Object Oriented Programming (23CSE111)

Assignment

Submitted by	
Name	
Roll No	
Year/Sem/Section	
Date of Submission	
Submitted to	
Name	Dr. B Raj Kumar
Department	CSE
Designation	Asst. Professor

Marks	

S.NO	Q.No	PAGE No.
1.	1	
2.	2	
3.	3	

1. Write a java program with class named “book”. The class should contain various attributes such as “title, author, yearofpublication”. It should also contain a “constructor” with parameters which initializes “title”, ”author”, and “yearofpublication”.Create a method which displays the details of the book i.e. “author, title, yearofpublication”.(Display the details of two books i.e. create 2 objects and display their details).

   CODE:

```
class book{
String titleofthebook;
String Author;
int yearofpublication;

//creating constructor//

book(String titleofthebook,String Author,int yearofpublication){
this.titleofthebook=titleofthebook;
this.Author=Author;
this.yearofpublication=yearofpublication;
}

//creating a methods//
public void titleofbook(){

System.out.println("The Title of book is :"+titleofthebook);

}
public void Author(){
System.out.println("The Author of book is :"+Author);
}

public void yearofpublication(){
System.out.println("The book is published in the year :"+yearofpublication);
}
```

```
//creating objects//
public static void main(String[] args){
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+" ;"+"Section:CSE-A");

book b1=new book( "A Lack of Order in the Floating Object Room","George Saunders",1986);
book b2=new book("Cattle Haul","Jesmyn Ward",2008);

b1.titleofbook();
b1.Author();
b2.titleofbook();
b2.yearofpublication();

}
}
```

```
C:\Users\smoha\Java Prgms>javac  book.java
book.java:20: error: <identifier> expected
System.out.println("The Title of book is :"+titleofthebook);
                   ^
book.java:20: error: illegal start of type
System.out.println("The Title of book is :"+titleofthebook);
                    ^
2 errors
```

ERROR:

S.no	ERROR MESSAGE	ERROR RECTIFICTION
1	**<identifier> expected**	**Missing closing brace for titleofbook() method.**

```
C:\Users\smoha\Java Prgms>javac  book.java

C:\Users\smoha\Java Prgms>java  book
Name:S Mohana Maheswari Rollno:AV.SC.U4CSE24314 Section:CSE-A
The Title of book is :A Lack of Order in the Floating Object Room
The Author of book is :George Saunders
The Title of book is :Cattle Haul
The book is published in the year :2008
```

2. Write a java program with class named “MyClass”, with a static variable “count” of “int” type, initialized to “0” and a constant variable “PI” of type “double” initialized to 3.14159 as attributes of that class. Now define a constructor for “MyClass” that increments the “count” variable each time an object of “MyClass” is created.Finally print the final values of “count” and “PI” variables.

   CODE:

```
class myclass{

//creating the variables


static int count=0;

final double pi=3.1415;

//creating a constructor

myclass(){

count++;

}

//method to print the values

public void values(){

System.out.println(+count);

System.out.println(+pi);

}

//object and the main function

public static void main(String[] args){

System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+"
;"+"Section:CSE-A");

myclass one=new myclass();

one.values();
```

```
myclass two=new myclass();
two.values();
myclass three=new myclass();
three.values();
myclass four=new myclass();
four.values();
}
}
```

Output:

```
C:\Users\smoha\Java Prgms>javac  myclass.java
myclass.java:23: error: ';' expected
myclass four=new myclass()
                          ^
1 error
```

Error:

Error:

S.no	ERROR MESSAGE	ERROR RECTIFICTION
1	Error: ‘;’ expected	Spectify the semicolon at the end.

Output:

```
C:\Users\smoha\Java Prgms>javac  myclass.java

C:\Users\smoha\Java Prgms>java  myclass
1
3.1415
2
3.1415
3
3.1415
4
3.1415
```

4.Write a Java program that takes a number from the user and generates an integer between 1 and 7. It displays the weekday name (Use Conditional Statements).

Ex: Sample Input

Input number: 3

Expected Output :

Wednesday

Code:

```
import java.util.Scanner;


 public class WeekdayName {
    public static void main(String[] args) {
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+" ;"+"Section:CSE-A");
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number (1-7): ");
        int number = scanner.nextInt();
        String weekday;

        if (number == 1) {
            weekday = "Monday";
        } else if (number == 2) {
            weekday = "Tuesday";
        } else if (number == 3) {
            weekday = "Wednesday";
        } else if (number == 4) {
            weekday = "Thursday";
        } else if (number == 5) {
            weekday = "Friday";
        } else if (number == 6) {
```

```
            weekday = "Saturday";
        } else if (number == 7) {
            weekday = "Sunday";
        } else {
            weekday = "Invalid input! Please enter a number between 1 and 7.";
        }
        System.out.println("The corresponding weekday is: " + weekday);
        scanner.close();
    }
}
```

Output:

```
C:\Users\smoha\Java Prgms>javac   WeekdayName.java
WeekdayName.java:37: error: ';' expected
         scanner.close()
                        ^
1 error
```

Error:

S.no	ERROR MESSAGE	ERROR RECTIFICTION
1	Error: ‘;’ expected	Spectify the semicolon at the end.

Output:

```
C:\Users\smoha\Java Prgms>javac WeekdayName.java

C:\Users\smoha\Java Prgms>java  WeekdayName
Name:S Mohana Maheswari; Rollno:AV.SC.U4CSE24314 ;Section:CSE-A
Enter a number (1-7): 5
The corresponding weekday is: Friday
```

5.Write a Java program to display the multiplication table of a given integer.

Ex: Sample Input

Input the number (Table to be calculated) : Input number of terms : 5

Expected Output :

```
5 X 0 = 0
5 X 1 = 5
```

```
5 X 2 = 10
5 X 3 = 15
5 X 4 = 20
5 X 5 = 25
```

CODE:

```
import java.util.Scanner;


public class MultiplicationTable {
   public static void main(String[] args) {
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+"
;"+"Section:CSE-A");

      Scanner scanner = new Scanner(System.in);


         System.out.print("Enter the number (table to be calculated): ");
      int number = scanner.nextInt();


         System.out.print("Enter the number of terms: ");
      int terms = scanner.nextInt();



      for (int i = 0; i <= terms; i++) {
         System.out.println(number + " x " + i + " = " + (number * i));
      }
      scanner.close();
   }
}
```

Output:

```
C:\Users\smoha\Java Prgms>javac  MultiplicationTable.java
MultiplicationTable.java:6: error: cannot find symbol
        scanner scanner = new Scanner(System.in);
        ^
  symbol:   class scanner
  location: class MultiplicationTable
1 error
```

Error:

S.no	ERROR MESSAGE	ERROR RECTIFICTION
1	Error: ‘;’ expected	In Scanner capital “S” should be taken.

Output:

```
C:\Users\smoha\Java Prgms>javac  MultiplicationTable.java

C:\Users\smoha\Java Prgms>java  MultiplicationTable
Enter the number (table to be calculated): 3
Enter the number of terms: 6
3 x 0 = 0
3 x 1 = 3
3 x 2 = 6
3 x 3 = 9
3 x 4 = 12
3 x 5 = 15
3 x 6 = 18
```

6.Write a Java program that reads two floating-point numbers and tests whether they are the same up to three decimal places (Use Conditional Statements).

Ex: Sample Input

Input floating-point number: 25.586

Input floating-point another number: 25.589

Expected Output :

They are different

CODE:

```
import java.util.Scanner;
```

```
public class floatingnumbers {
   public static void main(String[] args) {
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+"
;"+"Section:CSE-A");
            Scanner scanner = new Scanner(System.in);


           System.out.print("Enter the first floating-point number: ");
       double num1 = scanner.nextDouble();


       System.out.print("Enter the second floating-point number: ");
       double num2 = scanner.nextDouble();


           num1 = Math.round(num1 * 1000.0) / 1000.0;
       num2 = Math.round(num2 * 1000.0) / 1000.0;


            if (num1 == num2) {
          System.out.println("The numbers are the same up to three decimal places.");
       } else {
          System.out.println("The numbers are different.");
       }
       scanner.close();
   }
}
```

```
C:\Users\smoha\Java Prgms>javac  floatingnumbers.java
floatingnumbers.java:11: error: incompatible types: possible lossy conversion from double to float
        float num2 = scanner.nextDouble();
                                       ^
floatingnumbers.java:14: error: incompatible types: possible lossy conversion from double to float
        num2 = Math.round(num2 * 1000.0) / 1000.0;
                                         ^
2 errors
```

Error:

S.no	ERROR MESSAGE	ERROR RECTIFICTION

1	Error: incompatable types	Fix: Either change num2 to double or cast the result to float.

Output:

```
C:\Users\smoha\Java Prgms>javac  floatingnumbers.java

C:\Users\smoha\Java Prgms>java  floatingnumbers
Enter the first floating-point number: 23.456
Enter the second floating-point number: 23.457
The numbers are different.
```

7.Write a program that accepts three numbers from the user and prints "increasing" if the numbers are in increasing order, "decreasing" if the numbers are in decreasing order, and "Neither increasing or decreasing order" otherwise (Use Conditional Statements).

Ex: *Sample Output*

Input first number: 1524

Input second number: 2345

Input third number: 3321

Expected Output :

Increasing order

CODE:

```
import java.util.Scanner;


public class OrderCheck {

   public static void main(String[] args) {

System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+"
;"+"Section:CSE-A");


      Scanner scanner = new Scanner(System.in);


          System.out.print("Enter the first number: ");

      int num1 = scanner.nextInt();


      System.out.print("Enter the second number: ");

      int num2 = scanner.nextInt();
```

```
        System.out.print("Enter the third number: ");
        int num3 = scanner.nextInt();


             if (num1 < num2 && num2 < num3) {
           System.out.println("Increasing order");
        } else if (num1 > num2 && num2 > num3) {
           System.out.println("Decreasing order");
        } else {
           System.out.println("Neither increasing nor decreasing order");
        }



        scanner.close();
    }
}
```

Output:

```
C:\Users\smoha\Java Prgms>javac  OrderCheck.java
OrderCheck.java:28: error: reached end of file while parsing
}
 ^
1 error
```

Error:

S.no	ERROR MESSAGE	ERROR RECTIFICTION
1	Error: reached end of file while parsing	Fix: close the curly braces.

Output:

```
C:\Users\smoha\Java Prgms>javac  OrderCheck.java

C:\Users\smoha\Java Prgms>java  OrderCheck
Enter the first number: 234
Enter the second number: 237
Enter the third number: 566
Increasing order
```

8.Write a Java program that reads a positive integer and count the number of digits thenumber (less than ten billion) has (Use Conditional Statements).

Ex: *Sample Output*

Input an integer number less than ten billion: 125463

Expected Output :

Number of digits in the number: 6

CODE:

```
import java.util.Scanner;


public class DigitCounter {
   public static void main(String[] args) {
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+" ;"+"Section:CSE-A");
      Scanner scanner = new Scanner(System.in);
      System.out.print("Input an integer number less than ten billion: ");
          long number = scanner.nextLong();
          if (number < 0) {
         number = Math.abs(number);
      }


          if (number >= 10000000000L) {
         System.out.println("Number is too large!");
      } else {
         int digits = 0;
```

```
            if (number < 10) {
                digits = 1;
            } else if (number < 100) {
                digits = 2;
            } else if (number < 1000) {
                digits = 3;
            } else if (number < 10000) {
                digits = 4;
            } else if (number < 100000) {
                digits = 5;
            } else if (number < 1000000) {
                digits = 6;
            } else if (number < 10000000) {
                digits = 7;
            } else if (number < 100000000) {
                digits = 8;
            } else if (number < 1000000000) {
                digits = 9;
            } else {
                digits = 10;
            }

            System.out.println("Number of digits in the number: " + digits);
        }

        scanner.close();
    }
}
```

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac  DigitCounter.java

C:\Users\smoha\Java Prgms>java  DigitCounter
Name:S Mohana Maheswari; Rollno:AV.SC.U4CSE24314 ;Section:CSE-A
Input an integer number less than ten billion: 56432
Number of digits in the number: 5
```

9. Write a Java program to display Pascal's triangle.

Ex: *Sample Output*

Input number of rows: 5

Expected Output :

```
Input number of rows: 5
            1
          1 1
         1 2 1
        1 3 3 1
      1 4 6 4 1
```

CODE:

```
import java.util.Scanner;


public class PascalsTriangle {
   public static void main(String[] args) {
     System.out.println("Name: S Mohana Maheswari; Rollno: AV.SC.U4CSE24314; Section: CSE-A");
       Scanner scanner = new Scanner(System.in);
       System.out.print("Input number of rows: ");
       int rows = scanner.nextInt();

       for (int i = 0; i < rows; i++) {

          for (int space = 0; space < rows - i - 1; space++) {
             System.out.print(" ");
          }
```

```
            int number = 1;
            for (int j = 0; j <= i; j++) {
                System.out.print(number + " ");
                number = number * (i - j) / (j + 1);
            }

            System.out.println();
        }

        scanner.close();
    }
}
```

```
C:\Users\smoha\Java Prgms>javac  PascalsTriangle.java
PascalsTriangle.java:26: error: reached end of file while parsing
    }
     ^
1 error
```

Error:

S.no	ERROR MESSAGE	ERROR RECTIFICTION
1	Error: reached end of file while parsing	Fix: close the curly braces.

Output:

```
C:\Users\smoha\Java Prgms>javac  PascalsTriangle.java

C:\Users\smoha\Java Prgms>java  PascalsTriangle
Name: S Mohana Maheswari; Rollno: AV.SC.U4CSE24314; Section: CSE-A
Input number of rows: 5
    1
   1 1
  1 2 1
 1 3 3 1
1 4 6 4 1
```

10. Write a Java program to display the following character rhombus structure.

Ex: *Sample Output*
Input the number: 7
Expected Output :

```
      A
     ABA
    ABCBA
   ABCDCBA
  ABCDEDCBA
 ABCDEFEDCBA
ABCDEFGFEDCBA
 ABCDEFEDCBA
  ABCDEDCBA
   ABCDCBA
    ABCBA
     ABA
      A
```

CODE:

```
import java.util.Scanner;


public class CharacterRhombus {
   public static void main(String[] args) {
     System.out.println("Name: S Mohana Maheswari; Rollno: AV.SC.U4CSE24314; Section: CSE-A");
       Scanner scanner = new Scanner(System.in);
       System.out.print("Input the number: ");
       int n = scanner.nextInt();



       for (int i = 1; i <= n; i++) {


          for (int space = 1; space <= n - i; space++) {
             System.out.print(" ");
          }
```

```
                for (char ch = 'A'; ch < 'A' + i; ch++) {
            System.out.print(ch);
        }

                for (char ch = (char) ('A' + i - 2); ch >= 'A'; ch--) {
            System.out.print(ch);
        }

        System.out.println();
    }


    for (int i = n - 1; i >= 1; i--) {
                for (int space = 1; space <= n - i; space++) {
            System.out.print(" ");
        }

        for (char ch = 'A'; ch < 'A' + i; ch++) {
            System.out.print(ch);
        }

                for (char ch = (char) ('A' + i - 2); ch >= 'A'; ch--) {
            System.out.print(ch)
        }

        System.out.println();
    }

    scanner.close();
}
```

}

```
C:\Users\smoha\Java Prgms>

C:\Users\smoha\Java Prgms>javac  CharacterRhombus.java
CharacterRhombus.java:39: error: ';' expected
                System.out.print(ch)
                                    ^
1 error
```

Code Error	Code rectification
1. error: ';' expected	1. we mus end line with semicolon. .

```
C:\Users\smoha\Java Prgms>javac  CharacterRhombus.java

C:\Users\smoha\Java Prgms>java  CharacterRhombus
Name: S Mohana Maheswari; Rollno: AV.SC.U4CSE24314; Section: CSE-A
Input the number: 7
      A
     ABA
    ABCBA
   ABCDCBA
  ABCDEDCBA
 ABCDEFEDCBA
ABCDEFGFEDCBA
 ABCDEFEDCBA
  ABCDEDCBA
   ABCDCBA
    ABCBA
     ABA
      A
```

12.Write a Java program to create a class called Employee with methods called work () and getSalary(). Create a subclass called HRManager that overrides the work () method and adds a new method called addEmployee().

CODE:

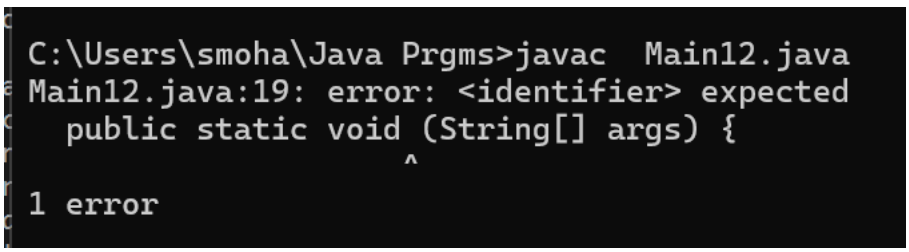
```
class Employee{
  public void work(){

     System.out.println("employee is working");
}
 public void getsalary(){
   System.out.println("employee gets his salary");
}}
class  HRManager extends Employee{

 public void work() {
        System.out.println("HR Manager is managing HR tasks");
    }

public void addEmployee(){
System.out.println("new employe is added ");
}}
class Main12{
  public static void main(String[] args) {
   HRManager  obj1=new  HRManager();
obj1.work();
obj1.addEmployee();
obj1.getsalary();
}}
```

OUTPUT:



Code Error	Code rectification
1. error: <identifier> expected	1. here main function missed ;so we need to call the main function. .

```
C:\Users\smoha\Java Prgms>javac  Main12.java

C:\Users\smoha\Java Prgms>java Main12
HR Manager is managing HR tasks
new employe is added
employee gets his salary
```

13.Create a calculator using the operations including addition, subtraction, multiplication and division using multi-level inheritance and display the desired output.

CODE:

```
class Addition {
    void add(int a, int b) {
        System.out.println("Addition of a and b: " + (a + b));
    }
}

class Subtraction extends Addition {
    void subtract(int a, int b) {
        System.out.println("Subtraction of a and b: " + (a - b));
    }
}

class Multiplication extends Subtraction {
```

```
    void multiply(int a, int b) {
        System.out.println("Multiplication of a and b: " + (a * b));
    }
}

class Division extends Multiplication {
    void divide(int a, int b) {
        if (b != 0) {
            System.out.println("Division of a and b: " + (a / b));
        } else {
            System.out.println("Division not allowed (division by zero).");
        }
    }
}

public class Calc_13 {
    public static void main(String[] args) {
        System.out.println("Name: S Mohana Maheswari; Roll No: AV.SC.U4CSE24314; Section: CSE-A");

        Division d = new Division();
        d.add(4, 5);
        d.subtract(6, 5);
        d.multiply(6, 7);
        d.divide(20, 5);
    }
}
```

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac  Calc_13.java
Calc_13.java:35: error: cannot find symbol
        d.Subtract(6, 5);
         ^
  symbol:   method Subtract(int,int)
  location: variable d of type Division
1 error
```

Code Error	Code rectification
1. cannot find symbol	1.write the correct spelling of subtract

```
C:\Users\smoha\Java Prgms>javac  Calc_13.java

C:\Users\smoha\Java Prgms>java  Calc_13
Name: S Mohana Maheswari; Roll No: AV.SC.U4CSE24314; Section: CSE-A
Addition of a and b: 9
Subtraction of a and b: 1
Multiplication of a and b: 42
Division of a and b: 4
```

14.Consider a software system for a company that manages its employees. The company categorizes its employees into two primary types: RegularEmployee and Manager. Both types of employees share common attributes such as name and employee ID, but managers have attributes such as a bonus. You are tasked with designing the Java classes for this scenario and add up the salary for each type.

CODE:

```
class Employee {
    protected String name;
    protected int employeeID;

    public Employee(String name, int employeeID) {
        this.name = name;
        this.employeeID = employeeID;
```

```
    }

    public double getSalary() {
        return 0.0;
    }

    public String getInfo() {
        return "ID: " + employeeID + ", Name: " + name;
    }
}
class RegularEmployee extends Employee {
    private double salary;

    public RegularEmployee(String name, int employeeID, double salary) {
        super(name, employeeID);
        this.salary = salary;
    }

    @Override
    public double getSalary() {
        return salary;
    }
}


class Manager extends Employee {
    private double salary;
    private double bonus;

    public Manager(String name, int employeeID, double salary, double bonus) {
```

```
        super(name, employeeID);
        this.salary = salary;
        this.bonus = bonus;
    }

    @Override
    public double getSalary() {
        return salary + bonus;
    }
}



public class EmployeeSystem {
    public static void main(String[] args) {
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+"
;"+"Section:CSE-A");
         RegularEmployee emp1 = new RegularEmployee("Alice", 101, 50000);
        RegularEmployee emp2 = new RegularEmployee("Bob", 102, 52000);
        Manager mgr1 = new Manager("Carol", 201, 80000, 10000);
        double totalRegularSalaries = emp1.getSalary() + emp2.getSalary();
        double totalManagerSalaries = mgr1.getSalary();
        System.out.println("Total Regular Employees' Salary:" + totalRegularSalaries);
        System.out.println("Total Managers' Salary: " + totalManagerSalaries);
    }
}
```

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac  EmployeeSystem.java

C:\Users\smoha\Java Prgms>java  EmployeeSystem
Name:S Mohana Maheswari; Rollno:AV.SC.U4CSE24314 ;Section:CSE-A
Total Regular Employees' Salary:102000.0
Total Managers' Salary: 90000.0
```

15.A superclass named “Shapes” has a method called “area()”. Subclasses of “Shapes” can be “Triangle”, “circle”, “Rectangle”, etc. Each subclass has its own way of calculating area. Using base class as Shapes with subclasses triangle, circle and rectangle, use overriding polymorphism and find the area for each shape

CODE:

```
class shapes{
  public void area(){
       System.out.println("Area of shapes");
}}
class triangle extends shapes{
int base;
int height;
triangle(int base,int height){
this.base=base;
this.height=height;
}
 public void area(){
   double areaoftriangle=0.5*base*height;
      System.out.println("Area of triangle :"+areaoftriangle);
}}


class rectangle extends shapes{
  int length;
int breadth;
rectangle(int length,int breadth){
this.length=length;
this.breadth=breadth;
}
 public void area(){
```

```
   int areaofrectangle=length*breadth;
      System.out.println("Area of rectangle :"+areaofrectangle);
}}
class circle extends shapes{
int radius;
circle(int radius){
this.radius=radius;
}
 public void area(){
   double areaofcircle=3.14*radius*radius;
      System.out.println("Area of circle :"+areaofcircle);
}}

class mainshapes{
public static void main(String[] args) {
shapes t1=new triangle(4,2);
t1.area();

shapes r1=new rectangle(3,2);
r1.area();

shapes c1=new circle(2);
c1.area();
}}
```

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac   mainshapes.java
mainshapes.java:25: error: cannot find symbol
   int areaofrectangle=lenght*breadth;
                       ^
  symbol:   variable lenght
  location: class rectangle
mainshapes.java:34: error: incompatible types: possible lossy conversion from double to int
   int areaofcircle=3.14*radius*radius;
                              ^
2 errors
```

ERROR:

Code Error	Code rectification
1. cannot find symbol 2. incompatible types: possible lossy conversion from double to int	1.write the correct spelling of length 2.correct int into double because use of double value (3.14)

```
C:\Users\smoha\Java Prgms>javac   mainshapes.java

C:\Users\smoha\Java Prgms>java  mainshapes
Area of triangle :4.0
Area of rectangle :6
Area of circle :12.56
```

16.creating one superclass Animal and three subclasses, Herbivores, Carnivores, and Omnivores. Subclasses extend the superclass and override its eat() method. Returning the method for the required type of animals.

CODE:

```
class animal{
   public void eat(){
    System.out.println(" Animal is eating");
}}

class  Herbivores extends animal{
  public void eat(){

   System.out.println("Herbivores eat plants.");
}}


class Carnivores   extends  animal{
   public void eat(){
      System.out.println("Carnivores eat meat.");
}}
```

```
class Omnivores  extends  animal{

public void eat(){
     System.out.println("Omnivores eat both plants and meat.");
}}

class mainanimal{
public static void main(String[] args) {
  animal o1=new Omnivores ();
  animal o2=new Carnivores ();
  animal o3=new Herbivores();
  o1.eat();
  o2.eat();
  o3.eat();
}}
```

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac  mainanimal.java
mainanimal.java:13: error: '{' expected
class Carnivores   extends  animal(){
                                   ^
mainanimal.java:19: error: '{' expected
class Omnivores  extends  animal(){
                                  ^
2 errors
```

Code Error	**Code rectification**
1. error: '{' expected	1.You use () only when calling a constructor, like new animal(). ⍰ But when you're extending a class, you only write the class name — no parentheses.

```
C:\Users\smoha\Java Prgms>javac  mainanimal.java

C:\Users\smoha\Java Prgms>java  mainanimal
Name:S Mohana Maheswari; Rollno:AV.SC.U4CSE24314 ;Section:CSE-A
Omnivores eat both plants and meat.
Carnivores eat meat.
Herbivores eat plants.
```

17.Write a Java program to create an abstract class Animal with an abstract method called sound(). Create subclasses Lion and Tiger that extend the Animal class and implement the sound() method to make a specific sound for each animal.

CODE:

```
abstract class animal{
  abstract void sound();
}


class  Lion  extends animal{
   public void sound(){
      System.out.println("Lion makes roar sound");
}}
 class Tiger extends animal{
   public void sound(){
    System.out.println("Tiger makes moaning sound");
}}


class mainanimal_17{
 public static void main(String[] args) {
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+"
;"+"Section:CSE-A");
  Tiger obj1=new Tiger();
  Lion obj2=new Lion();



  obj1.sound();
obj2.sound();
```

}}

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac  mainanimal_17.java
mainanimal_17.java:2: error: ';' expected
  abstract void sound()
                      ^
1 error
```

Code Error	Code rectification
1. error: ';' expected	1. we mus end line with semicolon. .

```
C:\Users\smoha\Java Prgms>javac  mainanimal_17.java

C:\Users\smoha\Java Prgms>java   mainanimal_17.java
Name:S Mohana Maheswari; Rollno:AV.SC.U4CSE24314 ;Section:CSE-A
Tiger makes moaning sound
Lion makes roar sound
```

18..Write a Java program to create an abstract class Shape3D with abstract methods calculateVolume() and calculateSurfaceArea(). Create subclasses Sphere and Cube that extend the Shape3D class and implement the respective methods to calculate the volume and surface area of each shape.

CODE:

```
abstract class shape3D{
   abstract void calculateVolume();
   abstract void calculateSurfaceArea();
}


class  sphere extends shape3D{

      double radius;
```

```
        sphere(int radius){
            this.radius=radius;
}
 public void calculateVolume(){
    double volumeofsphere=(4.0/3.0)*3.14*radius*radius*radius;
       System.out.println("volume of sphere:"+volumeofsphere);
}
 public void  calculateSurfaceArea(){
   double surfaceareaofsphere=4*3.14*radius*radius;
       System.out.println("surface area of sphere:"+surfaceareaofsphere);

}}

class  Cube extends shape3D{
    int side;
       Cube(int side){
         this.side=side;
}
  public void calculateVolume(){
          int volumeofCube=side*side*side;
              System.out.println("volume of cube:"+volumeofCube);
}
 public void  calculateSurfaceArea(){
   int surfaceareaofcube=6*side*side;
       System.out.println("surface area of cube:"+surfaceareaofcube);

}}

class mainShape3D{
  public static void main(String[] args) {
```

```
System.out.println("Name:S Mohana Maheswari"+"; "+"Rollno:AV.SC.U4CSE24314"+"
;"+"Section:CSE-A");
  Cube obj1=new Cube(2);
  sphere obj2=new sphere(4);
obj1.calculateSurfaceArea();
obj2.calculateSurfaceArea();
obj1.calculateVolume();
obj2.calculateVolume();
}}
```

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac   mainShape3D.java
mainShape3D.java:41: error: cannot find symbol
  Cube obj1=new cube(2);
               ^
  symbol:   class cube
  location: class mainShape3D
1 error
```

ERROR:

Code Error	**Code rectification**
1. cannot find symbol	1. our class name is Cube (with capital C) SO we shouls use capital “C” instead of small “c”. .

```
C:\Users\smoha\Java Prgms>javac   mainShape3D.java

C:\Users\smoha\Java Prgms>java  mainShape3D
Name:S Mohana Maheswari; Rollno:AV.SC.U4CSE24314 ;Section:CSE-A
surface area of cube:24
surface area of sphere:200.96
volume of cube:8
volume of sphere:267.94666666666666
```

24..Write a Java program to create an abstract class Bird with abstract methods fly() and makeSound(). Create subclasses Eagle and Hawk that extend the Bird class and implement the respective methods to describe how each bird flies and makes a sound.

CODE:

```
abstract class Bird {
   abstract void fly()
   abstract void makesound();
}

class Eagle extends Bird {
   public void fly() {
      System.out.println("Eagle is flying through wings");
   }

   public void makesound() {
      System.out.println("Eagle makes whistling sound");
   }
}

class Hawk extends Bird {
   public void fly() {
      System.out.println("Hawks fly by flapping their wings rapidly then relying on momentum to glide through the air.");
   }

   public void makesound() {
      System.out.println("Hawk makes kee-eeeee-arr sound");
   }
}
```

```
public class MainBird_24 {
    public static void main(String[] args) {
        System.out.println("Name: S Mohana Maheswari; Rollno: AV.SC.U4CSE24314; Section: CSE-A");

        Hawk obj1 = new Hawk();
        Eagle obj2 = new Eagle();

        obj1.fly();
        obj2.fly();
        obj1.makesound();
        obj2.makesound();
    }
}
```

OUTPUT:

```
C:\Users\smoha\Java Prgms>javac  MainBird_24.java
MainBird_24.java:2: error: ';' expected
    abstract void fly()
                      ^
1 error
```

ERROR:

Code Error	Code rectification
1. error: ';' expected	1. we mus end line with semicolon. .

```
C:\Users\smoha\Java Prgms>javac  MainBird_24.java

C:\Users\smoha\Java Prgms>java  MainBird_24
Name: S Mohana Maheswari; Rollno: AV.SC.U4CSE24314; Section: CSE-A
Hawks fly by flapping their wings rapidly then relying on momentum to glide through the air.
Eagle is flying through wings
Hawk makes kee-eeeee-arr sound
Eagle makes whistling sound
```