Enrolment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
M.SC INTEGRATED - SEMESTER - VI EXAMINATION - SUMMER 2025

Subject Code: 1360501   **Date: 08-05-2025**

Subject Name: Design and Analysis of Alrithm

Time:10:30 AM TO 01:00 PM   **Total Marks: 70**

Instructions

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

4. Use of simple calculators and non-programmable scientific calculators are permitted.

		Marks
Q.1 (a)	What is an algorithm? Explain various properties of an algorithm.	**03**
(b)	What is Amortized analysis? Explain different Methods for Amortized analysis.	**04**
(c)	Why do we use asymptotic notations in the study of algorithms? Briefly describe the commonly used asymptotic notations.	**07**
Q.2 (a)	Explain general characteristics of greedy algorithms.	**03**
(b)	What is the use of Loop Invariant? Explain different between Loop Invariant Condition and Loop Condition.	**04**
(c)	Sort the following numbers using Bucket Sort. 45, 96, 29,30,27,12,39,61,91	**07**

OR

(c)	llustrate the working of the quick sort on input instance: 25, 29, 30, 35, 42, 47, 50, 52, 60. Comment on the nature of input i.e. best case, average case or worst case.	**07**
Q.3 (a)	Explain how divide and conquer approach work?	**03**
(b)	Explain Merge Sort algorithm with suitable example.	**04**
(c)	For the given set of items and knapsack capacity = 5 kg, find the optimal solution for the 0/1 knapsack problem using dynamic programming.	**07**

Item	Weight	Value
I1	2	3
I2	3	4
I3	4	5
I4	5	6

OR

(a)	Explain Multiplying large Integers Problem.	**03**
(b)	Write an algorithm for Max-Min problem using divide and conquer approach. Calculate its complexity.	**04**

(c) Find minimum spanning tree for the given graph in fig-1 using prim's algorithm   **07**
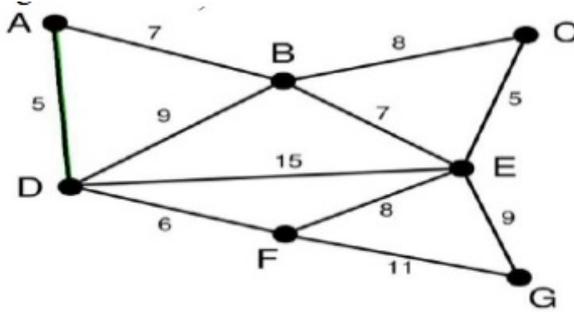

Fig-1

Q.4 (a) How huffman code is memory efficient compare to fixed length code?   **03**

(b) Demonstrate Binary Search method to search Key = 14, form the array A=<2,4,7,8,9,10,12,14,18>   **04**

(c) Define minimum spanning tree. Explain Prim's algorithm with suitable example.   **07**

OR

(a) Explain principle of optimality with suitable example.   **03**

(b) Find Longest Common Subsequence of given two strings using Dynamic Programming.
S1=abbacdcba S2=bcdbbcaa   **04**

(c) Solve Coin Change problem using Dynamic Programming. Take an example for Denominations: d1=1, d2=4, d3=6, give your answer for making change of Rs.9.   **07**

Q.5 (a) Differentiate between Backtracking and Branch-and-Bound algorithms.   **03**

(b) Traverse the following graph using Breadth First Search Technique. Also draw BFS Tree for a given graph.   **04**
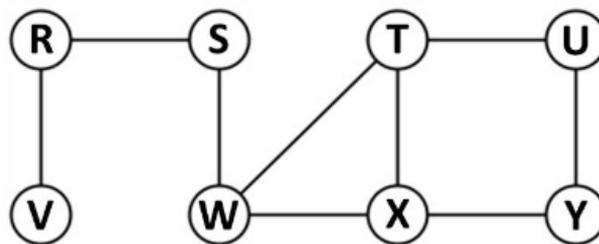
(c) What is Minimum Spanning Tree (MST)? Explain Dijkastra's shortest path algorithm to create the MST.   **07**

OR

(a) Define BFS. How it is differ from DFS.   **03**

(b) Explain Matrix chain multiplication briefly using dynamic programming algorithm.   **04**

(c) Explain Backtracking Method. What is N-Queens Problem? Give solution of 4- Queens Problem using Backtracking Method.   **07**

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