CO-R4.B3: DATA STRUCTURES 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 conditional probability? Explain with an example?
b) Explain Multithreading concept in Java and its applications.
c) What is time complexity of an Algorithm? Explain how time complexity is calculated for a Bubble sorting algorithm?
d) Write an algorithm to implement Priority Queue and trace with an example.
e) What is a Recursive method? Write Java code to find factorial value of a given number?
f) Draw the Binary tree with the help of the given Pre-order and In-order traversals of a binary tree. Pre-order: FBADCEGIH; In-order: ABCDEFGHI.
g) Develop an algorithm for Binary search method and calculate its Best case, Average case and Worst case complexities

(7x4)

2.
a) Explain with one example each, the concepts of Inheritance and Polymorphism in Object Oriented Programming and their applications.
b) Write Java code to implement Quick sort and find its time and space complexity by tracing with an example.

(9+9)

3.
a) Write Java code for Tower of Hanoi of 'n' disks. Explain the method for n=4.
b) Write Java code to implement a Circular Queue. Compare the 'overflow' and 'underflow' conditions of circular queue with a Linear Queue method.

(9+9)

4.
a) Write an algorithm for Binary Search Tree. Write a separate function for insertion and deletion of a node. Explain both insertion and deletion operations with one example each.
b) Write the characteristics of a Binary tree. Explain in brief the binary tree traversal methods with one example for each.

(12+6)

5.
a) Develop an algorithm for Breadth First Search (BFS). Write its characteristics and applications.
b) Write Kruskal minimum spanning tree algorithm. Compare it with Prim's minimum spanning tree algorithm.

(9+9)

6.
a) Write Java code to find the sum of first 'n' terms of Cos(X) series.
b) Write a Java code to implement Heap Sort. Explain with an example.
c) Write the time complexities of Bubble sort, Selection sort and insertion sort methods.

(6+9+3)

7. Write short notes on the following:
a) Xtreme Programming
b) Red Black Tree characteristics
c) Virtual Class
d) Brute-force String pattern matching method

(6+3+3+6)