kruskal's algorithm and find weight of MST: **07**



- Q.5** (a) Explain Spurious hits with an example. **03**
 (b) Write the pseudocode for Naïve String-Matching Algorithm. **04**
 (c) What is state space tree. How do you solve the Eight queens problem using backtracking with the help of state space tree. **07**

OR

- Q.5** (a) Explain polynomial time reduction. **03**
 (b) Differentiate between Backtracking and Branch-and-Bound algorithms. **04**
 (c) Define P, NP, NP complete and NP-Hard problems. Give examples of each. **07**
