W/D/TY

Reg. No: 24BDE0130

Final Assessment Test – April 2025

VIT Vellore Institute of Technology

Course: **BCSE102L** - **Structured and Object-Oriented Programming**

Class NBR(s): **4117/4119/4123** Slot: **B1**

Time: **Three Hours** Max. Marks: **100**

- **KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE**
- **DON'T WRITE ANYTHING ON THE QUESTION PAPER**

Answer ALL Questions

(10 X 10 = 100 Marks)

1. When would it be more appropriate to use a switch statement instead of an if-else statement? Create a menu-driven C program for a simple calculator. The user can choose options 1, 2, 3, or 4 for addition, subtraction, multiplication, or division, respectively. Write the switch statement that handles these options.

2. Given a square matrix of size N×N, write the C code to calculate the absolute difference of the sums across the two main diagonals. For example, given a 3 X 3 matrix as below:

   11 2 4

   4 5 6

   10 8 -12

   Sum across the first diagonal = 11+5-12= 4

   Sum across the second diagonal = 4+5+10 = 19

   Absolute Difference: |4-19| =15

3. Develop a C program to find the sum of array elements using Dynamic Memory Allocation. Memory for the array should be allocated dynamically using malloc(). The malloc() function allocates n * sizeof(int) bytes, where n is the size of the array. After computing the sum, the program should release the allocated memory using free () to prevent memory leaks.

4. Create a structure to specify data of customers in a bank. The data to be stored is as follows: Account number, Name, Account balance. Assume maximum of 20 customers in the bank. Create a function to read all customers details and call it in main function. Your program must have the functions for following activities:

   a) Print the Account number, name and balance of each customer.
   b) Withdraw money
   c) Deposit money
   d) Search Customer

5. A retail store is maintaining their buyer details such as buyer id and name, mobile number and address. They have decided to introduce an ideal buyer plan for the existing buyer. Ideal buyers earn discounts based on their collective purchase amount as follows:

Collective Purchase Amount	Discount (%)
>= Rs. 5,000	1
>= Rs 10,000	2
>= Rs 15,000	3
>= Rs 20,000	4

Design an OOP model and implement it using C++. Use the declaration of classes and application program to do the design. Use constructor to initialize the buyer details. The program must get the details, compute bill amount and print details both for regular and ideal buyers. You should create a base class for buyer details and derive the new classes for regular and ideal buyers.

6. Write a C++ program to create a class 'Person' with data members name and age, member function 'getdata()' and 'displaydata()' to read and display the person information. Create a new class 'Employee' from 'Person' class with data members empid and designation, methods 'getinfo()' and 'dis()' for reading and displaying the employee information. Derive another class 'PartTimeEmployee' from 'Employee' class with data member no_of_hours_worked and member functions for reading and displaying the necessary information. Invoke the methods for 'PartTimeEmployee' inside the main() to display the necessary information.

7. Write a C++ program where a function named 'area' is overloaded to:

- Calculate the area of a rectangle.
- Calculate the area of a circle.
- Calculate the area of a triangle.

8. How do function templates differ from class templates? Provide examples to illustrate the difference.

9.(a) Design a program where a class 'Mother' has a method show (), and a class 'Father' also has a method show (). A derived class 'Child' inherits from both Mother and 'Father'. Demonstrate how the 'Child' class can resolve ambiguity by explicitly calling methods from both parent classes.

OR

9.b) Create a class student to store the information of N students as reg.No., name, age and CGPA. Define necessary functions to read and display student's information. Create another member function to calculate the average CGPA of all the students. Invoke these functions inside the main function.

10.a) List advantages of recursive functions. Write a C program to find the factorial of the given number using function recursion.

OR

10.b) John is a software engineer working on a data analysis project. He has 2D matrix of integers representing data for different categories over several years. For each row, he needs to replace elements that are less than half of the maximum value in that row with -1. After that he needs to print the matrix. Help John to implement above task using C program.

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