

CO-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 the best-case and worst-case performance for an algorithm? Explain with an example.
- b) What is inheritance feature in object oriented programming? Explain with an example.
- c) Write an algorithm to implement a Circular queue.
- d) Write at least four merits and limitations of an iterative and recursive method.
- e) Write Java code to search a specific element in a list of elements using Binary search method.
- f) Explain Brute-Force string pattern matching with an example.
- g) Trace the 'Bubble sort' algorithm for descending order for the following data: 5, 2, 75, -10, 13, 83, 55, 45, 96, -34

(7x4)

2.

- a) What is Operator overloading and Function overloading? Write java code to demonstrate both operator and function overloading.
- b) What is Time complexity and Space complexity of an Algorithm? Write a Merge Sort Algorithm and find its time and space complexity by tracing with an example.

(9+9)

3.

- a) Write Java code to implement a doubly linked list for the following operations:
 - i) Create a linked list for a set of elements
 - ii) Insert an element (consider insertion at beginning, end and in between two elements of list)
 - iii) Delete an Element (consider deletion at beginning, end and in between two elements of list)
 - iv) Display the list
- b) Write Java code to implement a Stack. Write also applications of a Stack.

(9+9)

4.

- a) Write an algorithm to convert an infix expression into postfix expression.
- b) Write separate algorithm each for pre-order, in-order and post-order traversals of a binary tree using recursive method.
- c) Write Java code to demonstrate a Constructor and Destructor?

(6+9+3)

5.

- a) What is minimum spanning tree? Write Prim's algorithm to find minimum spanning tree. Trace the algorithm with an example.
- b) Write DFS and BFS algorithms. Explain both with one example each.

(9+9)

6.

- a) Write Java code to find the sum upto n^{th} term of $\sin(X)$ series.
- b) Write best-case, average-case and worst-cases of Heap sort, Quick sort and Radix sort algorithms.
- c) What is exception handling in java? Write java code to demonstrate exception handling for at least to handle three exceptions.

(6+3+9)

7. Write **short notes** on the following:

- a) AVL tree
- b) Asymptotic notation
- c) Object oriented programming Vs Procedure oriented programming
- d) Direct and undirected graph

(6+3+6+3)