

Exam. Code : 206701

Subject Code : 5170

M.Sc. Computer Science 1st Semester

MCS-101 : ADVANCED DATA STRUCTURES

Time Allowed—3 Hours] [Maximum Marks—100

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

1. Define a Binary Search Tree (BST). Write and explain the algorithm to perform search and insert an item in BST. Demonstrate the algorithm by taking an example. 20
2. What is an AVL search tree ? How is AVL different from the binary search tree ? Explain about the LL, LR, RR, RL imbalances in a Red-black tree with examples. 20
3. (a) What is 2-3 Tree ? Construct the 2-3 Tree for the following data :
18, 37, 45, 9, 18, 57, 41. 10
(b) What is Red-Black Tree ? Write the procedure to delete an item in red-black tree. 10
4. What is binary heap ? Explain the procedure to delete an element from a binary heap. Also, discuss the various applications of binary heap. 20

5. What do you mean by graph ? Write and explain any two algorithms for finding the minimal path in a graph with the help of suitable example. Also, compare the algorithms. 20
6. Explain the following :
- (a) 2-3-4 Trees 7
 - (b) Amortized Analysis 7
 - (c) Fibonacci Heap. 6
7. (a) Define B-tree. How is it different from binary tree ? Explain in detail about the deletion operation in B-tree. 10
- (b) Define priority queue and double ended priority queue. Write its major applications. 10
8. (a) Explain the concepts of external storage, external hashing and indexing files. 10
- (b) How are sorting and searching performed in external data structures ? Explain with an example. 10