Roll No. .....

MCA/D09

Design and Analysis of Algorithms

Paper: MCA-303 5477

Time: Three Hours] [Maximum Marks: 80

Note:- There are **NINE** questions in this paper. Attempt **FIVE** questions in all. Question No.1 is compulsory. Attempt remaining **FOUR** questions by selecting only **ONE** question from each Unit.

1. (a) What are different criteria which an algorithm must satisfy? 3

(b) Define and explain the following terms: 3

(i) Space Complexity, and 3

(ii) Time Complexity. 3

(c) What do you understand by program verification and testing? 3

(d) Write general algorithm for Greedy Method. 3

(e) Write a short note on Dynamic Programming. 3

(f) What do you understand by Ordered Searching? 3

(g) Discuss "State Space Method" for establishing lower bounds that is related to Oracles. 3

(h) Differentiate Deterministic and Non- Deterministic Algorithms. 3

UNIT-I

2(a) Compute space and time complexity of algorithm for Fibonacci Sequence. 7

(b) Compute complexity of algorithm for deletion from a heap. 7

3. Discuss various methods for computing time complexity with the help of suitable example. 14

UNIT-II

4(a) Derive general formula for Divide and Conquer strategy. 7

(b) Explain algorithm for Binary Search and compute its complexity. 7

5(a) Explain Knapsack problem in detail using appropriate example. 7

(b) Explain Bellman and Ford Algorithm to compute shortest path. 7

UNIT-III

6(a) Prove that any comparison based algorithm that computes the largest and second largest of a set of n unordered elements requires n-2 + [log n] comparisons. 7

(b) Prove that every algorithm for computing the value of a general nth degree polynomial that uses only +, - and * requires n additions or subtractions. 7

7 Explain comparison tree for sorting algorithms and compute its complexity. 14

UNIT-IV

8. Explain the following problems with the help of suitable examples:

(i) Chromatic Number Decision Problem, and
(ii) Scheduling Identical Processors Problem. 7+7

9. Explain any Np-Hard Graph Problem in detail by choosing appropriate example. 14