

University of Central Punjab

**Faculty of Information Technology**

**Object Oriented Programming**

**Fall 2025**

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| **Lab 04** | |
| **Topic** | Classes in C++, access specifiers, objects, methods, constructors, destructor. |
| **Objective** | Making students familiarize with the concepts of constructor, overloaded constructor, getter and setter functions and classes. |
| **CLO** | Apply object-oriented programming principles to implement real-world problems. |

**Instructions:**

* Indent your code.
* Comment your code.
* Use meaningful variable names.
* Plan your code carefully on a piece of paper before you implement it.
* Name of the program should be same as the task name. i.e. the first program should be Task\_1.cpp
* **void main() is not allowed. Use int main()**
* **You are not allowed to use any built-in functions**
* **You are required to follow the naming conventions as follow:**
  + **Variables:** firstName; (no underscores allowed)
  + **Function:** getName(); (no underscores allowed)
  + **ClassName:** BankAccount (no underscores allowed)

**Students are required to complete the following tasks in lab timings.**

**Task 1:**

Create a class named as **ComplexNumber** having following private attributes:

* **realPart(double)**
* **imaginaryPart(double)**

Now write the following functions for the above-mentioned class:

1. The program should include setter function(s) to assign user defined values to the above-mentioned variables.

**void setValue()**

1. The program should include getter function(s) to get values for the above-mentioned variables.

**void getValue()**

1. Write a **display** function to print the attributes of the class in the format given below.

**void display()**

1. Write a program to create **two objects** of **Complex Number** with different data. And then display all the complex number objects in the following format.
2. Write a function **sum** which calculates the sum of two complex numbers.
3. Write a function **difference** which calculates the difference of two complex numbers.

**Sample Outputs:**

**1st Complex Number :**

**Enter Real part of Complex Number: 6**

**Enter Imaginary part of Complex Number: 3**

**2nd Complex Number:**

**Enter Real part of Complex Number: 25**

**Enter Imaginary part of Complex Number: -30**

**1st Complex Number: 6 + 3i**

**2nd Complex Number: 25 - 30i**

**Sum of (6 + 3i) + (25 - 30i) = 31 + -27i**

**Difference of (6 + 3i) - (25 - 30i) = -19 + 33i**

**Task 2:**

Design a class **Time** having following private attributes:

* **hour(int)**
* **minute(int)**
* **second(int)**

Now implement the following member functions for the above mentioned class:

1. The program should include **setter** function(s) to assign user defined values to the above-mentioned variables.
2. The program should include **getter** functions to get values for the above-mentioned variables.
3. Write a function **addTime(Time t)** to add two Time objects.
4. Write a function **display()** to display the time in the format **HH:MM:SS**

**Sample Outputs:**

**Time 1: 12:45:30**

**Time 2: 2:30:45**

**Total Time: 15:16:15**

**Task 3:**

Write a **Circle** class that has the following private member variables:

* **radius** (double)
* **pi** (double) initialized with the value 3.14159

The class should have the following public member functions:

1. Write the default constructor which that sets radius to 0.0.
2. Write the parameterized constructor which accepts the radius of the circle as an argument.
3. Define **setRadius** function for the radius variable.
4. Define **getRadius** function for the radius variable.
5. Define function **Area** that returns the area of the circle.
6. Define **getDiameter r**eturns the diameter of the circle.
7. Define a function **getCircumference** which returns the circumference of the circle.
8. Define a **display** function that displays the radius, area, diameter and circumference of the circle object.

Write a program to demonstrate the Circle class by asking the user for the circle’s radius, creating a Circle object, and then displaying the circle’s area, diameter, and circumference.

**Task 4:**

Create a class **Employee** with the following attributes:

* **name (char \*)**
* **employeeID (int)**
* **salary (double)**

Implement the following member functions:

1. Write the default constructor which that sets above attribute to **null, 0** and **0.0**.
2. Write the parameterized constructor which accepts the employeeID as an argument.
3. The program should include **setter** function(s) to assign and update the values of the above-mentioned attributes.
4. The program should include **getter** functions to get values for the above-mentioned attributes.
5. Create **giveRaise** function that takes percentage as parameter, and then calculates the increased salary according to given percentage.
6. Write a **display()** function to display the employee details and the updated salary.

**Sample Outputs:**

**Name: Alice**

**Employee ID: 101**

**Salary: 50000**

**Giving a raise: 10%**

**New Salary: 55000**

**Task 5:**

Now create a menu based program where user should select the function that needs to be tested from the above functions.

**For example:**

* Press 1 for Testing **‘ComplexNumber’** class.
* Press 2 for Testing **‘Time’** class.
* Press 3 for Testing **‘Circle,** class.
* Press 4 for Testing **‘Employee’** class.
* Press 0 for exit.