VIT
Vellore Institute of Technology
CHENNAI

Reg. Number: 22BCE1138

Continuous Assessment Test(CAT) – I - JAN 2025

Programme	:	B.Tech CSE	Semester	WIN 24-25
Course Code & Course Title	:	BCSE102L – Structured and Object-Oriented Programming	Slot	E1
Faculty	:	Dr. NITHYANANDAM P Dr. HEMALATHA K Dr. ELAKIYA E Dr. VALARMATHI SUDHAKAR Dr. JEIPRATHA P N Dr. OMANA J Dr. REVATHI A R Dr. SUBBULAKSHMI T Dr. K UMA MAHESWARI Dr. SUDHA C	Class Number	CH2024250501540 CH2024250501541 CH2024250501542 CH2024250501543 CH2024250501544 CH2024250501545 CH2024250501546 CH2024250501547 CH2024250501548 CH2024250501549
Duration	:	90 Minutes	Max. Mark	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		The Collatz Sequence starts with any positive integer. If the number is even, divide it by 2. If it's odd, multiply it by 3 and add 1. Repeat this process until the number becomes 1. For example, starting with 6, the sequence is: 6 → 3 → 10 → 5 → 16 → 8 → 4 → 2 → 1. Write a C program that computes and prints the sequence for any given starting number.	10
2		Mr. Prem would like to determine the frequency of characters occurring in a given string for his Huffman encoding research work. Help him to attain the same using functions in C programming. For example, if the input string is "BCAADDDCCACACAC", then the frequency of character occurrence is A-5, B-1, C-6, D-3	10
3		A bookshop is offering a discount on the total price of books purchased. The discount ranges are listed below: a) **10% Discount**: If the total price of books exceeds $500. b) **5% Discount**: If the total price of books is between $300 and $500 (inclusive). c) **No Discount**: If the total price of books is less than $300. Write a C program that allows a customer to enter the prices of 10 books, calculate the total price of all books, and then apply the appropriate discount based on the conditions mentioned. The program should display the total price before and after applying the discount. Use arrays with pointers to implement the above.	15

4		For a given $N \times N$ matrix ($N \geq 4$), implement functions to extract and manipulate the non-edge elements as follows: 1. Identify and print all the non-edge elements. 2. Calculate and print the sum of the non-edge elements. 3. Transpose the non-edge elements while retaining the edge elements in their original positions, and print the resulting matrix. Note: Non-edge elements are the elements that are not located on the boundary of the matrix. **Example:** **Input:** N: 4 Matrix: 2 3 4 5 1 5 1 2 3 3 9 8 9 7 6 5 **Output:** Non-edge elements: 5 1 3 9 Sum: 18 Matrix with transposed non-edge elements: 2 3 4 5 1 5 3 2 3 1 9 8 9 7 6 5	15

**********All the best **********