Data Structures

Lab sheet 2 – **Classes and Objects**

Example 1: Counter Example

Create a class called **Counter** that includes: one pieces of information as private variable—a count (type uint). Your class should have two constructors; first constructor will initialize the variable count to zero. The second constructor should initialize the variable count to special value provide by the constructor's parameters.

Provide a method **incCount** that increment the count variable by 1. Provide a method **Display** that displays the count. Finally, write main program to test your class.

```
#include <iostream>
using namespace std;
#include <conio.h>
////////////////////////////////////////////////////////////
class Counter
  {
  private:
    unsigned int count;              //count
  public:
    Counter()                        //default constructor
     {count = 0;  }
          Counter(int i)             //constructor
    { count = i; }
    void inc_count()                 //increment count
      { count++; }
    int get_count()                  //return count
    { return count; }
 };
////////////////////////////////////////////////////////////
int main()
  {
  Counter c1, c2(4);                 //define and initialize

  cout << "\nc1=" << c1.get_count();  //display
  cout << "\nc2=" << c2.get_count();

  c1.inc_count();                    //increment c1
  c2.inc_count();                    //increment c2
  c2.inc_count();                    //increment c2

  cout << "\nc1=" << c1.get_count();  //display again
  cout << "\nc2=" << c2.get_count();
  cout << endl;
  getche();
  return 0;
```

```
}
```

Example 2:

Create a class called time to implement the time of day in a program. Represent time in computer memory by using separate int member data for hours, minutes, and seconds. We also want to perform the following operations on the time:

1. Set the time.
2. Print the time. It should display the time in **hh:mm:ss** format.
3. Increment the time by one second.
4. Increment the time by one minute.
5. Increment the time by one hour.

Write a program to test this class.

```
#include <iostream>
  using namespace std;
  ////////////////////////////////////////////////////////
  class Time
    {
    private:
      int hrs, mins, sec;
    public:
      void setTime(int, int, int);
       void incrementSeconds();
      void incrementMinutes();
      void incrementHours();
       void display()              //format 11:59:59
       { cout << hrs << ":" << mins << ":" << secs<<endl; }
    };

void Time::setTime(int hours, int minutes, int seconds)
{
hr = (0 <= hours && hours < 24)? hours : 0;
min = (0 <= minutes && minutes < 60) ? minutes : 0;
sec = (0 <= seconds && seconds < 60) ? seconds : 0;
}

void Time :: incrementHours()
{
hr = (hr > 23)? : 0 : hr++;
}

void Time :: incrementMinutes()
{
if (min > 59)
{
```

```
min = 0;
incrementHours(); //increment hours
}
else
min++;
}

void Time :: incrementSeconds()
{
if (sec > 59)
{
sec = 0;
incrementMinutes(); //increment minutes
}
else
sec++;
}
  ////////////////////////////////////////////////////
  void main()
    {
    Time time1;        //create object

    time1.setTime(5, 4, 30);
    time1.display();
   time1.incrementSeconds();
   time1.display();
   time1.incrementMinutes();
   time1.display();
    }
```

3- Write a C++ class called **CRectangle**, that has two private member variables of type int called length and width. Your class must include a constructor method that initializes the variables to zero value. And another constructor method to set special values to variables provide by the constructor's parameters. Your class should include function called **area** for return the area of the rectangle. Finally write main program to test your class.

4-Define a class student with the following specification

Private members of class student

admno	integer
name	string
eng. math, science	float
total	float
ctotal()	a function to calculate eng + math + science with float return type.

Public member function of class student

Takedata() Function to accept values for admno, sname, eng, science and invoke ctotal() to calculate total.

Showdata() Function to display all the data members on the screen.

5- Define a class in C++ with following description:

Private Members

A data member Flight number of type integer

A data member Destination of type string

A data member Distance of type float

A data member Fuel of type float

A member function CALFUEL() to calculate the value of Fuel as per the following criteria

Distance	Fuel
<=1000	500
more than 1000 and <=2000	1100
more than 2000	2200

Public Members

A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel

A function SHOWINFO() to allow user to view the content of all the data members