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

School of Computer Science and Engineering

Fall Semester 2024-25

CAT I

SLOT:B2+TB2

Programme Name & Branch: B.Tech & SCOPE

Course Name & Code: Data Structures and Algorithms & BCSE202L

Class Number (s): Common to all batches

Faculty Name (s):All

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

General instruction(s):

Specify if any printed material may be permitted

Any other specific instruction

Q. No.	Question	Max Marks

1.	Determine the time complexity of the following code snippet and explain the process of deriving the execution time for each statement.
	i)
	void fun(int n)
	{
	int i, j, k, count=0;
	for(i=n/2; i<=n; i++)
	for(j=1; j+n/2 <= n; j++)
	for(k=1; k <=n; k=k*2)
	count++;
	}
	
	Ans: $O(\sqrt{n})$
	
	ii)
	int i=1, s=1, n;
	while (s<n)
	{
	i=i+1;
	s=s+i;
	printf("VIT2024");
	}
		10

	Ans: $n^2 \log n$	
2.	Solve the following recurrence relation using recursion tree method i) T(n) = T(n/5) + T(4n/5) + n **Answer: $O(n * log_{5/4} n)$** ii) T(n) = 3T(n/4) + cn^2 **Answer: $O(n^2)$**	10
3.	Use a stack to convert the given infix expression to postfix notation. Provide a step-by-step pictorial representation of the process. $(3 * \log(x+1) - \frac{a}{2})$ **Answer: postfix 3x1+log*a2/-** **All stack steps need to be shown (Pictorial representation)**	10
4.	Imagine you have two queues: Q1 with six elements (a, b, c, d, e, f) and Q2 which is empty. The only operations you can perform on these queues are Enqueue (Q, element) and Dequeue (Q). Assume that pointer front points to index 0 in both the queues. Determine the following for transferring the elements of Q1 to Q2 in reverse order. i) Minimum number of Enqueue operations on Q1. **Answer: 0** ii) Minimum number of dequeue operations on Q2. **Answer: 0** Provide pictorial representations for each step, ensuring no additional storage is used.	10
5.	Given the list of numbers [19, 1, 9, 7, 3, 10, 13, 15, 8, 12], what would the list look like after three full passes of the bubble sort algorithm? Provide a step-by-step pictorial representation of the procedure. **Answer:** **First pass:** 1 9 7 3 10 13 15 8 12 19 **Second pass:** 1 7 3 9 10 13 8 12 15 19 **Third pass** 1 3 7 9 10 8 12 13 15 19	10