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) What do you mean by Recurrence Relation ? Discuss the terms time complexity and space complexity.

(b) Differentiate between Graph and Tree.

(c) Explain Polymorphism with suitable example.

(d) Enlist good features of JAVA.

(e) Discuss the term inheritance with suitable example.

(f) Write pseudocode for inserting data item at end of linked list.

(g) Write java code for performing binary search. **(7x4)**

2. (a) Explain Queue Data Structure ? Also Discuss insertion and deletion operations in Queue ?

(b) Define the term stack overflow and stack underflow with suitable example.

(c) Enlist the advantage and disadvantage of linked list. **(6+6+6)**

3. (a) Explain the term Recursion with suitable example. Write recursive code in java for multiplication of two numbers.

(b) State the problem of tower of Hanoi and explain it with 3 disks and 3 rods. Also discuss its time complexity.

(c) Discuss how we can change recursive program into non-recursive program with suitable example. **(5+8+5)**

4. (a) What do you mean by traversal in binary tree ? Enlist various traversal technique in binary tree.

(b) Explain Red Black tree along with its properties.

(c) Discuss various types of representation of binary tree in computer. Also which is more suitable and why ? **(8+6+4)**

5. (a) Write pseudocode for Depth First Search.

(b) Write short notes on the following :

(i) Connected Component

(ii) Bi-Connected Component

(c) Define AVL Tree. Discuss various rotations in AVL Tree with suitable example. **(5+5+8)**

6. (a) What is minimum spanning tree ? Write Prim's algorithm to find minimum spanning tree. Trace the algorithm with an example.

(b) Considering the text (T) as "ABBABAABBA" and the Pattern (P) as "ABAA" implement the Brute-force pattern matching algorithm in Java to find whether Pattern (P) exits in text (T) or not. Explain the steps of your program for the given T and P. **(9+9)**

7. (a) Define the structure of a node of Circular Doubly Linked list.

(b) A random array of Integer Elements is given as follows :

23, 85, 76, 49, 95, 52, 26, 15, 64

(i) Show the steps to sort this array using Quick Sort.

(ii) Show the steps to sort this array using Radix Sort.

(c) Explain the term stable sort and non-stable sort. **(3+10+5)**

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