**JAVA**

**Inheritance**

**Lab Exercise No:**34

/\*Create a class called Vehicle. Create subclasses like Truck, Bus, Car etc. Add common methods

in the base class and specific methods in the corresponding class. Create a class called Road

and create objects for the Truck, Car, Bus etc and display the appropriate message.\*/

**package hsbc.com.day3;**

**class Vehicle {**

**public Vehicle()**

**{**

**super();**

**}**

**protected String colourVehicle;**

**protected int speedVehicle;**

**void speed(int speedVehicle)**

**{**

**this.speedVehicle=speedVehicle;**

**System.out.println("Speed: "+speedVehicle);**

**}**

**void colour(String colourVehicle)**

**{**

**this.colourVehicle=colourVehicle;**

**System.out.println("Colour: "+colourVehicle);**

**}**

**}**

**class Truck extends Vehicle**

**{**

**protected int no\_Of\_Tyres;**

**protected String size;**

**public Truck() {**

**super();**

**}**

**public void tyres(int no\_Of\_Tyres)**

**{**

**this.no\_Of\_Tyres=no\_Of\_Tyres;**

**System.out.println("Tyres of truck: "+no\_Of\_Tyres);**

**}**

**public void sizeVehicle(String size)**

**{**

**this.size=size;**

**System.out.println("Size of truck: "+size);**

**}**

**}**

**class Car extends Vehicle**

**{**

**protected int seater;**

**public void seater(int seater)**

**{**

**this.seater=seater;**

**System.out.println("Car Seater: "+seater);**

**}**

**}**

**class Bus extends Vehicle**

**{**

**protected String ownership;**

**public void owned(String ownership)**

**{**

**this.ownership=ownership;**

**System.out.println("Ownership of bus: "+ownership);**

**}**

**}**

**public class Road**

**{**

**public static void main(String[] args) {**

**// TODO Auto-generated method stub**

**Truck obj1=new Truck();**

**obj1.tyres(6);**

**obj1.sizeVehicle("Big");**

**Car obj2=new Car();**

**obj2.seater(5);**

**Bus obj3=new Bus();**

**obj3.owned("Government");**

**}**

**}**

**Lab Exercise No:**35

/\*In the Vehicle class, constructor initialize few variables like color, no of

wheels, model etc. Give appropriate values for these variables from the invoking subclass\*/

**package** hsbc.com.day3;

**class** Vehicle {

**public** Vehicle()

{

**super**();

}

**protected** String colourVehicle;

**protected** **int** no\_Of\_Wheels;

**protected** String vehicleModel;

**public** Vehicle(**int** no\_Of\_Wheels,String colourVehicle,String vehicleName)

{

**this**.no\_Of\_Wheels=no\_Of\_Wheels;

**this**.colourVehicle=colourVehicle;

**this**.vehicleModel=vehicleModel;

}

}

**class** Truck **extends** Vehicle

{

**public** Truck() {

**super**(80,"White","Truck");

}

**public** **void** display() {

System.***out***.println("Vehicle wheels: "+no\_Of\_Wheels+" Colour of the Vehicle: "+colourVehicle+" Vehicle model: "+vehicleModel);

}

}

**class** Car **extends** Vehicle

{

**public** Car() {

**super**(120,"Black","Car");

}

**public** **void** display() {

System.***out***.println("Vehicle wheels: "+no\_Of\_Wheels+" Colour of the Vehicle: "+colourVehicle+" Vehicle model: "+vehicleModel);

}

}

**class** Bus **extends** Vehicle

{

**public** Bus() {

**super**(60,"Red","Bus");

}

**public** **void** display() {

System.***out***.println("Vehicle wheels: "+no\_Of\_Wheels+" Colour of the Vehicle: "+colourVehicle+" Vehicle model: "+vehicleModel);

}

}

**public** **class** City

{

**public** **static** **void** main(String[]args)

{

Truck obj1=**new** Truck();

obj1.display();

Car obj2=**new** Car();

obj2.display();

Bus obj3=**new** Bus();

obj3.display();

}

}

**Lab Exercise No:**36

/\*In the Lab Exercise 35, create another class called City which creates an object for the Car,

Truck and Bus class and displays the details through a display () method in the Vehicle class.

The other methods and data members should not be accessible by the City class\*/

**package** hsbc.com.day3;

**class** Vehicle {

**public** Vehicle()

{

**super**();

}

**protected** String colourVehicle;

**protected** **int** no\_Of\_Wheels;

**protected** String vehicleModel;

**public** Vehicle(**int** no\_Of\_Wheels,String colourVehicle,String vehicleName)

{

**this**.no\_Of\_Wheels=no\_Of\_Wheels;

**this**.colourVehicle=colourVehicle;

**this**.vehicleModel=vehicleModel;

}

}

**class** Truck **extends** Vehicle

{

**public** Truck() {

**super**(80,"White","Truck");

}

**public** **void** display() {

System.***out***.println("Vehicle wheels: "+no\_Of\_Wheels+" Colour of the Vehicle: "+colourVehicle+" Vehicle model: "+vehicleModel);

}

}

**class** Car **extends** Vehicle

{

**public** Car() {

**super**(120,"Black","Car");

}

**public** **void** display() {

System.***out***.println("Vehicle wheels: "+no\_Of\_Wheels+" Colour of the Vehicle: "+colourVehicle+" Vehicle model: "+vehicleModel);

}

}

**class** Bus **extends** Vehicle

{

**public** Bus() {

**super**(60,"Red","Bus");

}

**public** **void** display() {

System.***out***.println("Vehicle wheels: "+no\_Of\_Wheels+" Colour of the Vehicle: "+colourVehicle+" Vehicle model: "+vehicleModel);

}

}

**public** **class** City

{

**public** **static** **void** main(String[]args)

{

Truck obj1=**new** Truck();

obj1.display();

Car obj2=**new** Car();

obj2.display();

Bus obj3=**new** Bus();

obj3.display();

}

}

**Lab Exercise No:**37

/\*: In the Lab Exercise 30, create a super class called Animal and make all the existing classes as

the sub class for Animal class. Move the method isVegetarian and canClimb to the super class

and implement generically. Whenever necessary change the implementation of these methods

in the respective subclasses.Display the characteristic of each animal.

\*/

**package** org.animals;

**import** java.io.\*;

**abstract** **class** Animals {

**public** **static** **void** main(String[] args)**throws** IOException {

// **TODO** Auto-generated method stub

//InputStreamReader read=new InputStreamReader(System.in);

//BufferedReader buf=new BufferedReader(read);

Lion ob=**new** Lion("Ocre",45.5,23);

ob.sound();

ob.isVegetarian();

ob.canClimb();

Tiger ob1=**new** Tiger("Orange and black",39.8,25);

ob1.sound();

ob1.isVegetarian();

ob1.canClimb();

Deer ob2=**new** Deer("Peach",20,30);

ob2.sound();

ob2.isVegetarian();

ob2.canClimb();

Monkey ob3=**new** Monkey("Brown",18,23);

ob3.sound();

ob3.isVegetarian();

ob3.canClimb();

Elephant ob4=**new** Elephant("Grey",100,98);

ob4.sound();

ob4.isVegetarian();

ob4.canClimb();

Giraffe ob5=**new** Giraffe("Yellow",97,54);

ob5.sound();

ob5.isVegetarian();

ob5.canClimb();

}

**abstract** **void** isVegetarian();

**abstract** **void** canClimb();

}

//jar file

**package** org.animals;

**public** **class** Lion **extends** Animals {

String color;

**double** weight;

**int** age;

**public** Lion(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Lion class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Roar");

}

**public** **void** isVegetarian()

{

System.***out***.println("Non vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

}

**package** org.animals;

**public** **class** Tiger **extends** Animals {

String color;

**double** weight;

**int** age;

**public** Tiger(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Tiger class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Growls");

}

**public** **void** isVegetarian()

{

System.***out***.println("Non vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

}

**package** org.animals;

**public** **class** Deer **extends** Animals {

String color;

**double** weight;

**int** age;

**public** Deer(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Deer class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");//implementing fns of abstract class

}

**public** **void** canClimb()

{

System.***out***.println("No");

}

**public** **void** sound()

{

System.***out***.println("Deer voice");

}

}

**package** org.animals;

**public** **class** Monkey **extends** Animals {

String color;

**double** weight;

**int** age;

**public** Monkey(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Monkey class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Screech");

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Can climb");

}

}

**package** org.animals;

**public** **class** Elephant {

String color;

**double** weight;

**int** age;

**public** Elephant(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Elephant class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

**public** **void** sound()

{

System.***out***.println("Trumpet");

}

}

**package** org.animals;

**public** **class** Giraffe **extends** Animals{

String color;

**double** weight;

**int** age;

**public** Giraffe(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Giraffe class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Griraffe sound");

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

}

**Lab Exercise No:**38

/\*In the Lab Exercise 37, make the Lion, Tiger, Deer, Monkey, Elephant and Giraffe classes such

that these classes cannot be inherited\*/

**package** org.animals;

**public** **class** Solution38 **extends** Lion {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

System.***out***.println("Trying to extend final class but its showing an error");

}

}

**package** org.animals;

**final** **public** **class** Lion **extends** Animals {

String color;

**double** weight;

**int** age;

**public** Lion(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Lion class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Roar");

}

**public** **void** isVegetarian()

{

System.***out***.println("Non vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

}

**Lab Exercise No:**39

/\*Create a class called Worker. Write classes DailyWorker and SalariedWorker that inherit from

Worker.Every worker has a name and a salaryrate. Write method Pay (int hours) to compute

the week pay of every worker. A Daily worker is paid on the basis of the number of days

she/he works.The salaried worker gets paid the wage for 40 hours a week no matter what the

actual hours are. Test this program to calculate the pay of workers\*/

abstract class Worker {

abstract void pay(int hours);

public static void main(String[] args) {

// TODO Auto-generated method stub

dailyWorker dw=new dailyWorker("XYZ",700);

dw.pay(9);

salariedWorker sw=new salariedWorker("Tanisha",1000);

sw.pay(8);

}

}

class dailyWorker extends Worker{

String name;

double salaryRate;

public dailyWorker(String name, double salaryRate) {

super();

this.name = name;

this.salaryRate = salaryRate;

System.out.println("Name: "+name);

}

public void pay(int hours)

{

double final\_pay=hours\*salaryRate;

System.out.println("Daily Worker pay: "+final\_pay);

System.out.println("Daily Worker name: "+name);

System.out.println("Daily Worker rate: "+salaryRate);

}

}

class salariedWorker extends Worker{

String name;

double salaryRate;

public salariedWorker(String name, double salaryRate) {

super();

this.name = name;

this.salaryRate = salaryRate;

System.out.println("Name: "+name);

}

public void pay(int hours)

{

double final\_pay=8\*salaryRate;

System.out.println("Salaried Worker pay: "+final\_pay);

System.out.println("Salaried Worker name: "+name);

System.out.println("Salaried Worker rate: "+salaryRate);

}

}

**Lab Exercise No:**40

/\*In the Lab Exercise 37, make the Lion, Tiger, Deer, Monkey, Elephant and Giraffe classes such

that these classes cannot be inherited\*/

package org.animals;

public class WildAnimals{

public static void main(String[] args) {

// TODO Auto-generated method stub

WildAnimals ob=new Lion("Ocre",45.5,23);

ob.natureAnimals();

ob.location();

WildAnimals ob1=new Tiger("Orange and black",39.8,25);

ob1.natureAnimals();

ob1.location();

WildAnimals ob2=new Deer("Peach",20,30);

ob2.natureAnimals();

ob2.location();

WildAnimals ob3=new Monkey("Brown",18,23);

ob3.natureAnimals();

ob3.location();

WildAnimals ob4=new Giraffe("Yellow",97,54);

ob4.natureAnimals();

ob4.location();

}

String location;

String nature;

public void natureAnimals()

{

System.out.println("Wild animals are ferocious");

}

public void location()

{

System.out.println("Wild animals can be found in forests ");

}

}

**package** org.animals;

**public** **class** DomesticAnimals{

String location;

String nature;

**public** **void** natureAnimals()

{

System.***out***.println("Domestic animals are tame");

}

**public** **void** location()

{

System.***out***.println("Wild animals can be found in villages and human settlements ");

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

DomesticAnimals ob=**new** Elephant("Grey",100,98);

ob.natureAnimals();

ob.location();

}

} **package** org.animals;

**public** **class** Lion **extends** WildAnimals {

String color;

**double** weight;

**int** age;

**public** Lion(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Lion class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Roar");

}

**public** **void** isVegetarian()

{

System.***out***.println("Non vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

}

**package** org.animals;

**public** **class** Monkey **extends** WildAnimals {

String color;

**double** weight;

**int** age;

**public** Monkey(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Monkey class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Screech");

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Can climb");

}

}

**package** org.animals;

**public** **class** Tiger **extends** WildAnimals {

String color;

**double** weight;

**int** age;

**public** Tiger(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Tiger class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Growls");

}

**public** **void** isVegetarian()

{

System.***out***.println("Non vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

}

**package** org.animals;

**public** **class** Deer **extends** WildAnimals{

String color;

**double** weight;

**int** age;

**public** Deer(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Deer class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("No");

}

**public** **void** sound()

{

System.***out***.println("Deer voice");

}

}

**package** org.animals;

**public** **class** Giraffe **extends** WildAnimals{

String color;

**double** weight;

**int** age;

**public** Giraffe(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Giraffe class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** sound()

{

System.***out***.println("Griraffe sound");

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

}

**package** org.animals;

**public** **class** Elephant **extends** DomesticAnimals {

String color;

**double** weight;

**int** age;

**public** Elephant(String color, **double** weight, **int** age) {

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

System.***out***.println("Elephant class");

System.***out***.println("Color "+color);

System.***out***.println("Weight "+weight);

System.***out***.println("Age "+age);

}

**public** **void** isVegetarian()

{

System.***out***.println("Vegetarian");

}

**public** **void** canClimb()

{

System.***out***.println("Cannot climb");

}

**public** **void** sound()

{

System.***out***.println("Trumpet");

}

}

**Lab Exercise No:**41

/\*Create a class called Shape3D with the following method signatures alone, volume () and

surfaceArea (). Then create subclasses like Cylinder, Sphere, and Cube etc and implement

these methods\*/

package hsbc.com.day3;

import java.io.\*;

abstract class Shape3D {

public static void main(String[] args)throws IOException {

// TODO Auto-generated method stub

InputStreamReader read=new InputStreamReader(System.in);

BufferedReader buf=new BufferedReader(read);

System.out.println("Radius: ");

double r=Double.parseDouble(buf.readLine());

System.out.println("Height: ");

double h=Double.parseDouble(buf.readLine());

Cylinder obj1=new Cylinder();

obj1.volume(r,h);

obj1.surfaceArea(r,h);

Sphere obj2=new Sphere();

obj2.volume(r,h);

obj2.surfaceArea(r,h);

Cube obj3=new Cube();

obj3.volume(r,h);

obj3.surfaceArea(r,h);

}

abstract void volume(double r,double h);

abstract void surfaceArea(double r,double h);

}

class Cylinder extends Shape3D

{

void volume(double rad,double hei)

{

double volume=3.14\*rad\*rad\*hei;

System.out.println("Volume of Cylinder: "+volume);

}

void surfaceArea(double rad,double hei)

{

double sa=2\*3.14\*rad\*(rad+hei);

System.out.println("Surface Area of Cylinder: "+sa);

}

}

class Sphere extends Shape3D

{

void volume(double rad,double hei)

{

double volume=(4\*3.14\*rad\*rad\*rad)/3;

System.out.println("Volume of Sphere: "+volume);

}

void surfaceArea(double rad,double hei)

{

double sa=4\*3.14\*rad\*rad;

System.out.println("Surface Area of Cylinder: "+sa);

}

}

class Cube extends Shape3D

{

void volume(double rad,double hei)

{

double volume=hei\*hei\*hei;

System.out.println("Volume of Sphere: "+volume);

}

void surfaceArea(double rad,double hei)

{

double sa=6\*hei\*hei;

System.out.println("Surface Area of Cylinder: "+sa);

}

}

**Lab Exercise No:**42

/\*Create the classes required to store data regarding different types of courses that employees

Ina company can enroll for. All courses have name and course fee. Courses are also either

classroom delivered or delivered online. Courses could also be full time or part time. The

program must be menu based input which enables the course coordinator to register

employees for courses, list out employees registered for specific courses, deregister employees

from a course.

\*/

package hsbc.com.day3;

import java.util.Arrays;

import java.util.HashSet;

import java.util.Scanner;

import java.util.Set;

public class Solution42 extends Menu {

static Set<Integer> set = new HashSet<>(Arrays.asList());

static Course[] course = {

new Course(1, "React", 2000, "Online", "Full-time" ),

new Course(2, "Angular", 3000, "Classroom", "Part-time" ) ,

new Course(3, "AWS", 4000, "Online", "Part-time" ),

new Course(4, "Java", 5000, "Online", "Full-time")

};

Employee[] employees = {

new Employee (1, "Tanisha"),

new Employee (2, "Adwit"),

new Employee (3, "Agrawal"),

new Employee (4, "Renuka"),

new Employee (5, "Rajeev")

};

static Solution42 Solution = new Solution42();

public static void main(String[] args) {

// TODO Auto-generated method stub

Scanner scnr = new Scanner(System.in);

System.out.println("1.To register for a course\r\n" +

"2.To deregister for a course\r\n" +

"3.To list the courses offered\r\n" +

"4.To list the employees registered for a specific course.");

System.out.println("Enter option number you want to go for : ");

int i = scnr.nextInt();

int eID = 0;

int cID = 0;

switch (i) {

case 1 :

System.out.println("Enter Course ID and Employee ID");

cID = scnr.nextInt();

eID = scnr.nextInt();

Solution.registerForCourse(cID-1, eID);

break;

case 2:

System.out.println("Enter Course ID");

cID = scnr.nextInt();

System.out.println(course[cID-1]);

System.out.println("Enter Employee ID");

eID = scnr.nextInt();

Solution.deregisterForCourse(cID-1, eID);

break;

case 3:

Solution.listOfferedCourse();

break;

case 4:

System.out.println("Enter Course number to find all Employees who is enrolled :");

Solution.listEmployeesOfCourse((scnr.nextInt()) - 1);

break;

}

main(args);

scnr.close();

}

@Override

void registerForCourse(int courseID, int employeeID) {

// TODO Auto-generated method stub

course[courseID].employeeIDs.add(employeeID);

System.out.println("Updated Course Structure");

System.out.println(course[courseID]);

}

@Override

void deregisterForCourse(int courseID, int employeeID) {

// TODO Auto-generated method stub

course[courseID].employeeIDs.remove(employeeID);

System.out.println("Updated Course Structure");

System.out.println(course[courseID]);

}

@Override

String[] listOfferedCourse() {

// TODO Auto-generated method stub

for(Course curs : course) {

System.out.println(curs);

}

return null;

}

@Override

String[] listEmployeesOfCourse(int courseID) {

// TODO Auto-generated method stub

Set<Integer> emps = course[courseID].employeeIDs;

if(emps.size() != 0)

{

for(int empID : emps ) {

System.out.println(employees[empID-1].toString());

}

}

else {

System.out.println("No Employee is registered for this course");

}

return null;

}

}

abstract class Menu {

abstract void registerForCourse(int courseID, int employeeID);

abstract void deregisterForCourse(int courseID, int employeeID);

abstract String[] listOfferedCourse();

abstract String[] listEmployeesOfCourse(int courseID);

}

class Course{

int courseID;

String courseName;

double courseFee;

String courseDeliveryType;

String courseDurationType;

Set<Integer> employeeIDs = new HashSet<Integer>();

public Course(int courseID, String courseName, double courseFee, String courseDeliveryType,

String courseDurationType) {

super();

this.courseID = courseID;

this.courseName = courseName;

this.courseFee = courseFee;

this.courseDeliveryType = courseDeliveryType;

this.courseDurationType = courseDurationType;

this.employeeIDs = employeeIDs;

}

@Override

public String toString() {

return "Course [courseID=" + courseID + ", courseName=" + courseName + ", courseFee=" + courseFee

+ ", courseDeliveryType=" + courseDeliveryType + ", courseDurationType=" + courseDurationType

+ ", employeeIDs=" + employeeIDs + "]";

}

}

class Employee{

int empID;

String empName;

public Employee(int empID, String empName) {

super();

this.empID = empID;

this.empName = empName;

}

public Employee() {

super();

}

@Override

public String toString() {

return "Employee [empID=" + empID + ", empName=" + empName + "]";

}

}

**Lab Exercise No:**43

/\*Implement Lab Exercise 41 using Interfaces.\*/

**package** hsbc.com.day3;

**import** java.io.\*;

**interface** **class** Solution43 {

**public** **static** **void** main(String[] args)**throws** IOException {

// **TODO** Auto-generated method stub

InputStreamReader read=**new** InputStreamReader(System.***in***);

BufferedReader buf=**new** BufferedReader(read);

System.***out***.println("Radius: ");

**double** r=Double.*parseDouble*(buf.readLine());

System.***out***.println("Height: ");

**double** h=Double.*parseDouble*(buf.readLine());

Cylinder obj1=**new** Cylinder();

obj1.volume(r,h);

obj1.surfaceArea(r,h);

Sphere obj2=**new** Sphere();

obj2.volume(r,h);

obj2.surfaceArea(r,h);

Cube obj3=**new** Cube();

obj3.volume(r,h);

obj3.surfaceArea(r,h);

}

**interface** **void** volume(**double** r,**double** h);

**interface** **void** surfaceArea(**double** r,**double** h);

}

**class** Cylinder **implements** Solution43

{

**void** volume(**double** rad,**double** hei)

{

**double** volume=3.14\*rad\*rad\*hei;

System.***out***.println("Volume of Cylinder: "+volume);

}

**void** surfaceArea(**double** rad,**double** hei)

{

**double** sa=2\*3.14\*rad\*(rad+hei);

System.***out***.println("Surface Area of Cylinder: "+sa);

}

}

**class** Sphere **implements** Solution43

{

**void** volume(**double** rad,**double** hei)

{

**double** volume=(4\*3.14\*rad\*rad\*rad)/3;

System.***out***.println("Volume of Sphere: "+volume);

}

**void** surfaceArea(**double** rad,**double** hei)

{

**double** sa=4\*3.14\*rad\*rad;

System.***out***.println("Surface Area of Cylinder: "+sa);

}

}

**class** Cube **implements** Solution43

{

**void** volume(**double** rad,**double** hei)

{

**double** volume=hei\*hei\*hei;

System.***out***.println("Volume of Sphere: "+volume);

}

**void** surfaceArea(**double** rad,**double** hei)

{

**double** sa=6\*hei\*hei;

System.***out***.println("Surface Area of Cylinder: "+sa);

}

}

**Lab Exercise No:**44

/\*Create two interfaces namely Drawable and Fillable. Create class called Line, Circle, Square and

implement following methods through interface.

<I>Drawable ------ drawingColor(), thickness()

<I>Fillable ---------- fillingColor(), size()\*/

**package** hsbc.com.day3;

**public** **class** Solution44 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Line l=**new** Line();

l.drawingColor();

l.fillingColor();

l.size();

l.thickness();

Circle c=**new** Circle();

c.drawingColor();

c.fillingColor();

c.size();

c.thickness();

Square s=**new** Square();

s.drawingColor();

s.fillingColor();

s.size();

s.thickness();

}

}

**interface** drawable{

**void** drawingColor();

**void** thickness();

}

**interface** fillable{

**void** fillingColor();

**void** size();

}

**class** Line **implements** drawable,fillable

{

**public** **void** fillingColor() {

System.***out***.println("Line filling colour");

}

**public** **void** size() {

System.***out***.println("Line size");

}

**public** **void** drawingColor() {

System.***out***.println("Line drawing colour");

}

**public** **void** thickness() {

System.***out***.println("Line thickness");

}

}

**class** Circle **implements** drawable,fillable

{

**public** **void** fillingColor() {

System.***out***.println("Circle filling colour");

}

**public** **void** size() {

System.***out***.println("Circle size");

}

**public** **void** drawingColor() {

System.***out***.println("Circle drawing colour");

}

**public** **void** thickness() {

System.***out***.println("Circle thickness");

}

}

**class** Square **implements** drawable,fillable

{

**public** **void** fillingColor() {

System.***out***.println("Square filling colour");

}

**public** **void** size() {

System.***out***.println("Square size");

}

**public** **void** drawingColor() {

System.***out***.println("Square drawing colour");

}

**public** **void** thickness() {

System.***out***.println("Square thickness");

}

}

**Lab Exercise No:**45

/\*In Lab Exercise 39, create a package called finance and within it create an interface called

Payable. It should define the getPayInfo() method that all the worker classes will implement. Now display the details of the monthly pay of the workers\*/

**package** finance;

**public** **interface** payable {

**void** getPayInfo();

}

**package** hsbc.com.day3;

**import** finance.payable;

**abstract** **class** Worker **implements** payable {

**abstract** **void** pay(**int** hours);

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

dailyWorker dw=**new** dailyWorker("XYZ",700);

dw.pay(9);

dw.getPayInfo();

salariedWorker sw=**new** salariedWorker("Tanisha",1000);

sw.pay(8);

sw.getPayInfo();

}

}

**class** dailyWorker **extends** Worker{

String name;

**double** salaryRate;

**double** final\_pay=0;

**public** dailyWorker(String name, **double** salaryRate) {

**super**();

**this**.name = name;

**this**.salaryRate = salaryRate;

System.***out***.println("Name: "+name);

}

**public** **void** pay(**int** hours)

{

final\_pay=hours\*salaryRate;

}

**public** **void** getPayInfo()

{

System.***out***.println("Daily Worker pay: "+final\_pay);

System.***out***.println("Daily Worker name: "+name);

System.***out***.println("Daily Worker rate: "+salaryRate);

}

}

**class** salariedWorker **extends** Worker{

String name;

**double** salaryRate;

**double** final\_pay=0;

**public** salariedWorker(String name, **double** salaryRate) {

**super**();

**this**.name = name;

**this**.salaryRate = salaryRate;

System.***out***.println("Name: "+name);

}

**public** **void** pay(**int** hours)

{

final\_pay=8\*salaryRate;

}

**public** **void** getPayInfo()

{

System.***out***.println("Salaried Worker pay: "+final\_pay);

System.***out***.println("Salaried Worker name: "+name);

System.***out***.println("Salaried Worker rate: "+salaryRate);

}

}

**Lab Exercise No:**46

*Implementation of an interface*

**Exercise:***Createa package called bank with the following Interfaces.*

*<Interface> Account*

*<Interface>DepositAcc <Interface>LoanAcc*

*<Interface> Interest*

*<Interface>CreditInterest <Interface>DebitInterest*

1. *<Interface> Account*

*Data members: Four String variables to hold the account type “Savings, Fixed,PersonalLoan,*

*HousingLoan”*

*Methods: createAcc()*

1. *<Interface>DepositAcc*

*Methods: withdraw (), deposit(),getBalance()*

1. *<Interface>LoanAcc*

*Methods: repayPrincipal (),payInterest (),payPartialPrincipal ()*

1. *<Interface>Interest*

*Data members: Four double variables to hold the interest percentage of Savings account, Fixed*

*deposit account,PersonalLoan account and HousingLoan account.*

*Methods: calcInt()*

1. *<Interface>CreditInterest*

*Methods: addMonthlyInt(),addHalfYrlyInt(),addAnnualInt()*

1. *<Interface>DebitInterest*

*Methods: deductMonthlyInt(),deductHalfYrlyInt(),deductAnnualInt()*

*Create a package called BankImpl and create the following classes in it.*

1. *SavingsAcc which implements DepositAcc and CreditInterest*
2. *FDAcc which implements DepositAcc and CreditInterest*
3. *PersonalLoanAcc which implements LoanAcc and DebitInterest*
4. *HousingLoanAcc which implements LoanAcc and DebitInterest*

*Now create a class called MyAccount and create instances of all the accounts and generate appropriate output.*

**package** bank;

**public** **interface** account {

String ***savings***="Savings";

String ***fixed***="Fixed Deposit";

String ***personalLoan***="Personal Loan";

String ***housingLoan***="Housing Loan";

**public** **void** createAcc();

}

**interface** depositAcc **extends** account{

**public** **void** withdraw();

**public** **void** deposit();

**public** **void** getBalance();

}

**interface** LoanAcc **extends** account{

**public** **void** repayPrincipal();

**public** **void** payInterest();

**public** **void** payPartialPrincipal();

}

**interface** interest{

**double** ***interestSaving***=4.0;

**double** ***interestDeposit***=6.0;

**double** ***personalLoan***=11.4;

**double** ***housingLoan***=5.3;

**public** **void** calcInt();

}

**interface** creditInterest **extends** interest{

**public** **void** addMonthlyInt();

**public** **void** addHalfYrlyInt();

**public** **void** addAnnualInt();

}

**interface** debitInterest **extends** interest{

**public** **void** deductMonthlyInt();

**public** **void** deductHalfYrlyInt();

**public** **void** deductAnnualInt();

}

**package** bankImpl;

**import** bank.\*;

**public** **class** fdAcc **implements** depositAcc,creditInterest{

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

//implementing abstract methods

**public** **void** createAcc()

{

System.***out***.println("Open FD account");

}

**public** **void** calcInt()

{

System.***out***.println("FD account interest calculation");

}

**public** **void** addAnnualInt()

{

System.***out***.println("FD account- add annual interest");

}

**public** **void** addMonthlyInt()

{

System.***out***.println("FD account-add monhtly interest");

}

**public** **void** addHalfYrlyInt()

{

System.***out***.println("FD account- add half yearly interest");

}

**public** **void** withdraw()

{

System.***out***.println("FD account-withdraw");

}

**public** **void** deposit()

{

System.***out***.println("FD account-deposit");

}

**public** **void** getBalance()

{

System.***out***.println("FD account-Get Balance");

}

}

**package** bankImpl;

**import** bank.\*;

**public** **class** housingLoanAcc **implements** LoanAcc,debitInterest{

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

//implementing abstract methods

**public** **void** createAcc()

{

System.***out***.println("Open Housing Loan account");

}

**public** **void** repayPrincipal()

{

System.***out***.println("Housing Loan account-repay pprincipal");

}

**public** **void** payInterest()

{

System.***out***.println("Housing Loan account-payInterest");

}

**public** **void** payPartialPrincipal()

{

System.***out***.println("Housing Loan account-pay partial principal");

}

**public** **void** deductMonthlyInt(){

System.***out***.println("Housing Loan account-deduct monthly interest");

}

**public** **void** deductHalfYrlyInt()

{

System.***out***.println("Housing Loan account-deduct half yearly interest");

}

**public** **void** deductAnnualInt()

{

System.***out***.println("Housing Loan account-deduct annual interest");

}

}

**package** bankImpl;

**import** bank.\*;

**public** **class** personalLoanAcc **implements** LoanAcc,debitInterest{

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

//implementing abstract methods

**public** **void** createAcc()

{

System.***out***.println("Open Personal Loan account");

}

**public** **void** repayPrincipal()

{

System.***out***.println("Personal Loan account-repay pprincipal");

}

**public** **void** payInterest()

{

System.***out***.println("Personal Loan account-payInterest");

}

**public** **void** payPartialPrincipal()

{

System.***out***.println("Personal Loan account-pay partial principal");

}

**public** **void** deductMonthlyInt(){

System.***out***.println("Personal Loan account-deduct monthly interest");

}

**public** **void** deductHalfYrlyInt()

{

System.***out***.println("Personal Loan account-deduct half yearly interest");

}

**public** **void** deductAnnualInt()

{

System.***out***.println("Personal Loan account-deduct annual interest");

}

}

**package** bankImpl;

**import** bank.\*;

**public** **class** savingAcc **implements** depositAcc,creditInterest {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

//implementing abstract methods

**public** **void** createAcc()

{

System.***out***.println("Open Savings account");

}

**public** **void** calcInt()

{

System.***out***.println("Saving account interest calculation");

}

**public** **void** addAnnualInt()

{

System.***out***.println("Saving account- add annual interest");

}

**public** **void** addMonthlyInt()

{

System.***out***.println("Saving account-add monhtly interest");

}

**public** **void** addHalfYrlyInt()

{

System.***out***.println("Saving account- add half yearly interest");

}

**public** **void** withdraw()

{

System.***out***.println("Saving account-withdraw");

}

**public** **void** deposit()

{

System.***out***.println("Saving account-deposit");

}

**public** **void** getBalance()

{

System.***out***.println("Saving account-Get Balance");

}

}

**package** bankImpl;

**import** bank.account;

**public** **class** myAccount {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

savingAcc s=**new** savingAcc();

fdAcc f=**new** fdAcc();

personalLoanAcc p=**new** personalLoanAcc();

housingLoanAcc h=**new** housingLoanAcc();

s.createAcc();

s.deposit();

s.getBalance();

f.createAcc();

f.addHalfYrlyInt();

f.addAnnualInt();

p.createAcc();

p.deductMonthlyInt();

p.calcInt();

h.createAcc();

h.calcInt();

h.deductAnnualInt();

}

}

**Lab Exercise No:**47

/\*Create a class called BankAccount with deposit (), withdraw () and getBalance () methods. Create an inner class called InterestAdder and implement the interest calculations and add the interest to the current balance.

\*/

/\*Create a class called BankAccount with deposit (), withdraw () and getBalance () methods.

Create an inner class called InterestAdder and implement the interest calculations and add

the interest to the current balance.

\*/

**package** hsbc.com.day3;

**import** java.io.\*;

**public** **class** BankAccount47 {

String accName;

**double** accBalance;

**public** BankAccount47() {

**super**();

}

**public** BankAccount47(String accName, **double** accBalance) {

**super**();

**this**.accName = accName;

**this**.accBalance = accBalance;

}

**void** deposit(**double** depositAmount) {

**this**.accBalance += depositAmount;

}

**void** withdraw(**double** withdrawlAmount){

**this**.accBalance -= withdrawlAmount;

}

**void** getBalance(){

System.***out***.println("Current Balance is " + **this**.accName + " : " + **this**.accBalance);

}

**class** InterestAdder

{

**void** interest(**int** month) {

**double** i = (**double**)((month \* accBalance \* 0.12)/12);

accBalance += i;

System.***out***.println("Balance after " + month + " month(s) interest is : " + accBalance);

}

}

**public** **static** **void** main(String[] args)**throws** IOException {

// **TODO** Auto-generated method stub

InputStreamReader read=**new** InputStreamReader(System.***in***);

BufferedReader buf=**new** BufferedReader(read);

BankAccount47 ob=**new** BankAccount47("Tanisha",3446420);

BankAccount47.InterestAdder ob1=ob.**new** InterestAdder();

System.***out***.println("Balance: 3446420. Enter months");

**int** m=Integer.*parseInt*(buf.readLine());

ob1.interest(m);

}

}

**Lab Exercise No:**48

/\*Create a class called BankAccount with deposit (), withdraw () and getBalance () methods.

Create a local inner class inside the getBalance() method called InterestAdder and implement

the interest calculations and add the interest to the current balance.

\*/

**package** hsbc.com.day3;

**import** java.io.BufferedReader;

**import** java.io.IOException;

**import** java.io.InputStreamReader;

**import** hsbc.com.day3.BankAccount47.InterestAdder;

**public** **class** BankAccount48 {

String accName;

**double** accBalance;

**public** BankAccount48() {

**super**();

}

**public** BankAccount48(String accName, **double** accBalance) {

**super**();

**this**.accName = accName;

**this**.accBalance = accBalance;

}

**void** deposit(**double** depositAmount) {

**this**.accBalance += depositAmount;

}

**void** withdraw(**double** withdrawlAmount){

**this**.accBalance -= withdrawlAmount;

}

**void** getBalance(){

System.***out***.println("Current Balance is " + **this**.accName + " : " + **this**.accBalance);

}

**double** getBalanceInst(**int** months){

**class** InterestAdder {

**public** **double** interestAdder(**int** months) {

accBalance += (accBalance\* months \* 0.12 ) / 12;

**return** accBalance;

}

}

InterestAdder ia = **new** InterestAdder();

**return** ia.interestAdder(months);

}

**public** **static** **void** main(String[] args)**throws** IOException {

// **TODO** Auto-generated method stub

InputStreamReader read=**new** InputStreamReader(System.***in***);

BufferedReader buf=**new** BufferedReader(read);

BankAccount48 ob=**new** BankAccount48("Tanisha",3446420);

System.***out***.println("Balance: 3446420. Enter months");

**int** m=Integer.*parseInt*(buf.readLine());

System.***out***.println("Balance after " + m + " month(s) interest is : " + ob.getBalanceInst(m));

}

}

**Lab Exercise No:**49

/\*Create a class called BankAccount with deposit (), withdraw () and getBalance () methods. Create an anonymous inner class in the getBalance() method to do the interest calculations

and add the interest to the current balance\*/

package hsbc.com.day3;

abstract class Calculate{

abstract int interest();

}

public class BankAccount {

public int bal,interest;

void deposit(int n) {

bal=bal+n;

}

void withdraw(int n) {

bal=bal-n;

}

int getbal()

{

Calculate obj1=new Calculate() {

int interest() {

return((bal\*12)/(100\*12));

}

};

bal=bal+obj1.interest();

return bal;

}

public static void main(String[] args) {

// TODO Auto-generated method stub

BankAccount obj2=new BankAccount();

obj2.deposit(1000);

System.out.println(obj2.getbal());

}

}