COMSATS University Islamabad, Lahore Campus
Department of Computer Science

Assignment 3 – Semester FALL 2023

Course Title:	Data Structures & Algorithms				Course Code:	CSC211	Credit Hours: 4(3,1)
Course Instructor/s:	Mr. Imran Latif				Program Name:	BCS	
Semester:	3rd	Section:	C&D	Batch	FA22		
Total Marks:	**10**	Obtained Marks:			Due Date:	December 6, 2023	
Student's Name:					Reg. No.		

Important Instruction:

- Student is himself/herself responsible for successful submission of assignment on Microsoft Teams.
- Your submission must include the answers in a single pdf file.
- Copied assignment will get zero credit.
- Deadline: December 6,2023 till 11:30 PM

CLO: <1>; Bloom Taxonomy Level: <Applying>

Q-1 For every algorithm in a BST, root node is given as input along with any other input (if mentioned).

- To find and return the parent of given node?
- To find and return depth/level of given node?
- To find and return height of the tree.
- To find if a tree is BST or not?
- To find if two nodes are at same level of tree or not?
- To find and return total number of nodes?
- To find InOrderSuccessor of a given node. Discuss both the cases:

Q-2 Write the deletion algorithm of the BST iteratively. In this algorithm incorporate all the three cases:

- Case 1. Delete a Leaf Node in BST.
- Case 2. Delete a Node with Single Child in BST.
- Case 3. Delete a Node with Both Children in BST.

Q-3 Use a linked list to implement a priority queue in integers by using binary heap, test your class.

Q-4 Answer the following questions regarding trees.

I. Add and test this method for the binary tree class.

   public boolean isAVLTree()

II. Add and test this method for the AVL tree class.
   public boolean contains(int x)

III. Add and test this constructor for the AVL tree class.
   public AVLTree(int [] a)

Q-5 Build the AVL tree with the following set of data.

40 50 60 30 25 20 55 58 70 65 10 5

Note: Draw this tree on the sheet. Do not write the code.