Roll No. .... **Total Pages : 03**

CMCS/M-24 **24536**

DATA STRUCTURES AND ALGORITHMS

Paper : MS-20-21

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. Attempt *four* more questions, selecting exactly *one* question from each Unit. All questions carry equal marks.

Compulsory Question

1. (a) Comment on the need of circular queue.

(b) What is a threaded binary tree ?

(c) Provide some examples where divide and conquer strategy can be used.

(d) What is optimal BST ?

(e) What are various types of knapsack problems ?

(f) What is a transition table in string matching using finite automata ? **6×2.5=15**

Unit I

2. (a) Write a program/algorithm to delete every occurrence of a number from a given array. **7.5**

(b) How can you perform push and pop operations in a stack ? Explain by writing algorithms and using suitable examples. **7.5**

3. (a) What is Deque ? How can you insert and delete an element in a deque ? Explain. **7.5**

(b) What are the various asymptotic notations ? Explain in detail. **7.5**

Unit II

4. Write and explain the algorithms to insert an element at the end of a list in one-way, two-way, circular and header linked list. **15**

5. Comment on the need on balancing of binary tree. Discuss the various types of balanced trees along with insertions and deletion operations in any one of the balanced binary tree using all possible combinations. **15**

Unit III

6. State and prove Master's theorem. **15**

7. (a) Write and explain algorithm to sort the given data using bucket sort and analyze the same. **7.5**

(b) How can you solve LCS problem using dynamic programming ? Explain using suitable example. **7.5**

Unit IV

8. (a) How can you solve activity selection problem using greedy technique ? Explain in detail. **7.5**

(b) Write and explain the Ford-Fulkerson algorithm to find maximum flow. **7.5**

9. How can you store strings in computer memory ? Write and explain the algorithm for pattern matching using Rabin-Karp algorithm. **15**