National University

Of Computer & Emerging Sciences Faisalabad-Chiniot Campus

CL-1004
Object Oriented Programming

Lab No 8

Objectives:

- Class Basics
- Class, object and member functions
- Class private data members
- Constant and static data member
- Constant and statis member function

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: | Dynamic memory allocation, static members, static functions)

Write a program that calculates the area and keeps a count that how many times it has calculated the area.

1. Create a class area which has data members of length, width and area (int type).
2. It also has a static int member count, initialize it with zero.
3. Overload constructor of class and calculate area in it, pass the values of length and width from main.(calculate the area three times).
4. Create a static member function in class which tells that how many times area has been calculated. (This function will return the value of count when called)
5. Write function of display and display the area along with the value of count.
6. Use this pointer.

Problem 2: | (Class, object and member functions, DMA)

1. Define a class matrix with data members 2d array, row , col
2. Write a default constructor to initialize the data members to the following values:
    a. Row =2
    b. Col=3
    c. Allocate memory
    d. Initialize with 1 at each index
3. Write overloaded constructor that will take input row, col and allocate memory accordingly.
4. Write public function to inputData for matrix.
5. Create a dynamic array of matrix of size 4.
6. Assign memory at 0 index with default constructor
7. Assign memory at 1st index with overloaded constructor of same size
8. Write function for addMatrix in class which will add matrix2 with this and return the result matrix. E.g
   Matrix AddMatrix(Matrix matrix2)
9. Save result matrix at 3rd index
10. Call copy constructor which will copy matrix[3] = matrix[2];
11. Free memory by calling destructor.
12. Show proper message for call of constructor, copy constructor and destructor.
13. Use this pointer.

Problem 3: | (Class, object and member functions, DMA)

Create a class TicTacToe that will enable you to write a complete program to play the game of tic-tac-toe. The class contains as private data a 3-by-3 two-dimensional array of integers. The constructor should initialize the empty board to all zeros. Allow two human players. Wherever the first player moves, place a 1 in the specified square. Place a 2 wherever the second player moves. Each move must be to an empty square. After each move, determine whether the game has been won or is a draw. Use this pointer.

Problem 4: | (Classes, objects, Constructor, Destructor and Member functions, constant)

You are a programmer for the Home Software Company. You have been assigned to develop a class that models the basic workings of a bank account. The class should perform the following tasks:

- Save the account balance.
- Save the number of transactions performed on the account.
- Allow deposits to be made to the account.
- Allow withdrawals to be taken from the account.
- Calculate interest for the period.
- Report the current account balance at any time.
- Report the current number of transactions at any time.
- Use this pointer.

Private Member Variables

Variable	Description
balance	A double that holds the current account balance.
interestRate	A double that holds the interest rate for the period.
interest	A double that holds the interest earned for the current period.
transactions	An integer that holds the current number of transactions.
count	A static integer that hold the total number of time the program has taken choice

Public Member Functions

Function	Description
Constructor	Takes arguments to be initially stored in the balance and interestRate members. The default value for the balance is zero and the default value for the interest rate is 4.5%.

setInterestRate Takes a double argument which is stored in the interestRate member.

makeDeposit Takes a double argument, which is the amount of the deposit. This argument is added to balance.

withdraw Takes a double argument which is the amount of the withdrawal. This value is subtracted from the balance, unless the withdrawal amount is greater than the balance. If this happens, the function reports an error.

calcInterest Takes no arguments. This function calculates the amount of interest for the current period, stores this value in the interest member, and then adds it to the balance member.

incCount increment the value of count

getCount return the value of count

getInterestRate Returns the current interest rate (stored in the interestRate member).

getBalance Returns the current balance (stored in the balance member).

getInterest Returns the interest earned for the current period (stored in the interest member).

getTransactions Returns the number of transactions for the current period (stored in the transactions member).

Note: *All **get** methods must be constant. Output must in the same format as given on next page.*

```
 MENU
-----------------------------------------
A) Display the account balance
B) Display the number of transactions
C) Display interest earned for this period
D) Make a deposit
E) Make a withdrawal
F) Add interest for this period
G) Exit the program

Number of times program has teken choice: 0
Enter your choice: d
Enter the amount of the deposit: 6500

 MENU
-----------------------------------------
A) Display the account balance
B) Display the number of transactions
C) Display interest earned for this period
D) Make a deposit
E) Make a withdrawal
F) Add interest for this period
G) Exit the program

Number of times program has teken choice: 1
```

```
Enter your choice: f
Interest added.

 MENU
----------------------------------------
A) Display the account balance
B) Display the number of transactions
C) Display interest earned for this period
D) Make a deposit
E) Make a withdrawal
F) Add interest for this period
G) Exit the program

Number of times program has teken choice: 2
Enter your choice: a
The current balance is $6792.50

 MENU
----------------------------------------
A) Display the account balance
B) Display the number of transactions
C) Display interest earned for this period
D) Make a deposit
E) Make a withdrawal
F) Add interest for this period
G) Exit the program

Number of times program has teken choice: 3
Enter your choice: c
Interest earned for this period: $292.50

 MENU
----------------------------------------
A) Display the account balance
B) Display the number of transactions
C) Display interest earned for this period
D) Make a deposit
E) Make a withdrawal
F) Add interest for this period
G) Exit the program

Number of times program has teken choice: 4
Enter your choice: e
Enter the amount of the withdrawal: 6985
ERROR: Withdrawal amount too large.


 MENU
----------------------------------------
A) Display the account balance
B) Display the number of transactions
C) Display interest earned for this period
D) Make a deposit
E) Make a withdrawal
F) Add interest for this period
G) Exit the program

Number of times program has teken choice: 5
Enter your choice: b
There have been 1 transactions.
```

Proper code indentation will hold extra marks!

Best of luck ☺

You are done with your exercise, submit on classroom at given time.