C0-R4.B3: DATA STRUCTURE THROUGH JAVA

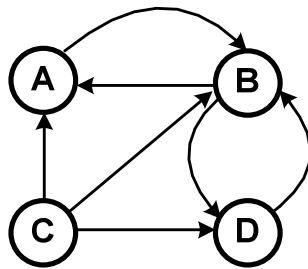**NOTE:**

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 are Primitive and Non Primitive data structures? Explain with a suitable example.
b) Draw the adjacency matrix of the following graph and find A^2 from the given graph.

c) Why is WORST CASE running time of an algorithm more important than best and average case running time?
d) What is object oriented programming? What are the unique advantages of object oriented programming paradigm?
e) Separation of interface and implementation is an abstraction mechanism in object-oriented programming language. Justify the statement.
f) Discuss the behavior of Quick sort method depending upon initial order of data.
g) What is Recursion? What criteria make a method recursive? Discuss with an example.

(7x4)

2.
a) What is regular expression pattern matching? Explain using Java code.
b) Show circular queue contents with front and rear after each step with size=5.
     i)   Insert 10, 20, 30.
     ii)   Delete
     iii)   Insert 40, 50, 60, 70. Initially queue is empty.
c) A Unix directory is a list of files and directories. Write Java program using queue that takes the name of a directory as a command line parameter and prints out all files contained in that directory (and any subdirectories) in level-order.

(4+6+8)

3.
a) Create a max heap tree and sort the given values in ascending order using heap sort with details: 4, −12, 16, 32, 24, 57, −11, 69, 96
b) Write the Java code for insertion of a node in doubly linked list.
c) Calculate total number of comparisons and exchanges required to arrange following data into ascending order using Selection and Bubble sort:
                 99, 56, 12, 16, 98, 34, −22, 10, 0, −10

(6+6+6)

4.

a)   Write and explain an algorithm for Breath First Search (BFS) traversal for undirected graph with a suitable example.

b)   Insert 45, 12, 25 and 39 into the following AVL Tree. Draw balanced tree after each insertion with balance factor and pivot node.

(8+10)

5.
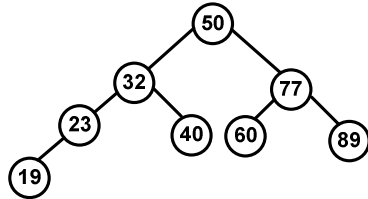
a)   Construct a binary search tree (using Alphabetic order) for the following data:
       K, O, X, C, A, B, F, P, U, G, J, Z
     Show its Preorder, Inorder and Postorder traversing sequences.

b)   What is an algorithm analysis? What are the ways to analyze an algorithm? Explain space and time complexity.

(9+9)

6.

a)   Showing each step, construct the Binary Search Tree using following data:
       32, 45, 12, 11, 13, 92, 78, 66, 17, 70, 98, 108.
     Delete 92 and then 32 from the tree. Draw tree after each deletion.

b)   What are the different forms of inheritance supported in Java? Discuss visibility of base class members in privately and publicly inherited classes.

(9+9)

7.

a)   Sort the following data using Radix sort. Trace the algorithm.
         103, 12, 150, 1405, 145, 1450, 130, 1045

b)   What are abstract classes? Give an example with the help of a Java program to illustrate the use of abstract classes.

c)   What is Asymptotic Algorithm Analysis? Explain with the help of an example.

(6+8+4)