

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 is Probability Space? Find the probability that a die shows an odd number and a coin shows a head, when a die is rolled and a coin is tossed.
 - b) Both Object-Oriented Programming and Relational Database Management Systems (RDBMSs) are extremely common in software today. Explain in brief with an example.
 - c) What is Time complexity and Space complexity of an Algorithm? Calculate Time and Space complexity for Quick Sort Algorithm.
 - d) What is a Dynamic Array? Write its merits and limitations over a linked list.
 - e) Explain in brief on Exception handling feature in JAVA with an example.
 - f) Write a non-recursive program in JAVA to implement a Stack.
 - g) What is a Trie? Write its advantages over a Binary Search Tree.

(7x4)

2.
 - a) Write Algorithm to convert an expression in Infix notation into Prefix notation.
 - b) What is Runtime and Compile time Polymorphism in JAVA? Write a JAVA code to demonstrate with an example.

(9+9)

3.
 - a) Write a program in JAVA to implement a Single linked list for the following:
 - i) Create a linked list for a class of students (consider Name and Age as fields of a Node)
 - ii) Insert a Node into the list
 - iii) Delete a Node from the list
 - iv) Display the list
 - b) Explain on Classes and Objects in JAVA with an example.

(12+6)

4.
 - a) Write AVL tree Algorithm for Searching, Traversal, Insert and Delete operations. Explain with an example.
 - b) Explain in brief on binary tree traversal methods with one example each.

(12+6)

5.
 - a) Explain the concept of Constructor and Destructor in JAVA with an example.
 - b) Write Pseudo code for DFS and BFS Algorithms for traversing a finite Graph. Explain each algorithm with an example.

(6+12)

6.
 - a) Write Java code to implement Merge Sort. Analyze its efficiency and complexity in respect of Best, Average and Worst case.
 - b) Write the merits and limitations of iterative and recursive methods.
 - c) Explain in brief the Method invocation in JAVA with an example.

(9+6+3)

7. Write short notes on the following:
 - a) Brute-force String pattern matching method
 - b) Binary Search Tree
 - c) Object Oriented Vs Procedure Oriented Programming
 - d) Features of JAVA in Web Programming

(5+4+4+5)