Exam. Code : 206701
Subject Code : 4644

M.Sc. Computer Science Semester–I

MCS–101 : ADVANCED DATA STRUCTURES

Time Allowed—3 Hours] [Maximum Marks—100

Note :— Attempt any **FIVE** questions. All questions carry equal marks.

1. (a) What do you mean by time and space complexity of an algorithm ? Explain different techniques with examples. 10

   (b) What is Binary Search Tree (BST) ? Write an algorithm to delete an element from BST. 10

2. (a) Define Red-Black Tree ? Construct the red-black tree for the following list with proper rotations and coloring : 7, 5, 6, 3, 9, 14, 15. 10

   (b) What is an AVL Search Tree ? How do you define the height of it ? Explain about the balance factor associated with a node of an AVL tree. 10

3. (a) What is 2–3 Tree ? Construct the 2–3 Tree for the following data : 45, 23, 29, 37, 9, 79, 39, 47. 10

(b) What is Binary Heap ? Explain the procedure to insert an element into binary heap. 10

4. What is Priority Queue ? What are its applications ? Write algorithms for operations on priority queue. 20

5. (a) Write and explain an algorithm for Knuth-Morris-Pratt pattern matching. 10

(b) Write and explain the Bellman Ford Algorithm with suitable example. 10

6. (a) Define B-tree. Explain in detail about the insertion and deletion operations in B-tree. 14

(b) What data structure is used for disjoint set ? Explain with an example. 6

7. Write short notes on the following :

(a) Binomial Heap. 7

(b) Fibonacci Heap. 7

(c) External Hashing. 6

8. (a) What do you mean by External Sorting ? Explain one technique of external sorting. 10

(b) Write a short note on external file. 10