**Day 3 Lab Solutions**

**Solution 34:**

**package** com.hsbc.example;

/\*

\* Lab Solution 34

\* Program to understand concept of inheritance

\*/

**public** **class** Road {

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

Truck t = **new** Truck();

t.printMethood();

Car c = **new** Car();

c.printMethood();

Bus b = **new** Bus();

b.printMethood();

}

}

**class** Vehicle{

**public** Vehicle() {

**super**();

}

**public** **void** printMethood() {

System.***out***.println("This is class Vehicle");

}

}

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

**public** Car() {

**super**();

}

**public** **void** printMethood() {

System.***out***.println("This is class Car");

}

}

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

**public** Truck() {

**super**();

}

**public** **void** printMethood() {

System.***out***.println("This is class Truck");

}

}

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

**public** Bus() {

**super**();

}

**public** **void** printMethood() {

System.***out***.println("This is class Bus");

}

}

**Solution 35:**

**package** com.hsbc.example;

/\*

\* Lab Solution 35

\* Program to understand concept of Super Keyword

\*/

**public** **class** Road {

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

Truck t = **new** Truck();

t.printMethood();

t.displayMethood();

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

Car c = **new** Car();

c.printMethood();

c.displayMethood();

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

Bus b = **new** Bus();

b.printMethood();

b.displayMethood();

}

}

**class** Vehicle{

**public** Vehicle() {

**super**();

}

**private** **int** vWheels;

**private** String vColor;

**private** String vModel;

**public** Vehicle(**int** vWheels, String vColor, String vModel) {

**super**();

**this**.vWheels = vWheels;

**this**.vColor = vColor;

**this**.vModel = vModel;

}

**public** **int** getvWheels() {

**return** vWheels;

}

**public** **void** setvWheels(**int** vWheels) {

**this**.vWheels = vWheels;

}

**public** String getvColor() {

**return** vColor;

}

**public** **void** setvColor(String vColor) {

**this**.vColor = vColor;

}

**public** String getvModel() {

**return** vModel;

}

**public** **void** setvModel(String vModel) {

**this**.vModel = vModel;

}

**public** **void** printMethood() {

System.***out***.println("This is class Vehicle");

}

}

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

**public** Car() {

**super**(4,"White","Audi A4");

}

**public** **void** printMethood() {

System.***out***.println("This is class Car");

}

**public** **void** displayMethood() {

System.***out***.println("Total Wheels : "+**this**.getvWheels());

System.***out***.println("Color : "+**this**.getvColor());

System.***out***.println("Model : "+**this**.getvModel());

}

}

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

**public** Truck() {

**super**(8,"RedOranage","Metato");

}

**public** **void** displayMethood() {

System.***out***.println("Total Wheels : "+**this**.getvWheels());

System.***out***.println("Color : "+**this**.getvColor());

System.***out***.println("Model : "+**this**.getvModel());

}

**public** **void** printMethood() {

System.***out***.println("This is class Truck");

}

}

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

**public** Bus() {

**super**(12,"Blue","Volvo");

}

**public** **void** displayMethood() {

System.***out***.println("Total Wheels : "+**this**.getvWheels());

System.***out***.println("Color : "+**this**.getvColor());

System.***out***.println("Model : "+**this**.getvModel());

}

**public** **void** printMethood() {

System.***out***.println("This is class Bus");

}

}

**Solution 39:**

**package** com.hsbc.example;

**import** java.util.Scanner;

/\*

\* Lab Solution 39

\* This code is to understand concept of Polymorphism

\*/

**public** **class** LabSolution39 {

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

DailyWorker d = **new** DailyWorker();

d.pay();

SalariedWorker sw = **new** SalariedWorker();

sw.pay();

}

}

**class** Worker{

**protected** String workerName;

**protected** **int** workerSalaryRate;

**public** String getWorkerName() {

**return** workerName;

}

**public** **void** setWorkerName(String workerName) {

**this**.workerName = workerName;

}

**public** **int** getWorkerSalaryRate() {

**return** workerSalaryRate;

}

**public** **void** setWorkerSalaryRate(**int** workerSalaryRate) {

**this**.workerSalaryRate = workerSalaryRate;

}

}

**class** DailyWorker **extends** Worker{

Scanner sc = **new** Scanner(System.***in***);

**void** pay() {

DailyWorker d = **new** DailyWorker();

System.***out***.println("Daily Worker Salary");

System.***out***.println("Enter total hours worked : ");

**int** hrs = sc.nextInt();

System.***out***.println("Enter Daily Based Salary: ");

d.setWorkerSalaryRate(sc.nextInt());

System.***out***.println("Total Salary for Dailyworker : "+hrs\*d.getWorkerSalaryRate());

}

}

**class** SalariedWorker **extends** Worker{

Scanner s = **new** Scanner(System.***in***);

**void** pay() {

SalariedWorker sw = **new** SalariedWorker();

System.***out***.println("Salaried Worker Salary");

System.***out***.println("Enter Salary Per Hour : ");

sw.setWorkerSalaryRate(s.nextInt());

System.***out***.println("Total Salary for Salaried Worker :"+ 40\*sw.getWorkerSalaryRate());

}

}

**Solution 41:**

**package** com.hsbc.example;

/\*

\* Lab Solution 41

\* This code is to understand concept of Abstract Classes

\*/

**public** **class** LabSolution41 {

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

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

Sphere s = **new** Sphere();

s.surfaceArea();

s.volume();

Cube c = **new** Cube();

c.surfaceArea();

c.volume();

Cylinder cd = **new** Cylinder();

cd.surfaceArea();

cd.volume();

}

}

**abstract** **class** Shape3D {

**abstract** **public** **void** surfaceArea();

**abstract** **public** **void** volume();

**float** pi = 3.14f;

}

//Declared methoods in abstract classes and implemented in sub classes

**class** Sphere **extends** Shape3D{

@Override

**public** **void** surfaceArea() {

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

**int** radius = 5;

**double** area = (**double**)4\*pi\*radius\*radius;

System.***out***.println("Surface area of Sphere :"+area);

}

@Override

**public** **void** volume() {

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

**int** radius = 5;

**double** volume = (**double**)1.34\*pi\*radius\*radius\*radius;

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

}

}

**class** Cylinder **extends** Shape3D{

@Override

**public** **void** surfaceArea() {

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

**int** radius = 4;

**int** height = 5;

**double** area = 2\*pi\*radius\*radius + pi\*radius\*height;

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

}

@Override

**public** **void** volume() {

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

**int** radius = 6;

**int** height = 5;

**double** volume =(**double**)pi\*radius\*radius\*height;

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

}

}

**class** Cube **extends** Shape3D{

@Override

**public** **void** surfaceArea() {

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

**int** side = 6;

**double** area = (**double**)side\*side;

System.***out***.println("Surface area of Cube :"+area);

}

@Override

**public** **void** volume() {

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

**int** side = 8;

**double** volume = (**double**)side\*side\*side;

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

}

}

**Solution 42:**

**package** com.hsbc.example;

/\*

\* Lab Solution 42

\* This code is to understand concept of Abstract Classes

\*/

**import** java.util.Arrays;

**import** java.util.HashSet;

**import** java.util.Scanner;

**import** java.util.Set;

**public** **class** LabSolution42 **extends** Menu {

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

**static** Course[] *course* = {

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

**new** Course(2, "EnTC", 3000, "Classroom", "Full-time" ) ,

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

**new** Course(4, "IT", 5000, "Classroom", "Full-time")

};

Employee[] employees = {

**new** Employee (1, "Pranav"),

**new** Employee (2, "Pradnya"),

**new** Employee (3, "Abhishek"),

**new** Employee (4, "Honey"),

**new** Employee (5, "Ria")

};

**static** LabSolution42 *Solution* = **new** LabSolution42();

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

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

Scanner sc = **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 = sc.nextInt();

**int** eID = 0;

**int** cID = 0;

**switch** (i) {

**case** 1 :

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

cID = sc.nextInt();

eID = sc.nextInt();

*Solution*.registerForCourse(cID-1, eID);

**break**;

**case** 2:

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

cID = sc.nextInt();

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

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

eID = sc.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((sc.nextInt()) - 1);

**break**;

}

*main*(args);

s.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 + "]";

}

}

**Solution 43:**

**package** com.hsbc.example;

**public** **class** LabSolution43 {

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

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

NewCube c = **new** NewCube();

c.surfaceArea();

c.volume();

NewCylinder cd = **new** NewCylinder();

cd.surfaceArea();

cd.volume();

NewSphere s = **new** NewSphere();

s.surfaceArea();

s.volume();

}

}

**interface** Shapes3D {

**public** **void** surfaceArea();

**public** **void** volume();

**float** ***pi*** = 3.14f;

}

**class** NewCube **implements** Shapes3D{

@Override

**public** **void** surfaceArea() {

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

**int** side = 6;

**double** area = (**double**)side\*side;

System.***out***.println("Surface area of Cube :"+area);

}

@Override

**public** **void** volume() {

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

**int** side = 8;

**double** volume = (**double**)side\*side\*side;

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

}

}

**class** NewCylinder **implements** Shapes3D{

@Override

**public** **void** surfaceArea() {

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

**int** radius = 4;

**int** height = 5;

**double** area = 2\****pi***\*radius\*radius + ***pi***\*radius\*height;

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

}

@Override

**public** **void** volume() {

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

**int** radius = 6;

**int** height = 5;

**double** volume =(**double**)***pi***\*radius\*radius\*height;

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

}

}

**class** NewSphere **implements** Shapes3D{

@Override

**public** **void** surfaceArea() {

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

**int** radius = 5;

**double** area = (**double**)4\****pi***\*radius\*radius;

System.***out***.println("Surface area of Sphere :"+area);

}

@Override

**public** **void** volume() {

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

**int** radius = 5;

**double** volume = (**double**)1.34\****pi***\*radius\*radius\*radius;

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

}

}

**Solution 44:**

**package** com.hsbc.example;

**public** **class** LabSolution44 {

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

// Calling methods in main function

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

l.drawingColor();

l.fillingColor();

l.size();

l.thickenss();

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

c.drawingColor();

c.fillingColor();

c.size();

c.thickenss();

Square sq = **new** Square();

sq.drawingColor();

sq.fillingColor();

sq.thickenss();

sq.size();

}

}

**interface** Fillable{

**public** **void** size();

**public** **void** fillingColor();

}

**interface** Drawable{

**public** **void** drawingColor();

**public** **void** thickenss();

}

//single class implementing methoods of two different interfaces

**class** Line **implements** Fillable, Drawable {

@Override

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

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

System.***out***.println("This DrawColor Methood of Line ");

}

@Override

**public** **void** thickenss() {

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

System.***out***.println("This Thick Methood of Line ");

}

@Override

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

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

System.***out***.println("This Size Methood of Line ");

}

@Override

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

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

System.***out***.println("This FillColor Methood of Line ");

}

}

**class** Circle **implements** Fillable, Drawable {

@Override

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

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

System.***out***.println("This DrawColor Methood of Circle ");

}

@Override

**public** **void** thickenss() {

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

System.***out***.println("This Thick Methood of Circle ");

}

@Override

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

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

System.***out***.println("This Size Methood of Circle ");

}

@Override

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

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

System.***out***.println("This FillColor Methood of Circle ");

}

}

**class** Square **implements** Fillable, Drawable {

@Override

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

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

System.***out***.println("This DrawColor Methood of Square ");

}

@Override

**public** **void** thickenss() {

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

System.***out***.println("This Thick Methood of Square ");

}

@Override

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

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

System.***out***.println("This Size Methood of Square ");

}

@Override

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

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

System.***out***.println("This FillColor Methood of Square ");

}

}

**Solution 45:**

**Solution 46:**

**Solution 47:**

**package** com.hsbc.example;

/\*

\* Lab Solution 47

\* This code is to undertsand the concept of Inner and Outer Class

\*/

**public** **class** LabSolution47 {

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

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

BankAccount outer = **new** BankAccount();

BankAccount.IntrestAdder inner = outer.**new** IntrestAdder();

outer.setBalance(1000);

outer.setDepositAmount(250);

outer.deposit();

outer.setWithdrawAmount(100);

outer.withdrawAmount();

inner.IntrestAmount();

outer.getBal();

System.***out***.println(outer.getBal());

}

}

**class** BankAccount {

**private** **double** balance;

**private** **double** depositAmount;

**private** **double** withdrawAmount;

**private** **double** intrest = 0;

//Getter Setters Methods

**public** **double** getBalance() {

**return** balance;

}

**public** **void** setBalance(**double** balance) {

**this**.balance = balance;

}

**public** **double** getDepositAmount() {

**return** depositAmount;

}

**public** **void** setDepositAmount(**double** depositAmount) {

**this**.depositAmount = depositAmount;

}

**public** **double** getWithdrawAmount() {

**return** withdrawAmount;

}

**public** **void** setWithdrawAmount(**double** withdrawAmount) {

**this**.withdrawAmount = withdrawAmount;

}

**public** **double** getIntrest() {

**return** intrest;

}

**public** **void** setIntrest(**double** intrest) {

**this**.intrest = intrest;

}

//3 methods

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

**this**.balance = **this**.balance + depositAmount;

}

**public** **void** withdrawAmount() {

**this**.balance = **this**.balance - withdrawAmount;

}

**public** **double** getBal() {

**return** **this**.balance += getIntrest();

}

**class** IntrestAdder{

**void** IntrestAmount() {

setIntrest((balance\*0.12)/0.12);

}

}

}

**Solution 49:**

**package** com.hsbc.example;

**abstract** **class** Calculate{

**abstract** **int** interest();

}

**class** BankAcc{

**public** **int** balance, interest;

**void** deposit(**int** x) {

balance = balance+x;

}

**void** withdraw(**int** x) {

balance = balance-x;

}

**int** getBalance() {

Calculate p=**new** Calculate(){

**int** interest(){

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

}

};

balance=balance+p.interest();

**return** balance;

}

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

{

BankAccount b=**new** BankAccount();

b.deposit(5);

System.out.println(b.getBalance());