AIM: Design Applications using Inheritance and Abstract Classes

A) Write a program to implement multilevel inheritance from the following figure. Accept and display data for one student.

SOURCE CODE:

```
using System;

namespace P3MultiLevelInheritance
{
    public class Student
    {
        int rollno;
        string name;
        public void getStudentData()
        {
            Console.WriteLine("Enter Roll No:");
            rollno = Int32.Parse(Console.ReadLine());
            Console.WriteLine("Enter Name:");
            name = Console.ReadLine();
        }
        public void displayStudentData()
        {
            Console.WriteLine("Roll No: "+ rollno);
            Console.WriteLine("Name: "+ name);
        }
    }

    public class Test : Student
    {
        public int marks1, marks2;
        public void getMarks()
        {
            getStudentData();
            Console.WriteLine("Enter Marks 1:");
            marks1 = Int32.Parse(Console.ReadLine());
            Console.WriteLine("Enter Marks 2:");
            marks2 = Int32.Parse(Console.ReadLine());
        }
        public void setMarks()
        {
            displayStudentData();
            Console.WriteLine("Marks1: "+ marks1);
```

```
            Console.WriteLine("Marks2: "+ marks2);
        }
    }

    public class Result : Test
    {
        int calc;
        public void getCalc()
        {
            getMarks();
            calc = (marks1 + marks2)/2;
            setMarks();
            Console.WriteLine("Total: "+ calc);
        }
    }

    class Program
    {
        static void Main(string[] args)
        {
            Result r = new Result();
            r.getCalc();
            Console.ReadLine();
        }
    }
}
```

OUTPUT:

```
C:\Users\NARENDER KESWANI\source\repos\P3MultiLevelInheritance\P3MultiLevelInheritance\bin\...
Enter Roll No:
24
Enter Name:
Narender Keswani
Enter Marks 1:
14
Enter Marks 2:
10
Roll No: 24
Name: Narender Keswani
Marks1: 14
Marks2: 10
Total: 12
```

B) Create a Super Class Student and two subclasses of it, Graduate and UnderGraduate. The members of the Student are name, id, grade, age and address and one method : boolean method IsPassed which takes in the parameter integer grade(0-100) and return true.The two subclasses override the method, for UG its 70% for passing and for G its 80% as passing grade.

SOURCE CODE:

```
using System;

namespace P3Overriding
{
   public class Student
   {
      public int id, grade, age;
      public string name, address;
      public void getData()
      {
         Console.WriteLine("Enter ID:");
         id = Int32.Parse(Console.ReadLine());
         Console.WriteLine("Enter Name:");
         name = Console.ReadLine();
         Console.WriteLine("Enter age:");
         age = Int32.Parse(Console.ReadLine());
         Console.WriteLine("Enter address:");
         address = Console.ReadLine();
         Console.WriteLine("Enter Grade:");
         grade = Int32.Parse(Console.ReadLine());

      }

      public void displayData()
      {
         Console.WriteLine("ID: " + id);
         Console.WriteLine("Name: "+ name);
         Console.WriteLine("Age: "+ age);
         Console.WriteLine("Address: "+ address);
         Console.WriteLine("Grade: " + grade);
      }
      public virtual Boolean IsPassed()
      {
         return true;
      }
   }

   public class Graduate : Student
   {
```

```
        public override bool IsPassed()
        {
            if (grade >= 80 && grade <= 100)
            {
                return true;
            }
            else
            {
                return false;
            }
        }

        }

        public class Undergraduate : Student
        {

        public override bool IsPassed()
        {
            if (grade >= 70 && grade <= 100)
            {
                return true;
            }
            else
            {
                return false;
            }
        }

    }

    class Program
        {
            static void Main(string[] args)
            {
                Graduate g = new Graduate();
                g.getData();
                g.displayData();
                g.IsPassed();

                if (g.IsPassed() == true)
                {
                    Console.WriteLine("Passed in Graduation.");
                }
                else
                {
```

```
            Console.WriteLine("Failed in Graduation.");
        }

        Undergraduate ug = new Undergraduate();
        ug.getData();
        ug.displayData();
        ug.IsPassed();

        if (ug.IsPassed() == true)
        {
            Console.WriteLine("Passed in UnderGraduation.");
        }
        else
        {
            Console.WriteLine("Failed in UnderGraduation.");
        }

        Console.ReadLine();
    }
  }
}
```

OUTPUT:

```
C:\Users\NARENDER KESWANI\source\repos\P3Overriding\P3C
Narender Keswani
Enter age:
21
Enter address:
Ulhasnagar
Enter Grade:
82
ID: 1
Name: Narender Keswani
Age: 21
Address: Ulhasnagar
Grade: 82
Passed in Graduation.
Enter ID:
02
Enter Name:
Neel Deshmukh
Enter age:
66
Enter address:
nallasoapara
Enter Grade:
79
ID: 2
Name: Neel Deshmukh
Age: 66
Address: nallasoapara
Grade: 79
Passed in UnderGraduation.
```

C) Program to calculate To find the area of various shapes: Rectangle, Circle, Ellipse, Square and Triangle using abstract class and abstract method.

SOURCE CODE:

```
using System;

namespace P3Abstract
{
```

```
public abstract class Shape
{
   public double area;
   public abstract void Area();
   public void displayData()
   {
      Console.WriteLine("Area is: " + area);
   }
}

public class Rectangle : Shape
{
   public double len, breadth;

   public void getData()
   {
      Console.WriteLine("Enter length of Rectangle");
      len = Double.Parse(Console.ReadLine());
      Console.WriteLine("Enter breadth of Rectangle");
      breadth = Double.Parse(Console.ReadLine());
   }
   public override void Area()
   {
      getData();
      area = len * breadth;
      displayData();
   }
}

public class Circle : Shape
{
   public double r;
   public void getData()
   {
      Console.WriteLine("Enter radius of Circle");
      r = Double.Parse(Console.ReadLine());
   }
   public override void Area()
   {
      getData();
      area = 3.14 * r * r;
      displayData();
   }
}

public class Ellipse : Shape
{
```

```
    public double a,b;
    public void getData()
    {
        Console.WriteLine("Enter a axis of Ellipse");
        a = Double.Parse(Console.ReadLine());
        Console.WriteLine("Enter b axis of Ellipse");
        b = Double.Parse(Console.ReadLine());
    }
    public override void Area()
    {
        getData();
        area = 3.14 * a * b;
        displayData();
    }
}

public class Square : Shape
{
    public double s;
    public void getData()
    {
        Console.WriteLine("Enter side of Square");
        s = Double.Parse(Console.ReadLine());
    }
    public override void Area()
    {
        getData();
        area = s * s;
        displayData();
    }
}

public class Triangle : Shape
{
    public double h, b;
    public void getData()
    {
        Console.WriteLine("Enter height of Triangle");
        h = Double.Parse(Console.ReadLine());
        Console.WriteLine("Enter breadth of Triangle");
        b = Double.Parse(Console.ReadLine());
    }
    public override void Area()
    {
        getData();
        area = 0.5 * h * b;
        displayData();
```

```
        }
    }

    class Program
    {

        static void Main(string[] args)
        {
            Rectangle r = new Rectangle();
            r.Area();
            Circle c = new Circle();
            c.Area();
            Ellipse e = new Ellipse();
            e.Area();
            Square s = new Square();
            s.Area();
            Triangle t = new Triangle();
            t.Area();
            Console.ReadLine();
        }
    }
}
```

OUTPUT:

```
C:\Users\NARENDER KESWANI\source\repos\P3Abstract\I
Enter length of Rectangle
10
Enter breadth of Rectangle
20
Area is: 200
Enter radius of Circle
5
Area is: 78.5
Enter a axis of Ellipse
5
Enter b axis of Ellipse
6
Area is: 94.2
Enter side of Square
9
Area is: 81
Enter height of Triangle
14
Enter breadth of Triangle
6
Area is: 42
```

CONCLUSION:

From this practical, I have learned about types of inheritance and overriding in C#.