ಭಾರತೀಯ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ ಸಂಸ್ಥೆ ರಾಯಚೂರು
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LAB - 4

Introduction to OOP

Submission Guidelines

- Ensure your system is in 'No Aeroplane Mode'.
- No Taskbar should be open.
- Create a new folder named `LAB-4`.
- Inside `LAB-4`, create two question files named in the following format: `[RollNumber]_[LabName]_[QuestionNumber]` (e.g., `12345_Lab4_Q1.cpp` and `12345_Lab4_Q2.cpp`)

Lab Timing and Submission

- Lab Time: 6:00 PM - 8:00 PM
- Submission Deadline: 8:00 PM - 8:05 PM (Submit on Classroom)
- No Extensions: Late submissions will not be accepted.
- Viva: 8:05 PM - 8:30 PM (Marks will be assigned based on viva performance)

Question 1:- (100 points)

Building a simple calculator

Design a calculator program in C++ using function templates. The program should support operations for **int**, **float**, and **double** data types.

The program should allow the user to:

1. Select the data type (**int**, **float**, and **double**).
2. Input two numbers and an arithmetic operation (either **+**, **-**, *****, or **/**).
3. Display the result of the operation.
4. Ask if the user wants to continue with more calculations or exit the program.
5. To continue, use '**1**' as input and for exit use '**0**'**(**you need to print the statement **"Calculator exited. Goodbye!"** before exiting the code**).**

Requirements:

1. Implement function templates for each arithmetic operation (addition, subtraction, multiplication, division).

2. Ensure the program uses function templates for the arithmetic operations and can work with any numeric data type.
3. The program must handle division by zero by displaying an error message.

Example for Input and Output :

Enter 1 for int, 2 for float, or 3 for double: 2

Enter first float number: 10.5

Enter second float number: 5.5

Enter operation (+, -, *, /): +

Result: 16

Enter 1 to continue, or 0 to exit: 1

Enter 1 for int, 2 for float, or 3 for double: 1

Enter first integer number: 10

Enter second integer number: 5

Enter operation (+, -, *, /): *

Result: 50

Enter 1 to continue, or 0 to exit: 0

"Calculator exited. Goodbye!"

Question 2:- (100 points)

You are managing an **electronics store** that sells different types of products: **Smartphones, Laptops, and Televisions**. Each product has common attributes such as **Product ID, Name, and Price**, but also has unique attributes based on the product category.

Your task is to **write a C++ program using templates** that:

1. Stores product details using a **template class** `Product<T>`.

2. common product details (`productID`, `name`, `price`) and an extra attribute of type `T`

3. Uses **structs** to define unique attributes for each category:

    - **Smartphone →** `ram (GB)`, `battery (mAh)`
    - **Laptop →** `processor (string)`, `storage (GB)`
    - **Television →** `screenSize (inches)`, `displayType (string)`

4. Allows **multiple objects** of different product types to be created.

5. Displays **all product details properly**, including category-specific attributes.

Write a program that creates **multiple objects** for different product categories and prints their details in a structured format.

Example Test Cases

Test Case 1:

Input:

Creating objects for:

- `Smartphone` → **RAM: 8GB, Battery: 5000**

- `Laptop` → **Processor: Intel i7, Storage: 512GB**
- `Television` → **Screen Size: 55 inches, Display: OLED**

Expected Output:

```
Product ID: 101
Name: Samsung
Price: 12000.00
RAM: 8GB, Battery: 5000


Product ID: 102
Name: Dell XPS 15
Price: 150000.00
Processor: Intel i7, Storage: 512GB

Product ID: 103
Name: LG OLED TV
```

Price: 14999.00

Screen Size: 55 inches, Display: OLED