

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-Vth Examination December 2010****Subject code:150703****Subject Name: Design & Analysis of Algorithms****Date: 16 /12 /2010****Time: 03.00 pm - 05.30 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)** Answer the following. **12**
 (i) What is an algorithm? Explain various properties of an algorithm.
 (ii) Explain: Worst Case, Best Case & Average Case Complexity.
 (iii) Define: Directed Acyclic Graph, Principle of Optimality.
 (iv) Explain P and NP Problems giving examples.
- (b)** Arrange following rate of growth in increasing order. **02**
 2^N , $n \log n$, n^2 , 1 , n , $\log n$, $n!$, n^3
- Q.2 (a)** Answer the following **07**
 (i) Compare Dynamic Programming Technique with Greedy Algorithms.
 (ii) Give the recursive algorithm to find Fibonacci sequence. Comment on the complexity of the algorithm.
- (b)** Explain how to apply the divide and conquer strategy for sorting the elements using quick sort with example. **07**
- OR**
- (b)** Explain the use of Divide and Conquer Technique for Binary Search Method. **07**
 Give the algorithm for Binary Search Method. What is the complexity of Binary Search Method?
- Q.3 (a)** Give and Explain the Prim's Algorithm to find out Minimum Spanning Tree with illustration. **07**
(b) Write an algorithm of Selection Sort Method. Give its complexity. **05**
(c) What do you mean by Asymptotic Notations? Explain. **02**
- OR**
- Q.3 (a)** Give and Explain the Kruskal's Algorithm to find out Minimum Spanning Tree with illustration. **07**
(b) Explain why the Heap sort method is called an efficient sorting algorithm. **07**
 Sort the following data using Heap sort method.
 65, 77, 5, 25, 32, 45, 99, 83, 69, 81
- Q.4 (a)** Solve the following 0/1 Knapsack Problem using Dynamic Programming. There are five items whose weights and values are given in following arrays. **08**
 Weight $w[] = \{ 1, 2, 5, 6, 7 \}$
 Value $v[] = \{ 1, 6, 18, 22, 28 \}$
 Show your equation and find out the optimal knapsack items for weight capacity of **11** units.

- (b) Give the algorithm for Depth First Search of a Graph. Also define “Articulation Point” of the graph and explain how to find it. **06**

OR

- Q.4 (a)** Explain how to find out Longest Common Subsequence of two strings using Dynamic Programming method. Find any one Longest Common Subsequence of given two strings using Dynamic Programming. **08**

S1=abbacdcba

S2=bcdbbcaac

- (b) Answer the following. **06**
(i) Explain Branch and Bound Technique in brief.
(ii) Explain “minimax” principle with its use.

- Q.5 (a)** Answer the following. **07**

(i) Compare NP-Hard with NP-Complete problems.

(ii) Give the algorithm to solve Tower of Hanoi Problem.

Comment on the complexity of the algorithm.

- (b) Explain the use of Backtracking method for solving Eight Queens Problem giving its algorithm. **07**

OR

- Q.5 (a)** Answer the following: **07**

(i) Give the characteristics of Greedy Algorithms.

(ii) Define: Directed Acyclic Graph, Dense graph, Sparse graph, Preconditioning.

- (b) Explain Rabin-Karp method for string matching and also give the algorithm. **07**
