JAVA-Week-6

Objective: To revise inheritance and to understand the concepts of Abstract class & Interface in Java.

Assignments:

1. Design an abstract class having two methods. Create Rectangle and Triangle classes by inheriting the shape class and override the above methods to suitably implement for Rectangle and Triangle class.

```
package Week6;

abstract class Area_Peri{

	public abstract int area(int w,int l);

	public abstract double perimeter(int a,int b);

}

class Rectangle extends Area_Peri{

	@Override
	public int area(int w, int l) {

		return w*l;
	}

	@Override
	public double perimeter(int w, int l) {

		return 2*(w+l);
	}
}

class Triangle extends Area_Peri{

	//Isosceles Triangle

	@Override
	public int area(int h,int b) {

		return (h*b)/2;
	}
```

```
	@Override
	public double perimeter(int h, int b) {

		return (h+h+b);
	}

}
public class Abstract_Rect_Tri {

	public static void main(String args[]) {

		Area_Peri obj=new Rectangle();
		System.out.println("Area of the Rectangle
"+obj.area(10,20));
		System.out.println("perimeter of the Rectangle
"+obj.perimeter(10,20));

		Area_Peri obj1=new Triangle();
		System.out.println("Area of the Triangle
"+obj1.area(10,20));
		System.out.println("perimeter of the Triangle
"+obj1.perimeter(20,10));
	}

}
```

```
Area of the Rectangle200
perimeter of the Rectangle60.0
Area of the Triangle100
perimeter of the Triangle50.0
```

2. Write a program in Java to illustrate the use of interface in Java.

```
package Week4;

interface Example{

	public void show();
}

class Test_Example implements Example{

	@Override
	public void show() {
```

```
            System.out.print("This is Interface");
      }


}

public class Interface_Test {

      public static void main(String args[]) {

            Example obj=new Test_Example();
            obj.show();
      }

}
This is Interface
```

3. Create a general class ThreeDObject and derive the classes Box, Cube, Cylinder and Cone from it. The class ThreeDObject has methods wholeSurfaceArea ( ) and volume( ). Override these two methods in each of the derived classes to calculate the volume and whole surface area of each type of three-dimensional objects. The dimensions of

the objects are to be taken from the users and passed through the respective constructors of each derived class. Write a main method to test these classes.

```
package Week6;

import java.util.Scanner;


abstract class ThreeDObject{

      abstract int SurfaceArea(int h, int w, int l);
      abstract int volume(int h, int w, int l);
}

class Box extends ThreeDObject{

      int SurfaceArea(int h, int w, int l) {

                  return (2*(h*w)+2*(h*l)+2*(w*l));
      }
```

```
        int volume(int h, int w, int l) {

            return (h*w*l);
        }
}

class Cube extends ThreeDObject{

        int SurfaceArea(int a,int b,int c) {

            return (6*a*b);
        }

        int volume(int a,int b,int c) {

                return (a*b*c);
            }

}

class Cone extends ThreeDObject{

        int SurfaceArea(int h,int r,int a) {

                return (int) (Math.PI*a*(r+Math.sqrt(Math.pow(h,
2)+Math.pow(r, 2))));
            }


        int volume(int h,int r,int a) {

                return (int) (Math.PI*a*r*(h/3));
            }

}

class Cylinder extends ThreeDObject{


        int SurfaceArea(int h,int r,int a) {

                return (int) (2*Math.PI*r*h+2*Math.PI*r*a);
            }
```

```
            int volume(int h,int r,int a) {

                        return (int) (Math.PI*r*a*h);
                    }
}
public class ThreeD_Class {

     public static void main(String args[])
     {
          ThreeDObject obj=new Box();
          ThreeDObject obj1=new Cube();
          ThreeDObject obj2=new Cone();
          ThreeDObject obj3=new Cylinder();

          System.out.println("Box surface area
"+obj.SurfaceArea(10,20,30));
          System.out.println("Cube surface area
"+obj1.SurfaceArea(10,10,10));
          System.out.println("Cone surface area
"+obj2.SurfaceArea(10,20,20));
          System.out.println("Cylinder surface area
"+obj3.SurfaceArea(10,20,20));

          System.out.println("Box volume "
+obj.volume(10,20,30));
          System.out.println("Cube volume
"+obj1.volume(10,10,10));
          System.out.println("Cone volume
"+obj2.volume(10,20,20));
          System.out.println("Cylinder volume
"+obj3.volume(10,20,20));

     }
}
```

```
Box surface area 2200
Cube surface area 600
Cone surface area 2661
Cylinder surface area 3769
Box volume 6000
Cube volume 1000
Cone volume 3769
Cylinder volume 12566
```

4. Write a program to create a class named Vehicle having protected instance variables regnNumber, speed, color, ownerName and a method showData ( ) to show "This is a vehicle class". Inherit the Vehicle class into subclasses named Bus

and Car having individual private instance variables routeNumber in Bus and manufacturerName in Car and both of them having showData ( ) method showing all details of Bus and Car respectively with content of the super class's showData ( ) method.

```
package Week6;

class Vehicle_Main {

	protected int regnNumber;
	protected int speed;
	protected String color;
	protected String ownerName;

	public Vehicle_Main(int regnNumber, int speed, String
color, String ownerName) {

		this.regnNumber = regnNumber;
		this.speed = speed;
		this.color = color;
		this.ownerName = ownerName;
	}


}

class Bus extends Vehicle_Main{

	int routeNumber;

	public Bus(int regnNumber, int speed, String color, String
ownerName, int routeNumber) {
		super(regnNumber, speed, color, ownerName);
		this.routeNumber = routeNumber;
	}



	public String ShowData() {
		return "Bus [routeNumber=" + routeNumber + ",
regnNumber=" + regnNumber + ", speed=" + speed + ", color="
				+ color + ", ownerName=" + ownerName + "]";
	}


}
```

```
class Car extends Vehicle_Main{

     String manufacturerName ;

     public Car(int regnNumber, int speed, String color, String
ownerName, String manufacturerName ) {
          super(regnNumber, speed, color, ownerName);
          this.manufacturerName  = manufacturerName ;
     }



     public String ShowData() {
          return "Car [manufacturerName=" + manufacturerName +
", regnNumber=" + regnNumber + ", speed=" + speed + ", color="
                    + color + ", ownerName=" + ownerName + "]";
     }


}

public class Vehicle_Drive {

     public static void main(String args[]) {

          Bus obj=new Bus(1010,70,"Black","Soumyadip",199);
          System.out.println(obj.ShowData());

          Car obj1=new Car(1010,70,"Black","Soumyadip","TATA");
          System.out.println(obj1.ShowData());

     }

}
Bus [routeNumber=199, regnNumber=1010, speed=70, color=Black,
ownerName=Soumyadip]
Car [manufacturerName=TATA, regnNumber=1010, speed=70,
color=Black, ownerName=Soumyadip]
```

5. Create three interfaces, each with two methods. Inherit a new interface from the three, adding a new method. Create a class by implementing the new interface and also inheriting from a concrete class. Now write four methods, each of which takes one of the four interfaces as an argument. In main ( ), create an object of your class and pass it to each of the methods.

```
package Week6;

interface Test1{

	public void show1();

	public void show2();

}

interface Test2{

	public void show3();

	public void show4();

}

interface Test3{

	public void show5();

	public void show6();

}

interface Test4{

	public void show7();

	public void show8();

}

interface MultiTest extends Test1,Test2,Test3,Test4{

	public void newMethod();
}

class Multi implements MultiTest{

	@Override
	public void show1() {
		System.out.println("Mehtod 1");
	}

	@Override
```

```
	public void show2() {
		System.out.println("Mehtod 2");
	}


	@Override
	public void show3() {
		System.out.println("Mehtod 3");
	}

	@Override
	public void show4() {
		System.out.println("Mehtod 4");
	}

	@Override
	public void show5() {
		System.out.println("Mehtod 5");
	}

	@Override
	public void show6() {
		System.out.println("Mehtod 6");
	}

	@Override
	public void show7() {
		System.out.println("Mehtod 7");
	}

	@Override
	public void show8() {
		System.out.println("Mehtod 8");
		}

	@Override
	public void newMethod() {
		System.out.println("Mehtod newMethod()");
	}

}

public class Multi_Interface {

	public static void main(String args[]) {

		MultiTest obj=new Multi();
```

```
            obj.show1();
            obj.show2();
            obj.show3();
            obj.show4();
            obj.show5();
            obj.show6();
            obj.show7();
            obj.show8();
            obj.newMethod();

      }

}
Mehtod 1
Mehtod 2
Mehtod 3
Mehtod 4
Mehtod 5
Mehtod 6
Mehtod 7
Mehtod 8
Mehtod newMethod()
```

6. Create an interface Department containing attributes deptName and deptHead. It also has abstract methods for printing the attributes. Create a class hostel containing hostelName, hostelLocation and numberofRooms. The class contains methods for getting and printing the attributes. Then write Student class extending the Hostel class and implementing the Department interface. This class contains attributes studentName, regdNo, electiveSubject and avgMarks. Write suitable getData and printData methods for this class. Also implement the abstract methods of the Department interface. Write a driver class to test the Student class. The program should be menu driven containing the options:

i) Admit new student

ii) Migrate a student

iii) Display details of a student

For the third option a search is to be made on the basis of the entered registration number.

```
package Week6;
```

```
import java.util.Scanner;

interface Department{

	public final String deptName="CSE";
	public final String deptHead="XYZ_Sir";

	public abstract String printData();
}

class Hostel{

	protected String hostelName,hostelLocation;
	protected int numberofRooms;

	public Hostel(String hostelName, String hostelLocation, int
numberofRooms) {
		this.hostelName = hostelName;
		this.hostelLocation = hostelLocation;
		this.numberofRooms = numberofRooms;
	}

}

class Student extends Hostel implements Department{

	protected String studentName, regdNo, electiveSubject;
	protected int avgMarks;

	public Student(String hostelName, String hostelLocation,
int numberofRooms, String studentName, String regdNo,
			String electiveSubject, int avgMarks) {
		super(hostelName, hostelLocation, numberofRooms);
		this.studentName = studentName;
		this.regdNo = regdNo;
		this.electiveSubject = electiveSubject;
		this.avgMarks = avgMarks;
	}

	@Override
	public String printData() {
		return "Student [studentName=" + studentName + ",
regdNo=" + regdNo + ", electiveSubject=" + electiveSubject
				+ ", avgMarks=" + avgMarks + ", hostelName="
+ hostelName + ", hostelLocation=" + hostelLocation
```

```
                    + ", numberofRooms=" + numberofRooms + ",
deptName=" + deptName + ", deptHead=" + deptHead + "]";
     }

}


public class Student_Interface {

     public static void main(String args[]) {
          Scanner sc=new Scanner(System.in);
          String studentName, regdNo, electiveSubject;
          int avgMarks,numberofRooms;
          String hostelName,hostelLocation;
          Student[] obj=new Student[10];
          int x=1,i=1;
          while(x!=0)
          {
               System.out.println("1: Admit");
               System.out.println("2: Migrate");
               System.out.println("3: Show");
               int z=sc.nextInt();
               if(z==1)
               {
                    System.out.println("Enter Student Name");
                    studentName=sc.next();
                    regdNo="UEMK3RD"+i;
                    System.out.println("Enter elected Subject");
                    electiveSubject=sc.next();
                    System.out.println("Enter avgMarks");
                    avgMarks=sc.nextInt();
                    System.out.println("Enter hostelName");
                    hostelName=sc.next();
                    System.out.println("Enter hostelLocation");
                    hostelLocation=sc.next();
                    System.out.println("Enter numberofRooms");
                    numberofRooms=sc.nextInt();

                    obj[i++]=new Student( hostelName,
hostelLocation,  numberofRooms,  studentName,
regdNo,electiveSubject,  avgMarks);
                    System.out.println("Student Added::Reg
Id"+regdNo);
               }
               else if(z==2)
               {
```

```
                    System.out.print("Enter the last digit of
the id ");
                    int o=sc.nextInt();
                    obj[o]=null;
               }
               else if(z==3){
                    System.out.print("Enter the last digit of
the id ");
                    int o=sc.nextInt();
                    System.out.println(obj[o].printData());
               }
               else
               {
                    x=0;
               }
               }
     }

}
1: Admit
2: Migrate
3: Show
1
Enter Student Name
Soumyadip
Enter elected Subject
Java
Enter avgMarks
80
Enter hostelName
UEMK_HOSTEL
Enter hostelLocation
Newtown
Enter numberofRooms
3
Student Added::Reg IdUEMK3RD1
1: Admit
2: Migrate
3: Show
3
Enter the last digit of the id 1
Student [studentName=Soumyadip, regdNo=UEMK3RD1,
electiveSubject=Java, avgMarks=80, hostelName=UEMK_HOSTEL,
hostelLocation=Newtown, numberofRooms=3, deptName=CSE,
deptHead=XYZ_Sir]
```

7. Create an interface called Player. The interface has an abstract method called play() that displays a message describing the meaning of "play" to the class. Create classes called Child, Musician, and Actor that all implement Player. Create an application that demonstrates the use of the classes (UsePlayer.java)

```
package Week6;

interface Player{

	abstract public void play();
}

class Child implements Player{

	@Override
	public void play() {

		System.out.println("This is Child");
	}

}
class Musician implements Player{

	@Override
	public void play() {

		System.out.println("This is Musician");
	}
}
class Actor  implements Player{

	@Override
	public void play() {

		System.out.println("This is Actor ");
	}

}
public class UsePlayer {

	public static void main(String args[]) {

		Player obj=new Child();
		Player obj1=new Musician();
		Player obj2=new Actor();
		obj.play();
```

```
            obj1.play();
            obj2.play();

      }

}
This is Child
This is Musician
This is Actor
```

8. Create an abstract class Accounts with the following details:

Data Members:

(a) Balance (b) accountNumber (c) accountHoldersName (d) address

Methods:

(a) withdrawl()- abstract

(b) deposit()- abstract

(c) display() to show the balance of the account number

Create a subclass of this class SavingsAccount and add the following details:

Data Members:

(a) rateOfInterest

Methods:

(a) calculateAount()

```
package Week6;

abstract class Account{

   protected String dipositor;
   protected String address;
   protected long ac;
   protected int ammount;


   public Account(String dipositor, String address, long ac, int
ammount) {
      this.dipositor = dipositor;
      this.address = address;
```

```
      this.ac = ac;
      this.ammount = ammount;
}

abstract public void withdraw(int am);
   abstract public void diposit(int a);
   abstract public String display();
}


class SavingsAccount  extends Account{


      private int roi;


      public SavingsAccount (String dipositor, String address,
long ac, int ammount) {
           super(dipositor, address, ac, ammount);
           this.roi = 5;
      }


    public void withdraw(int am)
    {
        if(am>ammount)
        {
            System.out.println("Invalid ammount");

        }
        else{
            ammount-=am;
        System.out.println("Ammount debited "+ammount);
        System.out.println("Updated balance "+ammount);
        }

    }


    public void diposit(int a)
    {
         ammount+=a;
        System.out.println("Ammount debited "+ammount);
        System.out.println("Updated balance "+ammount);

    }
```

```
    public void calculateAmount()
    {

        int sum=ammount*(1+roi*12);
        System.out.println("Intrestfor 12 months :"+sum);
         System.out.println("Recent balance "+ammount);
    }


     public String display() {
          return "SavingsAccount [Intrest Rate=" + roi + "%,
Dipositor=" + dipositor + ", Address=" + address + ", Ac/No.=" +
ac
                    + ", Ammount=" + ammount + "]";
     }




}

public class Abstract_Bank {

     public static void main (String[] args) {


          SavingsAccount  obj=new SavingsAccount ("Soumyadip",
"Birati",198982,2000);
          obj.diposit(500);
          obj.withdraw(300);
          obj.calculateAmount();
          System.out.print(obj.display());
     }
}
Ammount debited 2500
Updated balance 2500
Ammount debited 2200
Updated balance 2200
Intrestfor 12 months :134200
Recent balance 2200
SavingsAccount     [Intrest     Rate=5%,     Dipositor=Soumyadip,
Address=Birati, Ac/No.=198982, Ammount=2200]
```

9. Create an abstract class MotorVehicle with the following details:

Data Members:

(a) modelName (b)modelNumber (c) modelPrice

Methods:

(a) display() to show all the details

Create a subclass of this class Carthat inherits the class MotorVehicle and add the following details:

Data Members:

(b) discountRate

Methods:

(a) display() method to display the Car name, model number, price and the discount rate.

(b) discount() method to compute the discount.

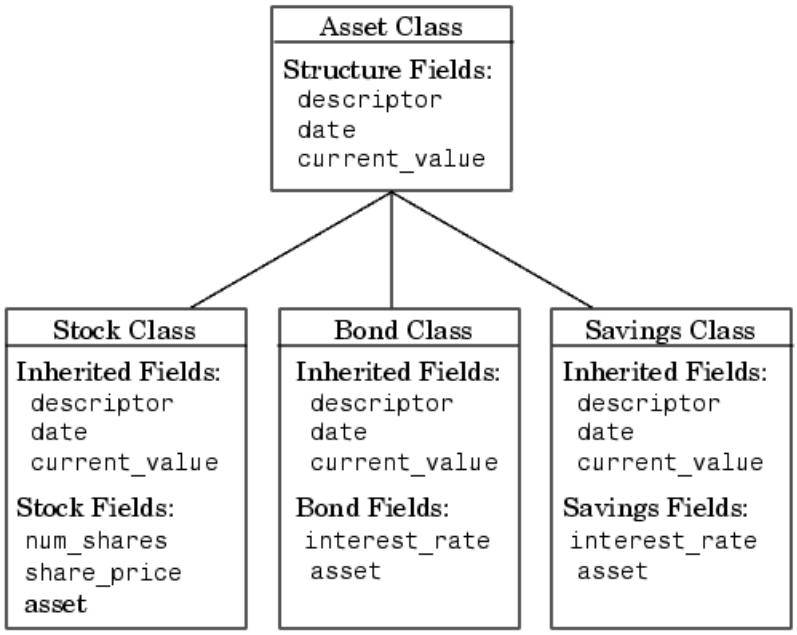
```
package Week6;

abstract class MotorVehicle  {


	protected String modelName;
	protected int mmdelPrice;
	protected int modelNumber;

	public MotorVehicle(String modelName, int mmdelPrice, int
modelNumber) {
		super();
		this.modelName = modelName;
		this.mmdelPrice = mmdelPrice;
		this.modelNumber = modelNumber;
	}

	abstract public String display();

}
class Carthat  extends MotorVehicle{


	double discountRate;

	public Carthat(String modelName, int mmdelPrice, int
modelNumber, double d) {
```

```
            super(modelName, mmdelPrice, modelNumber);
            this.discountRate = d;
      }

      public String display() {
            return "Carthat [discountRate=" + discountRate + ",
modelName=" + modelName + ", mmdelPrice=" + mmdelPrice
                        + ", modelNumber=" + modelNumber + "]";
      }


      public void discount()
      {
            System.out.println("Discount Price:"+(mmdelPrice-
(discountRate*mmdelPrice)));
      }


}



public class Vehicle_Drive {

      public static void main(String args[]) {

            Carthat obj=new Carthat("Duster", 1200000, 7768, 0.2);
            obj.discount();
            System.out.println(obj.display());
      }
}
```

```
Discount Price:960000.0
Carthat [discountRate=0.2, modelName=Duster, mmdelPrice=1200000,
modelNumber=7768]
```

10. Implement the below Diagram.

Here, Asset class is an abstract class containing an abstract method displayDetails() method. Stock, bond and Savings class inherit the Asset class and displayDetails() method is defined in every class.

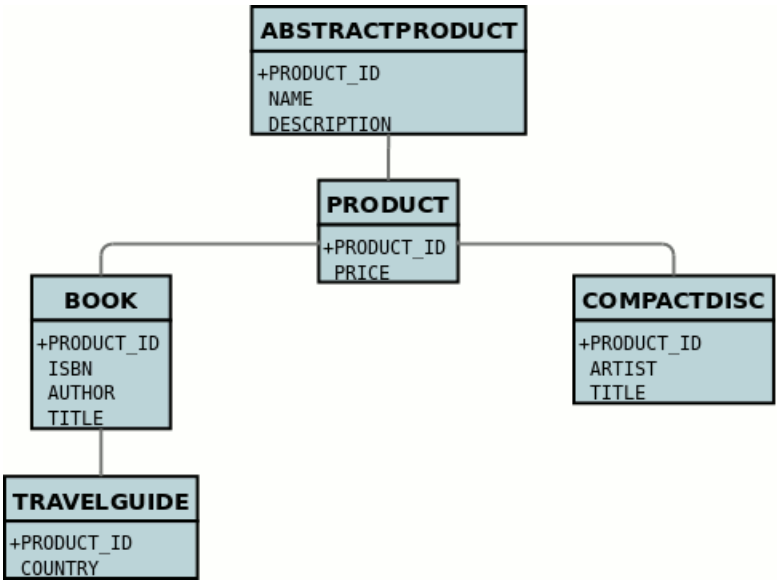



```
package Week6;


abstract class Asset{

	protected String descriptor;
	protected String date;
	protected int currentvalue;

	public Asset(String descriptor, String date, int
currentvalue) {
		super();
		this.descriptor = descriptor;
		this.date = date;
		this.currentvalue = currentvalue;
	}

	abstract public String display();
}

class Stock extends Asset{

	int num_share;
	int share_price;
	int asset;
```

```
	public Stock(String descriptor, String date, int
currentvalue, int num_share, int share_price, int asset) {
		super(descriptor, date, currentvalue);
		this.num_share = num_share;
		this.share_price = share_price;
		this.asset = asset;
	}

	public String display() {
		return "Stock [num_share=" + num_share + ",
share_price=" + share_price + ", asset=" + asset + ",
descriptor="
				+ descriptor + ", date=" + date + ",
currentvalue=" + currentvalue + "]";
	}

}


class Bond extends Asset{

	int intrest_rate;
	int asset;

	public Bond(String descriptor, String date, int
currentvalue, int intrest_rate, int asset) {
		super(descriptor, date, currentvalue);
		this.intrest_rate = intrest_rate;
		this.asset = asset;
	}

	public String display() {
		return "Bond [intrest_rate=" + intrest_rate + ",
asset=" + asset + ", descriptor=" + descriptor + ", date="
				+ date + ", currentvalue=" + currentvalue +
"]";
	}

}

class Savings extends Asset{

	int intrest_rate;
	int asset;

	public Savings(String descriptor, String date, int
currentvalue, int intrest_rate, int asset) {
```

```
            super(descriptor, date, currentvalue);
            this.intrest_rate = intrest_rate;
            this.asset = asset;
      }

      public String display() {
            return "Savings [intrest_rate=" + intrest_rate + ",
asset=" + asset + ", descriptor=" + descriptor + ", date="
                        + date + ", currentvalue=" + currentvalue +
"]";
      }

}


public class Abstract_Asset {


      public static void main(String args[]) {

            Asset obj=new Stock("Bruce", "17-08-2019", 50000, 10,
2500, 25000);
            Asset obj1=new Bond("Barry", "16-08-2019", 40000, 5,
75000);
            Asset obj2=new Savings("Soumyadip", "15-08-2019",
70000, 3,50000);
            System.out.println(obj.display());
            System.out.println(obj1.display());
            System.out.println(obj2.display());
      }

}


Stock [num_share=10, share_price=2500, asset=25000,
descriptor=Bruce, date=17-08-2019, currentvalue=50000]
Bond [intrest_rate=5, asset=75000, descriptor=Barry, date=16-08-
2019, currentvalue=40000]
Savings [intrest_rate=3, asset=50000, descriptor=Soumyadip,
date=15-08-2019, currentvalue=70000]
```

11. Implement the below Diagram. Here AbstractProduct is only abstract class.



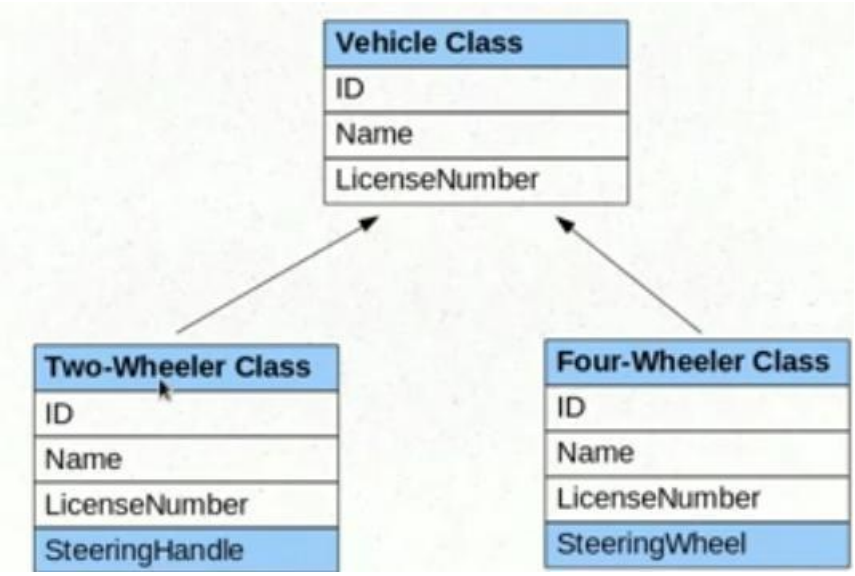

```
package Week6;


abstract class AbstractProduct{

	protected int productId;
	protected String name;
	protected String description;

	public AbstractProduct(int productId, String name, String
description) {
		super();
		this.productId = productId;
		this.name = name;
		this.description = description;
	}

}

class Product extends AbstractProduct{

	protected int price;

	public Product(int productId, String name, String
description, int price) {
		super(productId, name, description);
		this.price = price;
```

```
	}

}

class Book extends Product{

	protected int ISBN;
	protected String Author,Title;

	public Book(int productId, String name, String description,
int price, int iSBN, String author, String title) {
		super(productId, name, description, price);
		ISBN = iSBN;
		Author = author;
		Title = title;
	}


	public String display() {
		return "Book [ISBN=" + ISBN + ", Author=" + Author +
", Title=" + Title + ", price=" + price + ", productId="
				+ productId + ", name=" + name + ",
description=" + description + "]";
	}

}

class Travel_Guide extends Book{

	protected String Country;

	public Travel_Guide(int productId, String name, String
description, int price, int iSBN, String author,
			String title, String country) {
		super(productId, name, description, price, iSBN,
author, title);
		Country = country;
	}


	public String display() {
		return "Travel_Guide [Country=" + Country + ", ISBN="
+ ISBN + ", Author=" + Author + ", Title=" + Title
				+ ", price=" + price + ", productId=" +
productId + ", name=" + name + ", description=" + description
				+ "]";
	}
```

```
}

class CompactDisc extends Product{

     protected String Artist;
     protected String Title;

     public CompactDisc(int productId, String name, String
description, int price, String artist, String title) {
          super(productId, name, description, price);
          Artist = artist;
          Title = title;
     }


     public String display() {
          return "CompactDisc [Artist=" + Artist + ", Title=" +
Title + ", price=" + price + ", productId=" + productId
                    + ", name=" + name + ", description=" +
description + "]";
     }
}




public class Abstract_Product {

     public static void main(String args[]) {

          Book obj=new Book(101,"Chronicles","Chronicles, Volume
One is a memoir written by American musician Bob Dylan."
                    ,700,1786,"Bob Dylan","The Chronicles:Vol
1");

          Travel_Guide obj1=new Travel_Guide(102,"My Travel
Journal","My Travel Journal:1st Edition"
                    ,300,1786,"by The Unscripted Life
(Author)","My Travel Journal","India");

          CompactDisc obj2=new CompactDisc(103,"Abbey
Road","Abbey Road:1969/The Beatles"
                    ,5000,"The Beatles","Abbey Road:1969");

          System.out.println(obj.display());
          System.out.println(obj1.display());
```

```
            System.out.println(obj2.display());
      }
}
Book [ISBN=1786, Author=Bob Dylan, Title=The Chronicles:Vol 1,
price=700, productId=101, name=Chronicles,
description=Chronicles, Volume One is a memoir written by
American musician Bob Dylan.]
Travel_Guide [Country=India, ISBN=1786, Author=by The Unscripted
Life (Author), Title=My Travel Journal, price=300,
productId=102, name=My Travel Journal, description=My Travel
Journal:1st Edition]
CompactDisc [Artist=The Beatles, Title=Abbey Road:1969,
price=5000, productId=103, name=Abbey Road, description=Abbey
Road:1969/The Beatles]
```

12. Implement the below Diagram




```
package Week6;

abstract class Vechicle{

      protected int ID;
      protected String name;
      protected String LicenseNumber;

      public Vechicle(int iD, String name, String licenseNumber)
{
            ID = iD;
```

```
            this.name = name;
            LicenseNumber = licenseNumber;
      }

      abstract public String display();

}

class Two_Wheeler extends Vechicle{

      int SteeringHandle;

      public Two_Wheeler(int iD, String name, String
licenseNumber, int steeringHandle) {
            super(iD, name, licenseNumber);
            SteeringHandle = steeringHandle;
      }

      @Override
      public String display() {
            return "Two_Wheeler [SteeringHandle=" + SteeringHandle
+ ", ID=" + ID + ", name=" + name + ", LicenseNumber="
                        + LicenseNumber + "]";
      }

}

class Four_Wheeler extends Vechicle{

      int SteeringWheel;

      public Four_Wheeler(int iD, String name, String
licenseNumber, int steeringWheel) {
            super(iD, name, licenseNumber);
            SteeringWheel = steeringWheel;
      }

      @Override
      public String display() {

            return "Four_Wheeler [SteeringWheel=" + SteeringWheel
+ ", ID=" + ID + ", name=" + name + ", LicenseNumber="
                        + LicenseNumber + "]";
      }

}
```

```
public class Vehicle_Interface {

	public static void main(String args[]) {

		Vechicle obj=new Two_Wheeler(1011,"KTM","WBIO0897",1);
		Vechicle obj1=new
Four_Wheeler(1011,"Baleno","WBIO4547",1);

		System.out.println(obj.display());
		System.out.println(obj1.display());

	}

}
Two_Wheeler [SteeringHandle=1, ID=1011, name=KTM,
LicenseNumber=WBIO0897]
Four_Wheeler [SteeringWheel=1, ID=1011, name=Baleno,
LicenseNumber=WBIO4547]
```

13. Write a program to implement the Multiple Inheritance (Bank Interface, Customer & Account classes).

```
package Week6;

interface Bank{

	final String name="HDFC";
	public String details();

}

class Customer{

	protected String CustomerName;

	public Customer(String name) {
		super();
		this.CustomerName = name;
	}
}

class Account_Main extends Customer implements Bank{

	int acNo;

	public Account_Main(String name, int acNo) {
```

```
            super(name);
            this.acNo = acNo;
      }

      @Override
      public String details() {
            return "Account [acNo=" + acNo + ", CustomerName=" +
CustomerName + "]";
      }
}

public class Bank_Multiple_Inherit {

      public static void main(String args[]) {

            Bank obj=new Account_Main("Soumyadip",12990991);
            System.out.print(obj.details());
      }

}
Account [acNo=12990991, CustomerName=Soumyadip]
```

14. Write a program to implement the Multiple Inheritance (Gross Interface, Employee & Salary classes).

```
package Week6;

interface Gross{

      public String details();

}

class Employee{

      protected String EmployeeName;

      public Employee(String name) {
            super();
            this.EmployeeName = name;
      }


}

class Salary extends Employee implements Gross{
```

```
	int sal;

	public Salary(String name, int sal) {
		super(name);
		this.sal = sal;
	}

	@Override
	public String details() {
		return "Salary [Salary=" + sal + ", EmployeeName=" +
EmployeeName + "]";
	}
}


public class Gross_Multiple_Interface {

	public static void main(String args[]) {

		Gross obj=new Salary("Soumyadip",30000);
		System.out.print(obj.details());
	}

}
Salary [sal=30000, EmployeeName=Soumyadip]
```

15. Program to create a interface 'Mango' and implement it in classes 'Winter' and 'Summer'.

```
package Week6;

interface Mango{

	abstract public String Availability();
}

class Summer implements Mango{

	boolean Availability ;

	public Summer(boolean availability) {

		Availability = availability;
	}

	@Override
	public String Availability() {
```

```
            return "Summer [Availability=" + Availability + "]";
      }
}

class Winter implements Mango{

      boolean Availability ;

      public Winter(boolean availability) {

            Availability = availability;
      }

      @Override
      public String Availability() {
            return "Winter [Availability=" + Availability + "]";
      }
}

public class Mango_Interface {

      public static void main(String args[]) {

            Mango obj=new Summer(true);
            Mango obj1=new Winter(false);
            System.out.println(obj.Availability());
            System.out.println(obj1.Availability());
      }

}
```

```
Summer [Availability=true]
Winter [Availability=false]
```

16. Program to implement the Multiple Inheritance (Exam Interface, Student & Result classes).

```
package Week6;


interface Exam{

      abstract public String markSheet();
}

class Student_Exam{
```

```
	protected String name;

	public Student_Exam(String name) {
		super();
		this.name = name;
	}

	public void get()
	{

	}
}

class Results extends Student_Exam implements Exam{

	int percent;
	public Results(String name, int percent) {
		super(name);
		this.percent = percent;
	}
	@Override
	public String markSheet() {
		return "Result [percentage=" + percent + ", name=" +
name + "]";
	}
}
public class Exam_Interface {

	public static void main(String[] args) {

		Exam obj=new Results("Soumyadip",85);
		System.out.println(obj.markSheet());

	}
}
Result [percentage=85, name=Soumyadip]
```

17. Program to demonstrate use of hierarchical inheritance using interface.

```
package Week6;


interface A
{
	public void displayA();
```

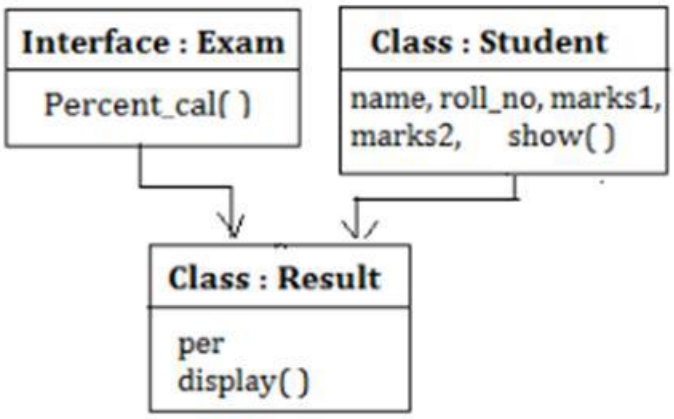
```
}

interface B extends A
{
     public void displayB();
}

interface C extends A
{
     public void displayC();
}

class Hierarchy implements B,C{

     @Override
     public void displayC() {
          System.out.println("Hi this is C");
     }

     @Override
     public void displayB() {
          System.out.println("Hi this is B");
     }

     @Override
     public void displayA() {
          System.out.println("Hi this is A");
     }
}

public class Hierarchical_Interface {

     public static void main(String args[])
     {
          Hierarchy obj=new Hierarchy();
          obj.displayA();
          obj.displayB();
          obj.displayC();
     }
}
Hi this is A
Hi this is B
Hi this is C
```

18. Java program to Perform Payroll Using Interface (Multiple Inheritance).

```
package Week6;

interface PayRoll{

	public String totalPay();

}

class Employee_Pay{

	protected String EmployeeName;

	public Employee_Pay(String name) {
		super();
		this.EmployeeName = name;
	}
}

class Salary_Pay extends Employee_Pay implements PayRoll{

	int sal;

	public Salary_Pay(String name, int sal) {
		super(name);
		this.sal = sal;
	}

	@Override
	public String totalPay() {
		return "Salary [Salary=" + sal + ", EmployeeName=" +
EmployeeName + "]";
	}
}

public class PayRoll_Multiple_Interface2 {

	public static void main(String args[]) {

		Gross obj=new Salary("Soumyadip",50000);
		System.out.print(obj.details());
	}

}
```

```
Salary [Salary=50000, EmployeeName=Soumyadip]
```

19. Implement the following diagram.




```
package Week6;

interface Exam_{

	public void percentCall();

}

class Student_{

	protected String name;
	protected int roll;
	protected int marks1;
	protected int marks2;

	public Student_(String name, int roll, int marks1, int
marks2) {
		super();
		this.name = name;
		this.roll = roll;
		this.marks1 = marks1;
		this.marks2 = marks2;
	}


	public String show() {
		return "Student [name=" + name + ", roll=" + roll + ",
marks1=" + marks1 + ", marks2=" + marks2 + "]";
	}

}
```

```
class Result extends Student_ implements Exam_{

	int per;

	public Result(String name, int roll, int marks1, int
marks2) {
		super(name, roll, marks1, marks2);
	}

	@Override
	public void percentCall() {


		per=(marks1+marks2)/2;
		System.out.println("Percentage :"+per);
	}


	public String display() {
		return "Result [percentage=" + per + ", name=" + name
+ ", roll=" + roll + ", marks1=" + marks1 + ", marks2=" + marks2
				+ "]";
	}
}
public class Result_Driver {

	public static void main(String args[]) {

		Result obj=new Result("Soumyadip",35,85,90);
		obj.percentCall();
		System.out.println(obj.show());
		System.out.println(obj.display());
	}

}
```

```
Percentage :87
Student [name=Soumyadip, roll=35, marks1=85, marks2=90]
Result [percentage=87, name=Soumyadip, roll=35, marks1=85,
marks2=90]
```