No. of Printed Pages : **2**

Sl. No.

C0-R4.B3 : DATA STRUCTURE THROUGH JAVA

NOTE :

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time : 3 Hours **Total Marks : 100**

---

1. (a) Explain compile time and run time polymorphism with suitable example.

(b) What is the difference between Stack and Queue ? Explain with suitable examples.

(c) What is constructor ? How it can be declared ? Explain why constructor doesn't have any return type ?

(d) What is circular queue ? Write an algorithm to insert data into a Circular queue.

(e) Justify : worst case running time of an algorithm is more important than best and average case running time.

(f) Write down advantages and disadvantages of brute-force string matching algorithm.

(g) Write Java code to find factorial value of a given number using Recursive method. **(7x4)**

2. (a) Draw the binary tree for the given traversal.

Inorder : YCBMSAHLOK

Preorder : HMCYBASOLK

(b) What is quick sort ? Sort the following array using quick sort method :

54 26 93 17 77 31 44 55 20

(c) How to delete node in Binary Search Tree ? Explain each case with example. **(6+6+6)**

3. (a) Explain with example Kruskal's algorithm to obtain minimum cost spanning tree.

(b) What is a 'Priority Queue' and write its Applications. Write Java code to implement the Priority Queue. **(9+9)**

4. (a) Define the term 'Spanning tree' ? Write Java code to implement for Breadth First Search (BFS).

(b) Write java code to implement 'Heap sort' algorithm.

(c) What is an algorithm analysis ? What are the ways to analyse an algorithm ? Explain space and time complexity. **(5+4+9)**

5. (a) Write an algorithm for 'Tower of Hanoi' and trace the algorithm for 4 disks.

(b) Develop an algorithm to implement AVL tree. Consider Searching, Insertion and Deletion operations. Write Time complexity in Big-O notation for average and worst cases in respect of Search, Insert and Delete operations. **(9+9)**

---

6. (a) What is Inheritance ? Why Java doesn't support multiple inheritances ? Discuss visibility of base class members in privately and publicly inherited classes.

(b) Explain the constructor chaining in Java with suitable example.

(c) Differentiate between abstract class and interface. Also, explain usage of interface with suitable example.

(6+6+6)

7. (a) List the advantages of doubly linked list over singly linked list. Write the step to delete a node x from a given singly linked list. Delete operation contains two parameters i.e. Delete (x, head), where head contains the address of first node of the linked list.

(b) Showing each step, construct the Binary Search Tree using following data :
10 12 5 4 20 8 7 15 13
Write the algorithm for search operation in binary search tree. **(9+9)**

- o 0 o -