VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act 1956)

School of Computer Science and Engineering

Winter Semester 2023-24

Continuous Assessment Test – 1

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**

General instruction(s):

Specify if any

Any other specific instruction

Q.No.	Question	Max Marks

1.	Given the Bubble sort pseudocode below
	Void sort(int a[], int N)
	{
	int t;
	for (int i = 0; i < N; i++)
	{
	for (int j=i+1;j<N;j++)
	{
	if(a[i]>a[j])
	{
	t=a[i];
	a[i]=a[j];
	a[j]=t;
	}
	}
	}
	}
	i) Compute the total cost function (3 Marks)
	ii) Find the time complexity of best and worst case for the above algorithm. (3 Marks)
	iii) Evaluate the Proof of Correctness of the above algorithm using loop invariant method. (4 Marks)
		10

2.	a) Devise the algorithm to push an element into the stack and to delete an element from the stack. Also formulate a function min_stack() that finds the minimum element present on the stack (6 Marks) b) Evaluate the given Postfix Expression (4 Marks) ***str = "100 200 + 2 / 5 * 7 +"***	10
3.	Create an empty singly linked list (L). Write the algorithm to perform the following operations on it and illustrate the same using the visual representations. 1. Insert(L,50) 2. Insert at the end(L,60) 3. Insert at the end(L,70) 4. Insert at the end(L,80) 5. Insert at first(L,1000) 6. Insert between(L,3000,60,70)	10
4.	Assume a circular queue size of 5. Insert with three elements 20,30 and 40. Initially front=0 and rear=0. After inserting 50 and 60 determine the value of front and rear. Also visualize the queue after performing each of the operations. 1. Write the algorithm for enqueue() and dequeue() operations of circular queue. 2. What happens if we try to insert 70 into the queue at this given state. 3. Delete three elements from the queue and print the value of front and rear. 4. Insert the element 80 into the queue	10
5.	a) Construct an expression tree for the following infix expression **a*(b + c) + ((d + e*f)*g)** (4 Marks) b) Write the pseudocode to perform Insertion and deletion in binary search tree. Construct the BST for the given values 20,3,78,56,34,8,9,24,8,11,18,87,56 (6 Marks)	10