**We will do all our class declarations and class’s private/public methods/variables declarations in the header file, named ‘hierarchy.h’. Even the implementation of constructors must also be in ‘hierarchy.cpp’. Stick to these conventions, else you will be penalized.**

**Task 1:**

In this task you are required to do the basic declarations for the 3 given classes.

You need to declare some private variables and public methods for all these classes.

Cricketer and PhdStudents classes will be derived from HumanBeing class.

All **HumanBeing** must have the following properties and functions**.**

* Name
* Nationality
* Age
* HumanBeing(string,string,int);
* void setName();
* default constructor

All ***Cricketer*** should have (in addition to all features of human beings)

* Average score
* MaxScore
* WicketsTaken

*Cricketer(string name, string nation, int age, int maxScr, int wickets, float avg);*

* float getAverage();
* void setMaxScore(int);

All **PhdStudents** must have

* AdvisorName
* InstituteName
* number of research publications

*PhdStudents(string name, string nation, int age, str AdvisorName, str InstituteName, int num);*

* string getInstitute();
* void setNumPubls(int);

**Note: In Cricketer and PhdStudent class, you only need to declare the ‘additional’ variables. As these classes are inherited, the ‘human being traits’ would automatically be imported.**

Now that you have declared all the private variables, you now need to make some **public set** and **get** functions, to access and modify their values.

Now implement each and every function declared in ‘hierarchy.cpp’. You already know what all these functions are meant to do. After doing so, compile ‘main.cpp’.

**Task 02:** **[30 marks]**

In geometry, there are different types of shapes, for example square, rectangle, circle and triangle etc.

A shape is a basic class and square, rectangle, circle and triangle are different derived classes.

You have to make a base Shape class.

class shape

{

protected:

string name;

public:

virtual double getArea();

virtual double getPerimeter();

virtual void printShape(); // prints the name of shape with respective data members

virtual void setName();

};

Square, rectangle, circle and triangle classes will be derived from shape class.

Square class will have following structure.

class square

{

double length;

public:

….

};

Circle class will have following structure.

class circle

{

double radius;

public:

….

};

Rectangle class will have following structure.

class rectangle

{

double length;

double width;

public:

….

};

Triangle class will have following structure.

class triangle

{

double length1;

double length2;

double length3;

public:

….};

You have to read 8 records from an input file provided to you. The format of records is

<shape name><data member(s)>

First two records are of type square, next two records are of type circle, next two records are of type rectangle and last two records are for triangle objects.

You have to make objects of respective derived class which will be pointed by base class i-e you have to make an array of pointers of type shape which will be pointing to objects of derived classes. You will be using pointer of base class to call different functions like (getArea,getPerimeter and printShape) in main class.