

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V • EXAMINATION – WINTER 2013

Subject Code: 150703**Date: 04-12-2013****Subject Name: Design and Analysis of Algorithms****Time: 10.30 am - 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** Answer the following.(Any FOUR) **14**
- (a) What is an algorithm? Explain characteristics of any algorithm.
- (b) Explain why analysis of algorithms is important? Arrange the following growth rate in increasing order:
 n^3 , 1, n^2 , $n \log(n)$, $n^2 \log(n)$, $\log(n)$, $n^{0.5}$
- (c) Define P, NP, NP complete and NP-Hard problems.
- (d) Explain: Articulation Point, Graph, Tree.
- (e) What is Recursion? Give Recursive algorithm for Tower of Hanoi Problem and give analysis of it.
- Q.2** (a) Explain in brief characteristics of greedy algorithms. Compare Greedy Method with Dynamic Programming Method. **07**
- (b) Explain Krushkal's Algorithm to find Minimum Spanning Tree with example. **07**
- OR**
- (b) Explain Prim's Algorithm to find Minimum Spanning Tree with example. **07**
- Q.3** (a) Give the properties of Heap Tree. Sort the following data with Heap Sort Method: 20, 50, 30, 75, 90, 60, 25, 10, 40. **07**
- (b) Explain Backtracking Method giving example of N-Queens Problem. Give the solution tree for 4-Queens Problem. **07**
- OR**
- Q.3** (a) Write a program/algorithm of Quick Sort Method and analyze it. **07**
- (b) Explain the use of Divide and Conquer Technique for Binary Search Method. What is the complexity of Binary Search Method? **07**
- Q.4** Answer any TWO of the following. **14**
- (a) Solve the following 0/1 Knapsack Problem using Dynamic Programming Method. Write the equation for solving the problem.
 $n = 5, W = 11$
- | | | | | | | |
|------------|---|---|---|----|----|----|
| Object | → | 1 | 2 | 3 | 4 | 5 |
| Weight (w) | → | 1 | 2 | 5 | 6 | 7 |
| Value (v) | → | 1 | 6 | 18 | 22 | 28 |
- (b) Solve Making Change problem using Dynamic Programming. (denominations: $d_1=1, d_2=4, d_3=6$). Give your answer for making change of Rs. 8.
- (c) Find Longest Common Subsequence using Dynamic Programming Technique with illustration $X=\{A,B,C,B,D,A,B\}$ $Y=\{B,D,C,A,B,A\}$
- Q.5** Answer any TWO of the following. **14**
- (a) Give and explain Rabin-Carp string matching algorithm with example.
- (b) Define Finite Automata? Explain its use for string matching with illustration.
- (c) Explain use of Branch & Bound Technique for solving Assignment Problem.
