

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: MC03094011

Date: 13-11-2025

Subject Name: Design and Analysis of Algorithms

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 algorithm? Explain analysis of algorithm with example of insertion sort.	07
(b) What do you mean by Divide and Conquer algorithm? How can we find maximum sub-array of an array using Divide and Conquer? Explain with example.	07
Q.2 (a) Write and explain Strassen's algorithm for matrix multiplication.	07
(b) What is dynamic programming? What are elements of dynamic programming? Write steps to solve a problem using dynamic programming.	07
OR	
(b) What is recurrence relation? What are the different ways of solving recurrence relation? Explain any one with example.	07
Q.3 (a) What is matrix chain multiplication problem? Write and explain dynamic algorithm to find effective way to multiply matrix chain.	07
(b) Write and explain Dijkstra's algorithm.	07
OR	
(a) What is LCS problem? Write dynamic algorithm to find LCS. Find LCS of $X = \{A, B, C, B\}$ and $Y = \{B, D, C, A, B\}$.	07
(b) Write and explain Bellman Ford algorithm.	07
Q.4 (a) What is MST? Write and explain Kruskal's algorithm to find MST.	07
(b) What is rod cutting problem? Write algorithm to find most profitable way of selling a rod. Also find the most profitable way to cut and sell a rod of length 4 with prices for lengths $L_i = \{1, 2, 3, 4\}$ are $P_i = \{10, 24, 30, 40\}$.	07
OR	
(a) Write Prim's algorithm. Explain it with example.	07
(b) Explain travelling salesman problem with proper example.	07
Q.5 (a) Explain backtracking method of problem solving. What is 8-Queen's problem? Solve the 4-Queen's problem using the backtracking method.	07
(b) What is asymptotic notation? Explain different asymptotic notations.	07

OR

- (a)** Explain 8-Puzzle problem using branch and bound approach. **07**
- (b)** What is activity selection problem? How can we solve it using greedy strategy? **07**
Explain with example.
