**Lab 4 - Encapsulation**

1. Create an Encapsulated class Rectangle class with length and width as data members. Create two constructors and a function to calculate Area.

**In the runner create two objects using default constructor and argument constructor. Call the getter function to find the length of both objects. Display which object has larger length.**

1. Create an Encapsulated class Point class with x and y as data members. Create two constructors and a function to move the point.

**In the runner create two points using default constructor and argument constructor. Now set the y coordinate of second point equal to the x coordinate of first point. Call display function to verify the result.**

1. Create an Encapsulated class Student with following characteristics:

Data Members:

* 1. String Name
  2. Int [] Result\_array[5] // Result array contains the marks for 5 subjects

Methods:

1. Student ( ??? ) // argument Constructor
2. verifyArrayLength(?) //private method
3. Average ( ??? ) // it calculates and returns the average based on the marks in the array.

**Runner:**

1. **Create two objects of type Student and call the Average method.**
2. **Create a third student with name as object 1 and result array as object 2**
3. Create an Encapsulated class Account class with balance as data member. Create two constructors and methods to withdraw and deposit balance.

**In the runner create two accounts. The second account should be created with the same balance as first account.**

1. Create an Encapsulated class Marks with three data members to store three marks. Create two constructors , display and set and get methods for all data members. Create a private method CalculateTotalMarks(). Also create a public method calculatePercentage().

**In the runner create two objects. Compare the percentage of both objects. Compare the marks of subject1 for both objects.**

1. Create an encapsulated Student Class with name, Gpa, subjects[5] and email as data members. Create
   1. Default constructor
   2. four- argument constructor
   3. verifyArrayLength(?) //private method
   4. Display()
   5. searchSubject (?)
   6. checkProbStatus (?) //Boolean return
   7. validateEmail(?) //Boolean return

**In the runner create two Student Objects. Compare the GPA of both students and display the student with higher GPA.**

**Check if two students are studying same subjects.**

1. Create an encapsulated class “University” having following characteristics:

**Data Members:**

* String uniName;
* String location;
* String rectorName;
* String departments[20]; // it’s a string array

**Constructors:**

* No argument
* Two argument (UniName and RectorName)
* A Constructor setting values of all parameters.

**Methods:**

* verifyArrayLength(?) //private method
* display
  + This methods displays all the data members of the class
* addADepartment
  + This method should add a new department the Departments [] array.
* checkIfLocatedInCapital
  + This method will return true if university is located in federal capital or provincial capital.
* searchDepartment
  + This method will return true if a certain department is found

**Runner class:**

**Create two University Objects.**

**Compare the number of departments in both universities and print the uniName with more departments.**

**Compare Location of both objects and print if both have same location.**