No. of Printed Pages : **2**

Sl. No.

C0-R4.B3 : DATA STRUCTURE THROUGH JAVA

NOTE :

1. Answer question 1 and any FOUR questions from 2 to 7.

2. Parts of the same questions should be answered together and in the same sequence.

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

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1. (a) List the operations performed (in sequence) when a method is called.

(b) What do you mean by overflow and underflow ?

(c) What is dangling pointer ? How it is handled in Java ?

(d) What are the parameters used to determine the efficiency of any sorting algorithm ? Discuss through an example.

(e) Searching a node in a Binary Search tree is efficient than Simple Binary tree. Comment.

(f) Why postfix and prefix expressions are faster than infix ?

(g) What is max-heap ? What are the properties of max-heap ? **(7x4)**

2. (a) Give rules for infix to postfix conversion.

(b) Convert following expression from infix to prefix.

K + L - M * N + (O^P) * W/U/V * T + Q

(c) Give code in Java for calculating Fibonacci series using recursion. **(5+7+6)**

3. (a) What do you mean by divide and conquer algorithm ? How do they work ? Give names of few divide and conquer sorting techniques. Sort 7, 6, 1, 5, 4, 3 using merge sort.

(b) Give an algorithm for quick sort.

(c) Compare time complexities of following sorting algorithms :

Bubble sort, Heap sort, Merge sort, Quick sort **(6+6+6)**

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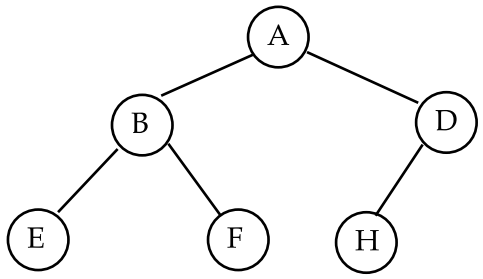
4. (a) Draw the graph for the Adjacency Matrix given below and generate its Spanning Tree.

$$A = \begin{bmatrix} 3 & 0 & 4 & 1 \\ 2 & 1 & 0 & 6 \\ 5 & 0 & 0 & 8 \\ 7 & 2 & 0 & 4 \end{bmatrix}$$

(b) What is Complete Binary Tree ? What are its properties ?

(c)



For the above Binary tree, find whether it is Perfect binary tree or a Complete Binary tree. **(6+6+6)**

5. (a) Write an algorithm/Java code to check for balanced parentheses in the given expression using :

(i) Stack

(ii) Queue

(b) What is Linked List ? Write steps to detect loop in linked list.

(c) Is linked list FIFO or LIFO ? Write Java class to implement Linked list. **(6+6+6)**

6. (a) Why is it called depth-first search ? Differentiate between BFS and DFS.

(b) Explain types of rotations in AVL trees. What is the purpose of AVL trees ?

(c) Give properties of B-Trees. What is the purpose of B-Trees ? **(6+6+6)**

7. (a) What is the difference between brute force and greedy algorithm ?

(b) What is the time complexity of brute force string matching algorithm ?

(c) What is Garbage Collection in Data Structure ?

(d) Is a heap a tree or array ? **(5+5+4+4)**

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