

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA - SEMESTER-IV EXAMINATION – SUMMER 2015

Subject Code: 640010**Date: 20/05/2015****Subject Name: Analysis & Design of Algorithm****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) Explain all asymptotic notations **04**
 (b) Define Algorithm. List all the different algorithm strategies. **03**
 (c) State the functional algorithmic specification for computing power x^n . **07**
 Establish the correctness and efficiency of this functional algorithm using the Principles of Mathematical Induction.

- Q.2** (a) Write an algorithm for merge sort and derive its time complexity. **07**
 (b) Write an algorithm for Breadth First Search (BFS) and explain it with example. **07**

OR

- (b) Briefly describe Pigeonhole Principle (or Dirichlet Drawer Principle) and also State Chinese Remainder theorem **07**

- Q.3** (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. **07**
 $S_1 = \text{abbacdcba}$ $S_2 = \text{bcdbbcaac}$
 (b) Write down four basic steps used in a dynamic programming solution. Briefly describe Travelling Salesman Problem and write down the basic solution methodology using dynamic programming approach. **07**

OR

- Q.3** (a) Schedule the jobs in such a way that so as to get maximum profit. **07**
- | Jobs | J1 | J2 | J3 | J4 | J5 | J6 |
|----------|----|----|----|----|----|----|
| Profit | 20 | 10 | 7 | 5 | 15 | 3 |
| Deadline | 2 | 1 | 3 | 1 | 1 | 3 |
- (b) Explain Dijkstra's Shortest Path Algorithm with suitable example. **07**

- Q.4** (a) Explain in brief the concept of binomial heap and Fibonacci heap **04**
 (b) Write a short note on Approximate Solutions of NP-Complete problems. **05**
 (c) What is Convex Hulls problem? Give an example of a 2-D Convex Hull and illustrate it with respect to the definition of Convex Hull. **05**

OR

- Q.4** (a) Explain Splay Trees **04**
 (b) What is Hamiltonian Circuit (Cycle)? Can it be used to solve Travelling Salesman Problem? Briefly Explain. **05**
Q.4 (c) Discuss Reduction in terms of P & NP Complete Problems. Also explain the reduction for any one known problem. **05**

- Q.5** (a) Explain: **07**
NP Complete Problem, Time Complexity, Space Efficiency, Theta Notation
- (b) (i) Write a short note on Approximate Solutions to NP-Complete problems. **07**
(ii) Give examples to show that the assumption that “P means ‘easy’ ” and “ ‘not in P’ means ‘hard’ ” is not always true in practice.

OR

- Q.5** (a) Explain Halting Problem. **07**
- (b) Briefly describe NP-Complete problems. What is the significance of NP Complete problems? Give an example of NP-Complete problem. **07**
