CL-1004
Object Oriented Programming
Lab No 12

Objectives:

- Function template
- Class template

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

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of every **task output in MS word and submit .cpp file with word file**.
7. Make separate .cpp files for all tasks and use this format **22F-1234_Task1.cpp.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google classroom. (Make sure your submission is completed).
11. Please submit your file in this format **22F-1234_L1**.
12. Do not submit your assignment **after deadline**.
13. **Do not copy code from any source otherwise you will be penalized with negative marks.**

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: Function Template

Write a template function that returns the average of all the elements of an array. The arguments to the function should be the array name and the size of the array. In main(), exercise the function with arrays of type int, long, double, and char.

Problem 3: Class Template

Create a function called swaps() that interchanges the values of the two arguments sent to it. (You will probably want to pass these arguments by reference.) Make the function into a template, so it can be used with all numerical data types (char, int, float, and so on). Also include String data type in it. Write a main() program to exercise the function with several types.

Problem 4: Class Template

Find the area of Triangle using class Template and use 3 file structure.

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 5: Function and Class Template

Write a C++ class Calculator. Write the function templates for the following functions of Calculator class and use 3 file structure:

1. Addition of two numbers
2. Subtraction of two numbers
3. Multiplication of two numbers
4. Division of two numbers
5. SquareRoot (use built in function sqrt() or sqrtf())

Write out of line definitions for the above mentioned functions.

These functions can possibly take these types of arguments:

- Integers
- Floats

Write the driver of this class containing the following function calls:

1. Addition (int , int)
2. Addition (int , float)
3. Addition (float , int)
4. Division (int, int)
5. Division (float , int)
6. Division (int , float)
7. SquareRoot(int)
8. SquareRoot(float)