VIT

Vellore Institute of Technology

## School of Computer Science and Engineering

**Winter Semester 2023-2024**

**Continuous Assessment Test – 1**

**Programme Name &Branch: B.Tech (BCB/BCE/BCI/BCT/BDS/BKT)** **Slot : A2+TA2**

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

**Class Number (s): ALL**

**Faculty Name (s): ALL**

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

**General instruction(s): ANSWER ALL THE QUESTIONS**

| Q.No. | Question |
|---|---|
| 1. | a) Demonstrate the iteration method to compute the asymptotic complexity for the following recurrence. $T(n) = 4T\left(\frac{n}{3}\right) + n^2$ **(5-Marks)** |
| | b) Use master's method to compute the asymptotic complexity for the following recurrences. In each case, identify the case of master method that it uses to compute the asymptotic complexity. **(5-Marks)** (a) $T(n) = 16T\left(\frac{n}{4}\right) + n^2$ (b) $T(n) = 3T\left(\frac{n}{3}\right) + n^{1/2}$ |
| 2. | Discuss how the greedy approach is used to solve optimization problems. Construct the frequency table of characters in "Hi! How are you?" in a non-decreasing order of frequency. Use Huffman code to find the code word for each character. **(10-Marks)** |
| 3. | Define maximum sub-array sum problem. Find the series of contiguous elements that results in the maximum sub-array sum for the array given below. **(10-Marks)** |

| -2 | -3 | 1 | 4 | -1 | 3 | 5 | -4 | 6 | 1 |
|---|---|---|---|---|---|---|---|---|---|

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| 4. | Longest common subsequence (LCS) problem is the problem of finding the longest subsequence common to all sequences in a set of sequences .Consider the sequences "ACCGGTCGAGT" and "GTCGTTCGG". Find the length of the longest common subsequence using dynamic programming approach with the pseudocode for the same. **(10-Marks)** |
| 5. | Given a set of non-negative integers S = {3, 34, 4, 12, 5, 2} and a sum 30, determine the subsets of S, whose sum is equal to 30 using backtracking. **(10-Marks)** |