

GUJARAT TECHNOLOGICAL UNIVERSITY**MCA - SEMESTER– V EXAMINATION – WINTER 2019****Subject Code: 3650001****Date: 21/11/2019****Subject Name: Design & 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.

- Q.1** (a) (1) Define algorithm. **07**
 (2) Define growth rate function.
 (3) What do you mean by time efficiency? Explain.
 (4) What is significance of space efficiency?
 (5) Give example of algorithm which follows decrease-and-conquer approach.
 (6) Explain concept of local optimum.
 (7) Explain principal of optimality.
- (b) (1) Derive worst case and best case time analysis for sequential (linear) search technique. **03**
 (2) Differentiate iterative and recursive approach. **04**
- Q.2** (a) Compare divide-and-conquer approach with greedy approach and dynamic approach. Also write difference among them. **07**
 (b) Explain the basic idea behind divide-and-conquer approach. How can divide-and-conquer approach could be applicable for making search operation more efficient? Explain with suitable example. **07**
- OR**
- (b) Explain Big-Oh Notation, Theta Notation and Omega Notations in detail. **07**
- Q.3** (a) Explain multiplication algorithm which uses divide-and-conquer technique and it requires fewer single-digit multiplication operations. **07**
 (b) Define minimum spanning tree. Explain how to use union-find data structure for finding minimum spanning tree using Krushkal's algorithm. **07**
- OR**
- Q.3** (a) Solve following fractional knapsack problem using greedy approach. The capacity of the knapsack (W) is 50, values of products are {60, 100, 120, 50} and weights of products in respective order are {10, 20, 30, 25} **07**
 (b) Write and explain abstract method of greedy approach. Explain how to solve fractional Knapsack problem using greedy approach. **07**
- Q.4** (a) Show how to find minimum coin change problem using dynamic programming method, where amount to be pay is 8 Rs. and available coin denomination $d = \{1, 4, 6\}$ **07**
 (b) Explain chain matrix multiplication problem. Explain how to solve it using dynamic programming approach with suitable example. **07**
- OR**
- Q.4** (a) Show how to find longest common subsequence for {B, A, C, D, B} and {B, D, C, B} using dynamic programming. Also explain its procedure in brief. **07**
 (b) Discuss travelling salesman problem with suitable example. **07**
- Q.5** (a) Explain backtracking method. How can N-Queen problem solve with backtracking method? **07**
 (b) Differentiate BFS and DFS algorithm with suitable example. **07**
- OR**
- Q.5** (a) Discuss best case and worst case time analysis for bubble sort. **07**

- (b) Demonstrate how quick sort algorithm rearrange following data into ascending data using first element as pivot number.
{50, 10, 60, 30, 80, 20, 40, 90}

07
