

## Module-7 Inheritance

Q22. Consider the following class structure as shown in the figure. The class Result derives information from the classes Internal, University and External respectively. The Internal and External classes access information from the Student class. Define all five classes and write a suitable program to create and display the information contained in Result object.

Ans:

```
#include<iostream>
using namespace std;
class Student
{
    protected:
        char Name ;
        int En_No ;
    public :
        int getdata()
        {
            cout<<"Enter name=";
            cin>>Name;
            cout<<"Enter Enrollment number=";
            cin>>En_No;
        }
        int disp()
        {
            cout<<"Name="<<Name<<"
            Enrollment number="<<En_No<<endl;
        }
};
class Internal : public Student
{
    protected:
        int Internal_mark;
        int getdata1()
        {
            getdata();
            cout<<"Enter Internal_Mark=";
            cin>>Internal_mark;
        }
        int disp1()
        {
            disp();
            cout<<"
            Internal mark is ="<<Internal_mark<<endl;
        }
};
class University : public Student
```

```

{
    protected:
        int University_mark;
        int getdata1()
        {
            getdata();
            cout<<"Enter University_Mark=";
            cin>>University_mark;
        }
        int disp1()
        {
            disp();
            cout<<" University mark is ="<<University_mark<<endl;
        }
};

class External : public Student
{
    protected:
        int External_mark;
        int getdata1()
        {
            getdata();
            cout<<"Enter External_Mark=";
            cin>>External_mark;
        }
        int disp1()
        {
            disp();
            cout<<"External mark is ="<<External_mark<<endl;
        }
};

class Result : public Internal,public University,public External
{
    public:
        int getdata2()
        {
            getdata1();
        }
        int disp2()
        {
            disp1();
        }
};

int main()
{
    Result r1;
    r1.getdata2();
    r1.disp2();
}

```

```
    return 0;  
}
```

Q26: Assume that Circle is defined using radius and Cylinder is defined using radius and height. Write a Circle class as base class and inherit the Cylinder class from it. Develop classes such that user can compute the area of Circle objects and volume of Cylinder objects. Area of Circle is  $\pi \times \text{radius} \times \text{radius}$ , while volume of Cylinder is  $\pi \times (\text{radius} \times \text{radius}) \times \text{height}$ .

Ans:

```
#include<iostream>

using namespace std;
class circle
{
    public:
    float rad;
    float area(float rad)
    {
        return 3.14*rad*rad;
    }
};

class cylinder : public circle
{
    public:
    float rad2,height;
    float volume(float rad2, float height)
    {
        return 3.14*(rad2*rad2)*height;
    }
};

int main()
{
    float r,r2,h;
    cylinder obj;
    cout<<"Radius of Circle : ";
    cin>>r;
    cout<<"\nArea of Circle : "<<obj.area(r);
    cout<<"\n=====\n\nRadius of Cylinder : ";
    cin>>r2;
    cout<<"\nHeight of Cylinder : ";
    cin>>h;
    cout<<"\n\nVolume of Cylinder : "<<obj.volume(r2,h);
    return 0;
}
```

Q27. Assume that vehicle class is defined as base class with price and year of manufacturing. Derive two classes namely bus and truck from base class with bus with seating capacity and truck with loading capacity. Develop classes with necessary member functions to get and put data. Demonstrate its use in main ()

Ans:

```
#include<iostream>
using namespace std;
```

```

class vehicle
{
    public:
    double price;
    int year;
    int get_basic()
    {
        cout<<"\nEnter Price of the Vehicle : ";
        cin>>price;
        cout<<"Enter Year of Manufacture : ";
        cin>>year;
    }
};

class bus : public vehicle
{
    int s_cap;
    public:
    int get_bus_cap()
    {
        cout<<"Enter Sitting Capacity : ";
        cin>>s_cap;
    }

    int disp_bus()
    {
        cout<<endl<<"\n.....";
        cout<<"\nVehicle Type    : BUS";
        cout<<"\nPrice          : "<<price;
        cout<<"\nYear of Manufacture : "<<year;
        cout<<"\nSitting Capacity  : "<<s_cap;
    }
};

class truck : public vehicle
{
    int l_cap;
    public:
    int get_truck_cap()
    {
        cout<<"Enter Loading Capacity(Tons) : ";
        cin>>l_cap;
    }

    int disp_truck()
    {
        cout<<endl<<"\n.....";
        cout<<"\nVehicle Type    : TRUCK";
    }
};

```

```

        cout<<"\nPrice          : "<<price;
        cout<<"\nYear of Manufacture : "<<year;
        cout<<"\nLoading Capacity : "<<l_cap<<" Tons";
    }
};

int main()
{
    bus b;
    truck t;
    cout<<"BUS : ";
    b.get_basic();
    b.get_bus_cap();
    cout<<"\nTRUCK : ";
    t.get_basic();
    t.get_truck_cap();
    b.disp_bus();
    t.disp_truck();
return 0;
}

```

Q28. Create a class student that stores roll\_no, name. Create a class test that stores marks obtained in five subjects. Class result derived from student and test contains the total marks and percentage obtained in test. Input and display information of a student

Ans:

```

#include <iostream>
using namespace std;
class Student{
protected:
    char name[20];
    int roll_number, age;
public:
    Student(){}
    void getDetails(){
        cout<<"Input roll number: ";
        cin>>roll_number;
        cout<<"Input name: ";
        cin.get();
        cin.getline(name, 20);
        cout<<"Input age: ";
        cin>>age;
    }
    void putDetails(){
        cout<<"Roll Number: "<<roll_number<<endl;
        cout<<"Name: "<<name<<endl;
        cout<<"Age: "<<age<<endl;
    }
};

```

```

class Test: public Student{
protected:
    int s1, s2, s3, s4, s5;
public:
    Test(): Student(){}
    void getmarks(){
        cout<<"Input marks: \n";
        cout<<"Subject 1: ";
        cin>>s1;
        cout<<"Subject 2: ";
        cin>>s2;
        cout<<"Subject 3: ";
        cin>>s3;
        cout<<"Subject 4: ";
        cin>>s4;
        cout<<"Subject 5: ";
        cin>>s5;
    }
    void putmarks(){
        cout<<"Subject 1: "<<s1<<endl;
        cout<<"Subject 2: "<<s2<<endl;
        cout<<"Subject 3: "<<s3<<endl;
        cout<<"Subject 2: "<<s4<<endl;
        cout<<"Subject 3: "<<s5<<endl;
    }
};

class Sports: public Student{
protected:
    int indoor, outdoor;
public:
    Sports(): Student(){}
    void getscore(){
        cout<<"Input sports scores: \n";
        cout<<"Indoor: ";
        cin>>indoor;
        cout<<"Outdoor: ";
        cin>>outdoor;
    }
    void putscore(){
        cout<<"Indoor: "<<indoor<<endl;
        cout<<"Outdoor: "<<outdoor<<endl;
    }
};

class Result: public Sports, public Test{
    int total;
public:
    Result(): Sports(), Test(){
        Test::getDetails();
    }
};

```

```

        getmarks();
        getscore();
        total = indoor + outdoor + s1 + s2 + s3;
    }
    void display(){
        cout<<endl;
        Test::putDetails();
        cout<<"Test Marks: \n"; Test::putmarks();
        cout<<"Sports Scores: \n"; Sports::putscore();
        cout<<"Total: "<<total<<endl;
        cout<<"Percentage: "<<total / 7 <<" % "<<endl;
    }
};

int main(){
    Result result;
    result.display();
    return 0;
}

```