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

School of Computer Science and Engineering

Winter Semester 2022-2023

Continuous Assessment Test – 1

Programme Name &Branch: B.Tech (BCB/BCE/BCI/BCT/BDS/BKT) **Slot : G2+TG2**

Course Name & code: BCSE204L – Design and Analysis of Algorithms

Class Number (s): ALL

Faculty Name (s): 10622/10781/11226/12357/12497/19700/14713/14816/16411/16700/17970/ 18807/ 18811/ 18871/18872/18876/18938/19004/19579/19594/19614/19620/19662/13329/18977

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

ANSWER ALL THE QUESTIONS

Q.No.	Questions	Max Marks
1.	a) Which one of the following is the recurrence equation for the worst-case time complexity of the Mergesort algorithm for sorting n (≥2) numbers in the recurrence equations given in the options below?, c is a constant. i. $T(n) = 2T(n/2) + n$ ii. $T(n) = T(n-1) + T(1) + cn$ iii. $T(n) = 2T(n-1) + cn$ iv. $T(n) = T(n/2) + n$ Justify your answer and solve the equation using appropriate method.	6
	b) Using the master's theorem, Solve the recurrence relation $T(n) = 2T(n/2)+n^3$, $n=2^k$.	4
2.	Design and develop an algorithm to multiply 2 integers and analyze their time complexity. Explain the technique used to speed up the computation using the numbers 1234 and 4321.	10
3.	Write the optimal cost function using dynamic programming and give the detailed discussions for the following scenario. Given a set of non-negative integers, and a value sum, determine if there is a subset of the given set with sum equal to the given sum.	10
4.	Elaborate the optimal substructure property of huffman coding using appropriate argument. Construct the frequency table of characters in "mississippi" in non-decreasing order of frequency. Using Huffman code method, find the code word for each character.	10
5.	The N Queen (e.g. N=4,8,..)problem is to place the N chess queens on an N×N chessboard so that no two queens attack each other. Discuss with an example and solve it using backtracking.	10