

**GUJARAT TECHNOLOGICAL UNIVERSITY****MCA - SEMESTER- V • EXAMINATION – WINTER 2020****Subject Code:4659301****Date:01/01/2020****Subject Name:Design & Analysis of Algorithms****Time:10:30 AM to 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks

- Q.1 (a) Define the following questions: 07**
- i. Define complexity of algorithms.
  - ii. Write 3 steps involved in Divide and conquer approach for problem solving.
  - iii. List characteristics of Greedy algorithm.
  - iv. Sort all the functions below in increasing order of asymptotic (big-O) growth.  
 a)  $O(n)$     b)  $O(\log_2 n)$     c)  $O(n!)$     d)  $O(2^n)$     e)  $O(n^2)$     f)  $O(1)$
  - v. State Principle of optimality.
  - vi. List problems that can be solved using more than one approach.
  - vii. Write limitation of Branch and Bound approach.
- (b) Explain use of Divide and conquer technique for Binary search method. State its best, average and worst case complexity. Apply binary search algorithm and find the element  $x=31$  in the following array. 07**  
 10, 15, 18, 26, 27, 31, 38, 45, 59
- Q.2 (a) Explain Asymptotic notation. 07**
- (b) Explain multiplying large integer problem and its analysis using Divide and Conquer approach with example. 07**
- Q.3 (a) Define MST. Explain Prim's algorithm to find MST for the given graph. 07**
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- (b) Explain fractional knapsack problem. Design and analyze algorithm for knapsack problem using greedy approach. 07**
- Q.4 (a) Design and analyze Dijkstra's Algorithm for finding shortest path. 07**
- (b) Describe Job sequencing problem. Find optimal solution for the given jobs (A,B,C,D,E) having deadline (2,1,2,1,3) and profit (100,19,27,25,15) respectively. 07**
- Q.5 (a) Explain coin change problem. Solve coin change problem using dynamic programming where coin denominations are (1,4,7) and amount to pay is 9. 07**
- (b) Explain Travelling salesman problem using branch and bound technique with example. 07**
- Q.6 (a) Find Longest Common Subsequence of given two strings using Dynamic Programming. 07**  
 $S_1=abbacdcb$      $S_2=bcdbbcaa$
- (b) Describe Rod cutting problem. Find the most profitable way of cutting the rod having length  $n=5$  where price for length  $L_i$  (1,2,3,4,5) are  $P_i$  (1,5,8,9,10). 07**
- Q.7 (a) Define N-Queen problem. Explain 4-queens solution using backtracking approach. 07**
- (b) Explain P, N, NP-Hard and NP-Complete problems. 07**
- Q.8 (a) Explain search and traversal using Depth first search with example. 07**
- (b) Explain 8-puzzle problem using branch and bound approach. 07**