VIT
Vellore Institute of Technology

School of Computer Science and Engineering

Winter Semester 2022-2023

Continuous Assessment Test – 1

SLOT: C1 + TC1

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

Course Name & code: Data Structures and Algorithms - BCSE202L

Class Number (s): VL2022230505829, VL2022230505831, VL2022230505834, VL2022230505836 VL2022230505857, VL2022230505859, VL2022230505861, VL2022230505953, VL2022230505956, VL2022230506218, VL2022230506305, VL2022230506315, VL2022230507612

Duration: 90 Min.

Maximum Marks: 50

Answer all questions

Q.No.	Question	Max Marks
1.	**a)** Solve the following recurrence equation using Master Theorem $T(n) = T(n/2) + 1$, where $n=2^k$ for all $k>=0$	3 Marks
	b) Solve the following equation using the substitution method or Iterative (Back substitution method) $T(n) = T(n/3) + T(2n/3) + cn$ where c is a constant and n is the input size.	7 Marks
2.	**a)** Solve the following recurrence equation using the recursive tree method $T(n) = 3T(n/4) + cn^2$ where c is a constant and n is the input size.	7 Marks

	b) Consider the following code snippet. Find the time complexity of the code. Assume the code is free from any syntax error and is running properly.
	`int j = 0;`
	`for (i=0; j≤ n; i++)`
	`{`
	`j=i+j;`
	`printf("I am a student of VIT");`
	`}`
		3 Marks

3.	Convert the given infix expression into postfix expressions using stack. Explain the step-by-step process. A + (B*C – (D / E^F) * G) * H	10 Marks
4.	**a)** A Circular Queue has a size of 5 and has elements 10, 20 and 40 where F=2 and R=4. After inserting 50 and 60, what is the value of F and R. Trying to insert 30 at this stage, what happens? Delete 2 elements from the Queue and insert 70, 80, 90. Show the sequence of steps with necessary diagrams with the value of F and R **b)** Write an algorithm to perform dequeue operation and show the implementation using an array.	6 Marks 4 Marks
5.	Sort the given string and show the intermediate results (step by step) using selection sort. 'P' 'R' 'O' 'U' 'D' 'T' 'O' 'B' 'E' 'A' 'V' 'I' 'T' 'I' 'A' 'N'	10 Marks