## GUJARAT TECHNOLOGICAL UNIVERSITY <br> 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 <br> 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)
(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:

$$
\mathrm{n}^{3}, 1, \mathrm{n}^{2}, \mathrm{n} \log (\mathrm{n}), \mathrm{n}^{2} \log (\mathrm{n}), \log (\mathrm{n}), \mathrm{n}^{0.5}
$$

(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.
(b) Explain Krushkal's Algorithm to find Minimum Spanning Tree with example.
(b) Explain Prim's Algorithm to find Minimum Spanning Tree with example. $\mathbf{0 7}$
Q. 3 (a) Give the properties of Heap Tree. Sort the following data with Heap Sort 07 Method: 20, 50, 30, 75, 90, 60, 25, 10, 40.
(b) Explain Backtracking Method giving example of N-Queens Problem. Give the solution tree for 4-Queens Problem.

## OR

Q. 3 (a) Write a program/algorithm of Quick Sort Method and analyze it.
(b) Explain the use of Divide and Conquer Technique for Binary Search Method. What is the complexity of Binary Search Method?
Q. 4 Answer any TWO of the following.
(a) Solve the following 0/1 Knapsack Problem using Dynamic Programming Method. Write the equation for solving the problem.

|  | $\mathrm{n}=5, \mathrm{~W}=11$ |  |  |  |  |  |
| :--- | :--- | :--- | :--- | ---: | ---: | ---: |
| Object | $\rightarrow$ | 1 | 2 | 3 | 4 | 5 |
| Weight (w) | $\rightarrow$ | 1 | 2 | 5 | 6 | 7 |
| Value (v) | $\rightarrow$ | 1 | 6 | 18 | 22 | 28 |

(b) Solve Making Change problem using Dynamic Programming. (denominations: $\mathrm{d} 1=1, \mathrm{~d} 2=4, \mathrm{~d} 3=6$ ). 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.

(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.

