



VIT

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

REG.NO: _____

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

SLOT: A2 +TA2

Programme Name & Branch : B.Tech (Computer Science & Engineering)
 Course Code and Course Name : Design and Analysis of Algorithms & BCSE204L
 Faculty Name(s) : Dr.P.Iyappan
 Class Number(s) : Common to all
 Date of Examination : 27.01.2025
 Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyze, 5 - Evaluate, 6 - Create)
- Course Outcomes:
 CO-1: Apply the mathematical tools to analyse and derive the running time of the algorithms.
 CO-2: Demonstrate the major algorithm design paradigms.

| Q. No | Question | M |
|-------|--|----|
| 1. | a. Design an algorithm by finding the required design paradigm to find the highest and lowest marks scored by students in the exam by fulfilling the below parameters and derive the respective recurrence relation for the same. i. Base case 1(If the input is only one element) give solution i.e what is highest and lowest? ii. Base case 2(If the input is two elements) give solution. iii. If the input is more than two elements, divide the inputs into sub-problems and use the recursive function for solving the sub-problems and write the procedure for combining the sub-solutions. | 5 |
| | b. Demonstrate the Recursive tree method to find the asymptotic complexity of the following recurrence equation (Note: Recursive tree with level wise time complexity should be given). $T(n) = 2T(n/2) + cn$ | 5 |
| 2. | Demonstrate how the Huffman code is used to make data smaller by Compressing it? Consider the following string "BCAADDCCACACAC" compress it and find out how many minimum numbers of bits are required for transmitting the above said string. Write down the needed process and the respective algorithm and analyse the time complexity. | 10 |

1 - 1/2



VIT

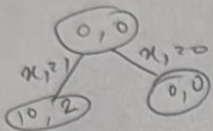
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO:

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

SLOT: AZ +TA2

| | | |
|---|---|----|
| 3 | Given an array consisting of number of following elements $\{-2, -5, 6, -2, -3, 1, 5, -6\}$. Find a contiguous non-empty subarray within the array that has the <u>maximum sum</u> , and return the <u>sum</u> as well as the subarray elements. Implement using appropriate design paradigm and give the optimized algorithm and derive the <u>time complexity</u> . 9 | 10 |
| 4 | Consider a knapsack bag where $n = 4$, and the values (profits) are given by $\{10, 12, 12, 18\}$ and the weights given by $\{2, 4, 6, 9\}$. The maximum weight is given by $W = 15$. The solution is to find subset of objects such that the total value is maximized, and the sum of weights of the objects does not exceed a given capacity W . Implement and write the algorithm using Dynamic Programming strategy and derive time complexity. | 10 |
| 5 | <p>i. In real time application, many problems which deals with searching for set of solutions or which ask for an optimal solution satisfying some constraints can be solved using which design paradigm?. Define the Design paradigm and Differentiate implicit and explicit Constraints with example.</p> <p>ii. Demonstrate N queen (where n is 5), the problem is to place n chess Queens on $N \times N$ chess board, So that no queens should attack each other. Show the steps that by involving the appropriate design paradigm to attain the list of solutions where no queens should attack each other. Discuss the algorithm and analyse its time Complexity.</p> | 10 |



12,4
12,6
18,9