

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 question should be answered together and in the same sequence.

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

1. (a) Define Data structure and explain various types of data structure.
 (b) Explain different kind of rotation in AVL tree.
 (c) What are asymptotic notations explain them briefly ?
 (d) Write recursive java program to solve tower of Hanoi problem ?
 (e) Explain how multiple inheritance is implemented in Java ?
 (f) Define Polymorphism and write a java programme to implement Polymorphism.
 (g) Write a java programme to implement brute-force substring search ? (7x4)

2. (a) Sort the following number in ascending order using Insertion sort. 4, 3, 2, 10, 12, 1, 5, 6 and Write the output after each iteration.
 (b) Translate infix expression into its equivalent postfix expression :
 $A*(B+D)/E-F*(G+H/K)$.
 (c) What do you meant by Time Space Tradeoff ? Explain all the 3 cases (Best, Average, Worst) w.r.t to it. (6+6+6)

3. (a) What are the advantages of linked list over arrays ? Implement Doubly Circular Linked List and insert an element at a given position in this linked list.
 (b) Write a Java program to implement a linear queue using Stack.
 (c) For the given 2D array (integer) of order 15X10 whose base address is 1500, find the address of the location A[12][9] where 2D array is implemented using row major order and column major order. (6+6+6)

4. (a) Analyse the effectiveness of Radix Sort over Quick Sort using an example. Also implement Radix Sort using Java.
 (b) What is Stack ? Write an algorithm to perform push and pop operations in stack implemented using array. (9+9)

5. (a) Construct a binary tree whose nodes in inorder and preorder are given as follows :
 Inorder : 10, 15, 17, 18, 20, 25, 30, 35, 38, 40, 50
 Preorder : 20, 15, 10, 18, 17, 30, 25, 40, 35, 38, 50
 (b) What is B-tree ? Construct a B-tree of order 3 for the following set of Input data : 5, 9, 3, 7, 1, 2, 8, 6, 0, 4 (9+9)

6. (a) Consider the following specification of a graph G , where V and E are the vertices and edges respectively in G .
- $V(G) = \{1, 2, 3, 4\}$
 $E(G) = \{(1, 2), (1, 3), (3, 3), (3, 4), (4, 1)\}$
- (i) Draw an undirected graph.
(ii) Draw its adjacency matrix.
- (b) Explain various graph traversal schemes and write their merits and demerits. (9+9)
7. (a) What is a Binary Search Tree (BST) ? Make a BST for the following sequence of numbers.
45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48
Traverse the tree in Preorder, Inorder and postorder.
- (b) Illustrate the Queue operations using java program. (9+9)

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