

**VIT**Vellore Institute of Technology
(Chartered to be University under section 3 of U.G. Act, 1956)**School of Computer Science and Engineering**
Fall Semester 2024-25
CAT I**SLOT: B1+TB1****Programme Name & Branch: B.Tech. - Computer Science and Engineering**
Course Name & Code: Data Structures and Algorithms, BCSE202L
Class Number (s): ALL
Exam Duration: 90 Min.**Maximum Marks: 50****General instruction(s):** Any other specific instruction

Q. No.	Question	Marks
1.	<p>a) Function Sort(array, n) // n is the number of elements in array for (i from 0 to n-1) { for (j from 0 to n-2-i) { if array[j] > array[j+1] { // Swapping array[j] and array[j+1] temp = array[j] array[j] = array[j+1] array[j+1] = temp } } } } </p> <p>Find out the worst-case time complexity for this iterative algorithm using summation formulas. Assume that the input array is unsorted.</p> <p>b) Write the pseudo code for recursive linear search algorithm, and the find the recurrence relation of the algorithm.</p>	5+5
2.	<p>State Master's Theorem and apply the same to solve the following recurrence relation :</p> <p>i) $T(n) = T(n/2) + 2^n$ ii) $T(n) = 2T(n/2) + n \log n$ iii) $T(n) = 3T(n/2) + n^2$ iv) $T(n) = 64T(n/8) - n^2 \log n$</p>	5+5
3.	<p>Provide the steps for a) infix to postfix and b) infix to prefix conversion using proper data structure and show to convert the given infix expression: $(a-b)/c*(d + e - f / g)$ to postfix.</p>	5+5
4.	<p>Deque (Double Ended queue) efficiently manages insertion and deletion of elements at both ends, i.e., front and rear. Implement and compare <code>enqueueFront()</code> <code>dequeRear()</code> operations for linear and circular DEqueue.</p>	5+5
5.	<p>Output of a sorting algorithm after 2nd iteration looks like: 10 12 93 42 77 63 57.</p> <ul style="list-style-type: none"> Identify the sorting algorithm applied on this array of integers; (1 mark) Show the steps to sort the entire array, (4 marks) Provide the pseudo code for the same algorithm. (5 marks) 	10