Seat No.: _____ Enrolment No._____

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. Establish the correctness and efficiency of this functional algorithm using the Principles of Mathematical Induction. **07**

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. S1=abbacdcba S2=bcdbbcaac **07**

(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**

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