**Tutorial 4**

**Implement the following programs in C++ language**

1. Define a structure called **Student** that would describe the following information:

Student name

Department

3 subject marks

Percentage

Develop a program to compute percentage of 3 subjects for 5 students.

1. Perform program 1 using 3 functions **getdata()**, **putdata()** and **calculate\_avg()** for scanning, printing and calculating percentage respectively.
2. Write a class named **Vector** to represent a vector (a series of 5 integer values). Include member functions to perform the following tasks:
   * To create the vector
   * To multiply by a scalar value
   * To display the vector in the form <V1, V2, …V5>
3. Create a class **Employee** that would describe the following information:

Employee Name

Employee Department

Employee Age

Develop a program using 2 member functions **get\_record()** and **put\_record()** to scan and print the records of employee respectively. Use arrays of object to create a record of 5 employees and print them onto the screen.

1. Perform program 1 using class. Use 3 member functions **getdata()**, **putdata()** and **calculate\_per()** for scanning, printing and calculating percentage respectively.
2. Add a function **sortdata()** to print the students information according to their percentage in ascending order in program 5.(pending)
3. W.A.P. to demonstrate the use of static data member and static member function.(pending)
4. Create a class named **Weight** which stores the values of weights in kilograms and grams. Write a program that can read values for the class objects and add two objects to produce the addition of weights represented by them.
5. Create a class named **Complex** which stores complex number (Real and Imaginary part). Write a program that can read values for the class objects and add two objects to produce the addition of complex numbers.
6. Declare the class name **Base** with data members and member function named **get()** which reads 2 integer values from user. Declare a friend function **mean(base ob)** inside the class. Define the friend function outside the class which returns the mean value (ob.val1+ob.val2)/2 as a float.
7. Create two classes **Manager** and **Scientist** which stores following information:

Name of Manager / Scientist

Salary of Manager / Scientist

Create a function **income\_tax()** which calculates the income tax to be paid as per the following rule:

For Manager Income Tax = 10% of salary.

For Scientist Income Tax = 5% of salary.

Use friend function for the function income\_tax().(pending)

1. Create two classes **Rectangular** and **Polar** which describes a point in the plane using polar coordinates and rectangular coordinates respectively. Write a program that can read values for the class objects and add one object of Rectangular with another object of Polar. Use a friend function to carry out the addition operation. Display the results in desired units.

**Rectangular to Polar** **Polar to Rectangular**

x = r cosθ θ = atan(y/x)

y = r sinθ r = sqrt (x2 + y2)

(pending)

1. Create two classes **DM** and **DB** which store the values of distances. DM stores distances in meters and centimetres and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. Display the results in desired units.

1 Meter = 3.28 Feet 1 Feet = 0.3048 Meter

1 Centimeter = 0.3937 Inch 1 Inch = 2.54 Centimeters