Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**MCA - SEMESTER– V EXAMINATION – WINTER 2019**

**Subject Code: 4659301 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) Which algorithms are used to find Minimum spanning tree (MST)? **07**
2) Define Algorithm.
3) Define P-type Problem.
4) What do you mean by Decrease and conquer?
5) Define Recursion.
6) Define time complexity for Dijkstra's algorithm?
7) Write down the Best case, Worst Case and Average case Complexity for Heap sort.

**(b)** What do you understand by analysis of algorithm? Write a note on Asymptotic notations Big Oh, Omega, Theta. **07**

**Q.2** **(a)** Explain the Binary Search of an ordered array with algorithm. **07**

**(b)** Explain Limitations of Divide-and-Conquer strategy. **07**

**OR**

**(b)** Explain Merge sort and its analysis using Divide-and-Conquer strategy with example. **07**

**Q.3** **(a)** What aspects require to use the loop? Which three design process require for these aspect to develop the algorithm? Explain with example. **07**

**(b)** Design and explain Dijkstra's shortest path algorithm. **07**

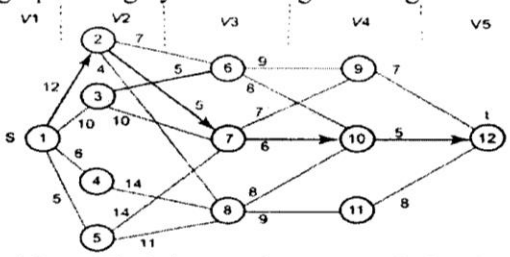
**OR**

**Q.3** **(a)** Define Greedy algorithm and Explain the Knapsack problem. Find the optimal solution to the Knapsack instance n = 3, M = 20, P = {25, 24, 15}, W = {18, 15, 10}. **07**

**(b)** Using greedy algorithm find an optimal schedule for following jobs with n=4. Profits: (P1,P2,P3,P4) = (30, 35, 20, 25) Deadline: (d1,d2,d3,d4) =(2, 1,2,1). **07**

**Q.4** **(a)** 1) Find the Largest Common Subsequence (LCS) if X={a,b,c,b,d,a,b} and Y={b,d,c,a,b,a}. **03**

2) Explain Multistage graph using dynamic Programming for following **04**




**(b)** Explain Rod Cutting problem. Find the maximum profit for the following data. Length of the rod = 5 Profit for 4 cuts of unit 1,2,3,4 are 2,5,9,8 Also give the algorithm for the same. **07**

**OR**

**Q.4** **(a)** Write a note on 8 – puzzle problem **07**

**(b)** Write a note on TSP. How it can be solved using branch and Bound strategy? Explain it with an example **07**

**Q.5** **(a)** What is Backtracking? Explain BFS with Algorithm. **07**

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|---|---|---|---|
| | **(b)** | Write a note on P, NP-hard and NP complete algorithms. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Solve Scale Balancing problem. Compute its time complexity. | **07** |
| | **(b)** | What is N-Queen problem? Discuss 4-queen problem solution. | **07** |

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