CL-217
Object Oriented Programming

Objectives:

- Function template
- Class template
- Exception Handling

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. Use proper **font family (Calibri or Times New Roman)** and **font size** of the **title (16 points), heading (14 points), subheading (12 points),** and **normal text (10 points)**.
2. First think about the problem statement and then write/draw your logic on paper.
3. **Microsoft Visual Studio** should be used to make c++ programs. Programs made with any other software would not be accepted.
4. For each task in the manual create a new C++ program with the naming convention as follows:
   TASK-NO
5. **Mention what is happening in each line of code using comments**.
6. Write all codes one by one with proper numbering and also paste screen shot of each problem using the **snipping tool** (default screen capture software in windows) on **Microsoft word file.**
7. Please submit your file with this naming convention **ROLLNO_SECTION_GROUPNO_LABNO**.
8. Do not copy from any source otherwise, you will be penalized with zero marks.
9. Submit your lab on **Google Classroom**.

Problem 1: Function Template

Wire a simple C++ program for addition and multiplication using function template.

Write functions Add () and Mul () in your program.

From main() pass the different data types values to functions using function calls:

- Add(int ,int)
- Add(float,float)
- Add(double,double)
- Mul(int,int)

- Mul(float,float)
- Mul(double,double)

Problem 2: Class Template

Find the area of Triangle using class Template.

Define a class Triangle having methods:

- Area()
- Perimeter()

Done the following tasks:

1) Pass the length and width of triangle.
2) Fine the area and perimeter of Triangle containing the following function calls:
    1. Area(int,int)
    2. Area(float,float)
    3. Area(int,float)
    4. Area(float,double)
    5. Area(double,int)
    6. Area(float,double)
    7. Area(double,double)
3) And same for the perimeter.

Hints:

- Triangle A= $\frac{1}{2}$(LxW)
- Perimeter P= (L+W)

Problem 3: Exception Handling

a. Write a simple program using function that throws an exception if divide by zero occur and catch the exception in main.

b. Write a program to throw and catch the following type of exceptions:

    1. Integer i.e. throw 1

    2. Float

3. String i.e. throw “abc”
4. Character

Write one try block and appropriate specific catch block/s.

Problem 4: Exception Handling

Write a program that lets the user perform arithmetic operations on fractions. Fractions are of the form a/b, in which a and b are integers and b! = 0. Your program must be menu driven, allowing the user to select the operation (+, -, *, or /) and input the numerator and denominator of each fraction.

Furthermore, your program must consist of at least the following functions:

a. **Function menu:** This function informs the user about the program’s purpose, explains how to enter data, and allows the user to select the operation.

b. **Function addFractions:** This function takes as input four integers representing the numerators and denominators of two fractions, adds the fractions, and returns the numerator and denominator of the result.

c. **Function subtractFractions**: This function takes as input four integers representing the numerators and denominators of two fractions, subtracts the fractions, and returns the numerator and denominator of the result**Function multiplyFractions:** This function takes as input four integers representing the numerators and denominators of two fractions, multiplies the fractions, and returns the numerators and denominators of the result.

d. **Function divideFractions:** This function takes as input four integers representing the numerators and denominators of two fractions, divides the fractions, and returns the numerator and denominator of the result.

Code the above problem such that your program handles Exceptions such as division by zero and invalid input.