Question 1: Write a program to create a class Rectangle with the following information: length, breadth in integer.

- Add two constructors, (a) default constructor, and (b) constructor to pass on length and breadth of a Rectangle.
- Add a method *printData( )* to print the two information about the rectangle in console.
- Add methods *printArea( )* and *printPerimeter( )* to compute and print the area and perimeter of rectangle in console.
- Create two objects of this class, r1 and r2. Show the output of both the constructors and all method of these two objects.

PROGRAM:-

```
import java.util.*;
class Rectangle_Default {

private double length;
private double breadth;
private double area;
private double perimeter;

Rectangle_Default()
{
System.out.println("The default constructor ");
Scanner kb = new Scanner(System.in);
System.out.print("Enter the length of the rectangle: ");
double inputLen = kb.nextDouble();
length = inputLen;
System.out.print("Enter the breadth of the rectangle: ");
 double inputBreadth = kb.nextDouble();
breadth = inputBreadth;

printData();
 printArea();
 printPerimeter();
}

void printData()
{
System.out.println("The length is: "+length+" and the breadth is: "+ breadth);
}

void printArea()
```

```
{
System.out.println("The area is : "+(area = length *breadth));
}
void printPerimeter()
{
System.out.println("The perimeter of the rectangle is :"+(perimeter = 2*(length +
breadth)));
System.out.println();
}
}
class Rectangle_Parameterized {
private double length;
 private double breadth;
 private double area;
 private double perimeter;
Rectangle_Parameterized( double inputLen , double inputBreadth)
{
this.length = inputLen; this.breadth = inputBreadth;
printData(); printArea(); printPerimeter();
}
void printData()
{
System.out.println("The Length of the rectangle is : "+length+" and the breadth
of the rectangle is : "+breadth);
}
void printArea()
{
System.out.println("The area of the rectangle is : "+(area = length* breadth));
}
void printPerimeter()
{
System.out.println("The perimeter of the rectangle is :" +(perimeter= 2*(length +
breadth)));
}
}
class test{

public static void main(String args[] )
{
Scanner in = new Scanner(System.in); new Rectangle_Default();
System.out.println("the parameterized constructor");
System.out.print("Enter the length of the rectangle: ");
 double inputLen = in.nextDouble();
 System.out.print("Enter the breadth of the rectangle: ");
```

```
 double inputBreadth = in.nextDouble();
new Rectangle_Parameterized( inputLen , inputBreadth );
 }
}
```

OUTPUT:-

```
  The default constructor
  Enter the length of the rectangle: 10
  Enter the breadth of the rectangle: 15
  The length is: 10.0 and the breadth is: 15.0
  The area is : 150.0
  The perimeter of the rectangle is :50.0

  the parameterized constructor
  Enter the length of the rectangle: 12
  Enter the breadth of the rectangle: 15
  The Length of the rectangle is : 12.0 and the breadth of the rectangle is : 15.0
  The area of the rectangle is : 180.0
  The perimeter of the rectangle is :54.0
  PS E:\java with vs>
```

Question 2: Write a program to create a class ***Circles*** with the following information: radius in integer.

- Add two constructors, (a) default constructor, and (b) constructor to pass on radius of a Circle.
- Add a method *printData( )* to print the radius of the Circle in console.
- Add methods *printArea( )* and *printPerimeter( )* to compute and print the area and perimeter of Circle in console.
- Create two objects of this class, c1 and c2. Show the output of both the constructors and all methods of these two objects.

PROGRAM:-

```
import java.util.*;
class Circles_default {

    private double radius;
    private double area;
    private double perimeter;

    Circles_default()
```

```
    {
    System.out.println("The default constructor");
    Scanner kb = new Scanner(System.in);
    System.out.print("Enter the radius of the circle:");
     radius = kb.nextDouble();


     printArea();
      printPerimeter();
    }
    void printArea()
    {
    System.out.println("The area of the circle is : "+(area = 3.14 * (radius) *
(radius) ));
    }

    void printPerimeter()
    {
    System.out.println("The perimeter of the circle is: "+(perimeter = 2
    * 3.14 * radius ));
    }
    }

    class Circles_Parameterized
    {
    private double radius;
    private double area;
    private double perimeter;
Circles_Parameterized(double inputRadius)
{
radius = inputRadius;

 printArea();
 printPerimeter();
}
void printArea()
{
System.out.println("The area of the circle is : "+(area = 3.14*(radius)*(radius)
));
}
void printPerimeter()
{
System.out.println("The perimeter of the circle is: "+(perimeter =2*3.14*radius
));
```

```
  }
}
class codeDriver
{
public static void main(String[] args) {

Scanner in = new Scanner(System.in);
new Circles_default();
System.out.println();
System.out.println("The parameterized constructor ");
System.out.print("Enter the radius of the circle: ");
double inputRadius = in.nextDouble();
new Circles_Parameterized(inputRadius);
}
}
```

OUTPUT: -

```
The default constructor
Enter the radius of the circle:5
The area of the circle is : 78.5
The perimeter of the circle is: 31.400000000000002

The parameterized constructor
Enter the radius of the circle: 10
The area of the circle is : 314.0
The perimeter of the circle is: 62.800000000000004
PS E:\java with vs>
```

Question 3: Design and implement a class named RightangleTriangle that extends a GeometricObject class. The class contains:

- Two double data fields named *baze* and *hite* with default values 3.0 and 5.0 to denote base and height of the right-angle triangle.
- A no-arg constructor that creates a default triangle.
- A constructor that creates a triangle with the specified base and height.
- The accessor methods (getter and setter) for all the data fields.
- A method named getArea() that returns the area of this triangle.
- A method named printData() to print all data field values in console.

The superclass → GeometricObject class should have following data fields: private String

color = "white"; private java.util.Date dateCreated;

- Implement all types of constructors to initialize and set these data fields. Use *super* keyword to set these values in your triangle class.
- Implement another class *mainClass* where you create an object t1 of the RightangleTriangle class and print its area and the value of all its data fields.

PROGRAM:-

```
import java.util.*;

class GeometericObject
{
protected String color = "white";
protected Date dateCreated = new Date();
}
class RightangleTriangle extends GeometericObject {

private double baze = 3.5; private double hite = 5.0;

RightangleTriangle()
{
System.out.println("The default triangle has been created on
"+(super.dateCreated)+" with color "+(super.color));
printData();
getArea();
}

RightangleTriangle(double spc_baze , double spc_hite)
{
System.out.println("The Specifed right angled triangle has been created on
"+(super.dateCreated)+" with color "+(super.color));
getter_and_setter( spc_baze , spc_hite); printData();
getArea();
}

void getter_and_setter( double spc_baze , double spc_hite )
{
baze = spc_baze; hite = spc_hite;
}

void getArea()
{
System.out.println("The area of the right angled triangle is: "+(0.5* baze *
hite));
}
```

```
void printData()
{
System.out.println("The base of the triangle is "+baze+" and the height of the
triangle is "+hite);
}
}
class driver1
{
public static void main(String[] args) {
    Scanner kb = new Scanner(System.in);
    new RightangleTriangle();
    System.out.println();
System.out.println(" the specified triangle ");
System.out.print("Enter the base and height of the right angled triangle: ");
double spc_baze = kb.nextDouble();
double spc_hite = kb.nextDouble();
new RightangleTriangle(spc_baze, spc_hite );}}
```

OUTPUT:-

```
The default triangle has been created on Thu Jan 20 23:21:35 IST 2022 with color white
The base of the triangle is 3.5 and the height of the triangle is 5.0
The area of the right angled triangle is: 8.75

 the specified triangle
Enter the base and height of the right angled triangle: 7
24
The Specifed right angled triangle has been created on Thu Jan 20 23:22:24 IST 2022 with color white
The base of the triangle is 7.0 and the height of the triangle is 24.0
The area of the right angled triangle is: 84.0
PS E:\java with vs>
```

Question 4: Write a program that includes a class named *Person* and its two subclasses named *Student* and *Employee*.

- Make *Faculty* and *Staff* subclasses of *Employee*.
- A person has a name, address, phone number, and email address.
- A student has a class status (freshman, sophomore, junior, or senior). Define the status as a constant.
- An employee has an office, salary, and date hired.
- Use Java API to get the current date as the date hired.
- A faculty member has office hours and a rank.

- A staff member has a title.
- Create a *printData( )* method in each class to print the value of its data fields.
- Override this method in subclasses – *Faculty, Staff and Student* to print output of all data fields (in addition to the parent class data fields).

PROGRAM:-

```
import java.io.*;
import java.util.*;

class Person {

protected String name;
protected String address;
protected int phone_num;
protected String email;

Person()
{
Scanner inp1 = new Scanner(System.in);
System.out.print("Enter the name of the person: ");
name = inp1.nextLine();
System.out.print("Enter the address of the person: ");
 address = inp1.nextLine();
System.out.print("Enter the phone number: ");
phone_num = Integer.parseInt(inp1.nextLine());
System.out.print("Enter the email address of the person: ");
 email = inp1.nextLine();
}

void printData()
{
System.out.println(" Details ");
System.out.println("Name: "+name);
System.out.println("Address: "+address);
System.out.println("Phone number: "+phone_num);
 System.out.println("Email address: "+email);
}
}

class student extends Person{
protected String status;

student()
```

```
{
super();
Scanner inp2 = new Scanner(System.in);
System.out.print("Enter the status of the student: ");
status = inp2.nextLine();
System.out.println();

super.printData();
printData();
}

void printData()
{
System.out.println("Status: "+status);
 System.out.println("End of Details");
System.out.println();
  }

}
class employee extends Person{
    String office;
double salary;
Date hired_date = new Date();

employee()
{
super();
Scanner kb = new Scanner(System.in);
System.out.print("Enter the office : ");
office = kb.nextLine();
System.out.print("Enter the salary : ");
salary = kb.nextDouble();
}

void printData()
{
super.printData();
System.out.println("Office: "+office);
System.out.println("Salary: "+salary);
System.out.println("Hired: "+hired_date);
}
}

class faculty extends employee{
```

```
    int hours;
String rank;

faculty()
{
super();
Scanner inp3 = new Scanner(System.in);
System.out.print("Enter the working hours of the faculty: ");
hours = Integer.parseInt(inp3.nextLine());
System.out.print("Enter the rank of the faculty: ");
rank = inp3.nextLine();
System.out.println();
super.printData();
printData();
}

void printData()
{
System.out.println("Working hours: "+hours);
System.out.println("Rank: "+rank);
System.out.println(" End of Details");
System.out.println();
}


}

class staff extends employee{
String title;
staff()
{
super();
Scanner inp4 = new Scanner(System.in);
System.out.print("Enter the title of the staff member: ");
title = inp4.nextLine();
System.out.println();
super.printData();
printData();
}

void printData()
{
System.out.println("Title: "+title);
System.out.println(" End of Details");
```

```
System.out.println();
}
}

class start{
public static void main(String[] args) {
new faculty();
new staff();
new student();
}
}
```

OUTPUT:-

```
Enter the name of the person: sahu kumar
Enter the address of the person: bihar
Enter the phone number: 8457952
Enter the email address of the person: sahu@kumar
Enter the office : DSw
Enter the salary : 60000
Enter the working hours of the faculty: 5
Enter the rank of the faculty: Dean

 Details
Name: sahu kumar
Address: bihar
Phone number: 8457952
Email address: sahu@kumar
Office: DSw
Salary: 60000.0
Hired: Fri Jan 21 12:18:40 IST 2022
Working hours: 5
Rank: Dean
 End of Details
```

```
Enter the name of the person: joshi singh
Enter the address of the person: dehradun
Enter the phone number: 9547856
Enter the email address of the person: joshi@singh
Enter the office : Director
Enter the salary : 50000
Enter the title of the staff member: Higher

 Details
Name: joshi singh
Address: dehradun
Phone number: 9547856
Email address: joshi@singh
Office: Director
Salary: 50000.0
Hired: Fri Jan 21 12:19:58 IST 2022
Title: Higher
 End of Details
```

```
 Enter the name of the person: umang raj
 Enter the address of the person: kolkata
 Enter the phone number: 8541254
 Enter the email address of the person: umang@raj
 Enter the status of the student: sophomore

  Details
 Name: umang raj
 Address: kolkata
 Phone number: 8541254
 Email address: umang@raj
 Status: sophomore
 End of Details
```

******THANK YOU******