VIT
Vellore Institute of Technology

School of Computer Science and Engineering

Winter Semester 2023-24

Continuous Assessment Test – 2

SLOT – D2

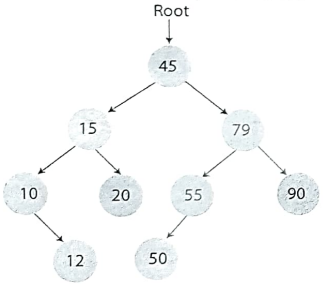
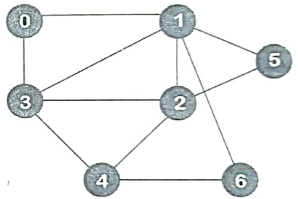
Programme Name & Branch : B.Tech & Computer Science and Engineering and Business Systems

Course Name & code: Data Structures and Algorithms CBS1003

Class Number (s): VL2023240503598 , VL2023240503597

Faculty Name (s): Dr. Balaji N, Dr. Karthik K.

Exam Duration: 90 Min. **Maximum Marks: 50**

Q.No.	Question	Max Marks
1.	Build a splay tree using the following keys 20, 21, 22, 23, 24, 25, and 26. Give the pictorial representation for splaying operation after inserting every node in the tree. After constructing the tree with given elements delete the key 25 and 21. Write an algorithm for delete operation in splay tree.	10
2.	Write an algorithm to display the nodes present in each path of the binary tree and find the longest path in the tree. For example the following binary tree has four different paths and longest path are 1 and 3.  Path 1: 45, 15, 10, 12 Path 2: 45, 15, 20 Path 3: 45, 79, 55, 50 Path 4: 45, 79, 90	10
3.	**Sharpener and pencil problem:** you are given a collection of 'n' sharpener of different radius and collection of 'n' pencil with different radius. You are allowed to try a sharpener and pencil together from which you can determine whether sharpener is larger than the pencil or smaller than the pencil or matches the pencil exactly. The problem is to match each sharpener to its corresponding pencil. Write an algorithm to solve the problem and also illustrate your algorithm for any sample inputs.	10
4.	i) Write an insertion sort algorithm and illustrate the algorithm with a given input a[]={78, 56, 4, 34, 5} (5 mark) ii) Write a merge sort algorithm and illustrate the algorithm with a sample input. (5 mark)	10
5.	i) Perform BFS from source node "2" from the given graph. Also process the nodes based on descending alphabetical order of their node labels. Illustrate the algorithm with step by step procedure. (5 mark) ii) Perform DFS from source node "4" from the given graph. Illustrate the algorithm with step by step procedure. (5 mark)  	10