

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT on

**Object Oriented Java Programming
(23CS3PCOOJ)**

Submitted by

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in partial fulfilment for the award of the degree of
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CERTIFICATE

This is to certify that the Lab work entitled “Object Oriented Java Programming (23CS3PCOOJ)” carried out by **BHAKTI BASAVARAJ VARADAI (1BM24IC015)**, who is Bonafide student of **B.M.S. College of Engineering**. It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object-Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

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Github Link:

<https://github.com/Bhaktivaradai/JAVA>

Program 1

Implement Quadratic Equation

```

import java.util.Scanner;
import java.util.lang;
public class Lab1{

    public static void main(String[] args){
        Scanner s=new Scanner(System.in);
        int a,b,c;
        double r1,r2;
        System.out.println("Enter the value for a,b and c :");
        a=s.nextInt();
        b=s.nextInt();
        c=s.nextInt();
        if(a==0){
            System.out.println("Not a quadratic equation");
            a=s.nextInt();
        }
        float d=(b*b)-(4*a*c);
        if(d==0){
            r1=(-b)/((double)(2*a));
            System.out.println("Roots are real and equal");
            System.out.println("Root 1 = "+r1);
            System.out.println("Root 2 = "+r1);
        }
        else if(d>0){
            r1=(-b+Math.sqrt(d))/((double)(2*a));
            r2=(-b-Math.sqrt(d))/((double)(2*a));
            System.out.println("Roots are real and distinct ");
            System.out.println("Root1 = "+r1);
            System.out.println("Root2 = "+r2);
        }
    }
}

```

```

    }
    else if(d>0){
        r1=(-b+Math.sqrt(d))/(double)(2*a);
        r2=(-b-Math.sqrt(d))/(double)(2*a);
        System.out.println(x: "Roots are real and distinct ");
        System.out.println("Root1 = "+r1);
        System.out.println("Root2 = "+r2);
    }
    else if (d<0){
        r1=(-b)/(double)(2*a);
        r2=(Math.sqrt(-d))/(double)(2*a);
        System.out.println(x: "Roots are imaginary");
        System.out.println("Root1 = "+r1+"+"+r2);
        System.out.println("Root2 = "+r1+"+"+r2);
    }
}
}

```

OUTPUT

```

Enter the value for a,b and c :
1
2
3
Roots are imaginary
Root1 = -1.0+1.4142135623730951
Root2 = -1.0+1.4142135623730951
Press any key to continue . . .

```

Program 2 : STUDENT SGPA

```
import java.util.Scanner;
class Subject{
    int subjectMarks;
    int credits;
    int grade;
}
class Student{
    String name,usn;
    double sgpa;
    Scanner s;
    Subject [] subject;
    Student(){
        s=new Scanner(System.in);
        subject=new Subject[8];
        for(int i=0;i<8;i++){
            subject[i]=new Subject();
        }
    }
    public void getdetails(){
        System.out.print("Enter the name : ");
        name=s.nextLine();
        System.out.print("Enter usn : ");
        usn=s.nextLine();
    }
}
```

```

public void getmarks(){
    for(int i=0;i<8;i++){
        System.out.print("Enter marks for subject "+(i+1)+":");
        subject[i].subjectMarks=s.nextInt();
        System.out.print("Enter credit for subject "+(i+1)+":");
        subject[i].credits=s.nextInt();
        subject[i].grade=(subject[i].subjectMarks/10)+1;
        if(subject[i].grade>10){
            subject[i].grade=10;
        }
        if(subject[i].grade<=4){
            subject[i].grade=4;
        }
    }
}

public void computesgpa(){
    int totalcredits=0;
    int effectivescore=0;
    for(int i=0;i<8;i++){
        effectivescore=(subject[i].subjectMarks*subject[i].credits);
        totalcredits+=subject[i].credits;
    }
    sgpa=(double)(effectivescore)/(double)(totalcredits);
}
}

```

```

        System.out.println("Name : "+name);
        System.out.println("USN : "+usn);
        System.out.println("SGPA : "+sgpa);
    }
}

public class Lab2{
    public static void main(String[] args){
        Student st = new Student();
        st.getdetails();
        st.getmarks();
        st.computesgpa();
        st.display();
    }
}

```


output

```
Run and Debug open a folder
laur undefined - VS Code Console
Enter the name : Khushi
Enter usn : 1BM24IC023
Enter marks for subject 1:40
Enter credit for subject 1:3
Enter marks for subject 2:50
Enter credit for subject 2:5
Enter marks for subject 3:67
Enter credit for subject 3:6
Enter marks for subject 4:78
Enter credit for subject 4:7
Enter marks for subject 5:89
Enter credit for subject 5:8
Enter marks for subject 6:67
Enter credit for subject 6:9
Enter marks for subject 7:57
Enter credit for subject 7:6
Enter marks for subject 8:50
Enter credit for subject 8:8
Name : Khushi
USN : 1BM24IC023
SGPA :7.6923076923076925
Press any key to continue . . .
```

Program 3: BOOK

```
import java.util.Scanner;
class Book{
    String name;
    String author;
    int numPages;
    int price;
    Book(String name,String author,int numPages,int price){
        this.name=name;
        this.author=author;
        this.numPages=numPages;
        this.price=price;
    }
    public String toString(){
        String name ,author,numPages,price;
        name="Book name : " +this.name+"\n";
        author="Book author : "+this.author+"\n";
        numPages="Number of pages : "+this.numPages+"\n";
        price="Price : "+this.price+"\n";
        return name+author+numPages+ price;
    }
}
public class Lab3{
    public static void main(String[] args){
        Scanner s=new Scanner(System.in);
        String name;
        String author;
        int numPages;
        int price;
```

```

public class Lab3{
    public static void main(String[] args){
        Scanner s=new Scanner(System.in);
        String name;
        String author;
        int numPages;
        int price;

        System.out.print(s: "Enter the number of books : ");
        int n=s.nextInt();
        Book [] b;
        b=new Book[n];
        for(int i=0;i<n;i++){
            System.out.print("Enter the name of the book "+(i+1)+" :");
            name=s.next();
            System.out.print("Enter the author of the book "+(i+1)+" :");
            author=s.next();
            System.out.print("Enter the number of pages in the book "+(i+1)+" :");
            numPages=s.nextInt();
            System.out.print("Enter the price of the book "+(i+1)+" :");
            price=s.nextInt();
            b[i]=new Book(name,author,numPages,price);
        }
        for(int i=0;i<n;i++){
            System.out.println(b[i].toString());
        }
    }
}

```

OUTPUT

```
Enter the number of books : 2
Enter the name of the book 1:HarryPotter
Enter the author of the book 1:JKRowling
Enter the number of pages in the book 1:1000
Enter the price of the book 1:300
Enter the name of the book 2:Panchatantra
Enter the author of the book 2:VishnuSharma
Enter the number of pages in the book 2:1050
Enter the price of the book 2:400
Book name: HarryPotter
Author name: JKRowling
Price: 1000
Number of pages: 300

Book name: Panchatantra
Author name: VishnuSharma
Price: 1050
Number of pages: 400

Press any key to continue . . . _
```

Program 4: ABSTRACT CLASS

```
import java.util.Scanner;
class InputScanner{
    Scanner s=new Scanner(System.in);
}
abstract class Shape extends InputScanner{
    int dimension1;
    int dimension2;
    abstract void printArea();
}
class Rectangle extends Shape{
    void input(){
        System.out.print(s: "Enter the dimensions of rectecgle (length and breadth) : ");
        dimension1=s.nextInt();
        dimension2=s.nextInt();
    }
    void printArea(){
        double area=dimension1*dimension2;
        System.out.println("Area of rectangle is :"+area);
    }
}
class Triangle extends Shape{
    void input(){
        System.out.println(x: "Enter the dimension(height and breadth): ");
        dimension1=s.nextInt();
        dimension2=s.nextInt();
    }
    void printArea(){
        double area=0.5*dimension1*dimension2;
        System.out.println("Area of triangle is : "+area);
    }
}
```

```

class Circle extends Shape{
    void input(){
        System.out.println(x: "Enter the dimenson(radius) :");
        dimension1=s.nextInt();
    }
    void printArea(){
        double area=Math.PI*dimension1*dimension1;
        System.out.println("Area is :"+area);
    }
}

public class Lab4{
    public static void main(String[] args){
        Rectangle r=new Rectangle();
        Triangle t=new Triangle();
        Circle c=new Circle();
        r.input();
        t.input();
        c.input();
        r.printArea();
        t.printArea();
        c.printArea();
    }
}

```

OUTPUT

```

Enter the dimensions of the rectangle (length and breadth):
2 3
Enter the dimensions of the triangle (base and height):
2 4
Enter the dimension of the circle (radius):
3
Area of Rectangle = 6.0
Area of Triangle = 4.0
Area of Circle = 28.259999999999998

```


Program 5: BANK

```
import java.util.Scanner;
import java.lang.Math;
abstract class Account{
    protected String customerName;
    protected String accountNumber;
    protected String accountType;
    protected double balance;
    Account(String customerName,String accountNumber,String accountType,double initialBalance){
        this.customerName=customerName;
        this.accountNumber=accountNumber;
        this.accountType=accountType;
        this.balance=initialBalance;
    }
    public void deposit(double amount){
        if(amount>0){
            balance+=amount;
            System.out.println("Deposit:$"+amount);
            displayBalance();
        }
    }
    public void displayBalance(){
        System.out.println("current balance for"+customerName+"("+accountType+") : $" +balance);
    }
    public abstract void computeAndDepositInterest();
    public abstract void permitWithdrawal(double amount);
    public abstract void checkForMinimumBalance();
}
```

```

class SavAcct extends Account{
    private static final double RATE=0.05;
    public SavAcct(String customerName,String accountNumber,double initialBalance){
        super(customerName,accountNumber,accountType: "Savings",initialBalance);
    }
    @Override
    public void computeAndDepositInterest(){
        double interest=balance*RATE;
        balance+=interest;
        System.out.println("Interest (5%) of $" +interest+"deposited");
        displayBalance();
    }
    @Override
    public void permitWithdrawal(double amount){
        if(amount>0 && balance>=amount){
            balance-=amount;
            System.out.println("Withdrew :$" +amount);
            displayBalance();
        }else{
            System.out.println(x: "Insufficient funds or invalid withdrawal amount");
        }
    }
    @Override
    public void checkForMinimumBalance(){

```



```

class CurrAcct extends Account{
    private static final double Min_balance=500.0;
    private static final double PENALTY=50.0;

    public CurrAcct(String customerName,String accountNumber,double initialBalance){
        super(customerName,accountNumber,accountType: "Current ",initialBalance);
    }
    @Override
    public void computeAndDepositInterest(){
        System.out.println(x: "Current ban does not earn interest");
    }
    @Override
    public void permitWithdrawal(double amount){
        if(amount>0 && balance>=amount){
            balance-=amount;
            System.out.println("Withdrew :$"+amount);
            checkForMinimumBalance();
        }else{
            System.out.println(x: "Insufficient funds or invalid withdrawal amount");
        }
    }
}

```

```

    @Override
    public void permitWithdrawal(double amount){
        if(amount>0 && balance>=amount){
            balance-=amount;
            System.out.println("Withdrew :$"+amount);
            checkForMinimumBalance();
        }else{
            System.out.println(x: "Insufficient funds or invalid withdrawal amount");
        }
    }
    @Override
    public void checkForMinimumBalance(){
        if(balance<Min_balance && balance>0){
            balance-=PENALTY;
            System.out.println("bALANCE FELL BELOW OF $"+Min_balance+"."+PENALTY+"imposed");
            displayBalance();
        }else if(balance<=0){
            System.out.println(x: "Account is overdrawn or empty.no further actions possible");
        }
    }
}

```

```

public class BankDemo{
    public static void main(String[] args) {
        System.out.println(x: "---TESTING SAVNGS ACCOUNT");
        SavAcct sa = new SavAcct(customerName: "Alice",accountNumber: "SA1234",initialBalance: 1000.0);
        sa.displayBalance();
        sa.deposit(amount: 200.0);
        sa.permitWithdrawal(amount: 50.0);
        sa.computeAndDepositInterest();
        sa.checkForMinimumBalance();
        System.out.println(x: "---TESTING CURRENT ACCOUNT");
        CurrAcct ca = new CurrAcct(customerName: "BOB",accountNumber: "CA1234",initialBalance: 600.0);
        ca.displayBalance();
        ca.deposit(amount: 50.0);
        ca.computeAndDepositInterest();
        ca.permitWithdrawal(amount: 100.0);
        ca.checkForMinimumBalance();
    }
}

```

OUTPUT

```

---TESTING SAVNGS ACCOUNT
current balance forAlice(Savings) : $1000.0
Deposit:$200.0
current balance forAlice(Savings) : $1200.0
Withdrew :$50.0
current balance forAlice(Savings) : $1150.0
Interest (5%) of $57.5deposited
current balance forAlice(Savings) : $1207.5
---TESTING CURRENT ACCOUNT
current balance forBOB(Current ) : $600.0
Deposit:$50.0
current balance forBOB(Current ) : $650.0
Current ban does not earn interest
Withdrew :$100.0
Press any key to continue . . .

```

Program 6: PACKAGE

PACKAGE CIE

```

package CIE;
import java.util.Scanner;
public class Internals extends Student{
    protected int cieMarks[]=new int[5];
    public void inputCIEmarks(){
        Scanner s=new Scanner(System.in);
        for(int i=0;i<5;i++){
            System.out.print("Enter CIE marks for subject "+(i+1)+" : ");
            cieMarks[i]=s.nextInt();
        }
    }
}

```

```

package CIE;
import java.util.Scanner;
public class Student{
    protected String usn=new String();
    protected String name =new String();
    protected int sem;
    public void inputStudentDetails(){
        Scanner s=new Scanner(System.in);
        System.out.println("Enter student name, USN and sem: ");
        name=s.next();
        usn=s.next();
        sem=s.nextInt();
    }
    public void displayStudentDetails(){
        System.out.println("Name: "+name);
        System.out.println("USN: "+usn);
        System.out.println("Sem: "+sem);
    }
}

```

PACKAGE SEE

```

package SEE;
import CIE.Internals;
import java.util.Scanner;
public class Externals extends Internals{
    protected int seeMarks[]=new int[5];
    protected int finalMarks[]=new int[5];
    public void inputSEEmarks(){
        Scanner s=new Scanner(System.in);
        for(int i=0;i<5;i++){
            System.out.print("Enter SEE marks for subject "+(i+1)+": ");
            seeMarks[i]=s.nextInt();
        }
    }
    public void calculateFinalMarks(){
        for(int i=0;i<5;i++){
            finalMarks[i]=seeMarks[i]+cieMarks[i];
        }
    }
    public void displayFinalMarks(){
        System.out.println("---Final Marks---");
        for(int i=0;i<5;i++){
            System.out.println("Subject "+(i+1)+": "+finalMarks[i]);
        }
    }
}

```

```

import SEE.Externals;
import java.util.Scanner;
public class Lab6 {
    public static void main(String[] args) {
        Scanner s=new Scanner(System.in);
        System.out.println("Enter no. of students: ");
        int n=s.nextInt();
        Externals[] students=new Externals[n];
        for(int i=0;i<n;i++){
            System.out.println("Enter details of student "+(i+1)+": ");
            students[i]=new Externals();
            students[i].inputStudentDetails();
            students[i].inputCIEmarks();
            students[i].inputSEEmarks();
            students[i].calculateFinalMarks();
        }
        for(int i=0;i<n;i++){
            System.out.println("\nStudent "+(i+1));
        }
    }
}

```

```
        students[i].displayFinalMarks();  
    }  
}
```

OUTPUT

```
Enter no. of students:  
1  
Enter details of student 1:  
Enter student name, USN and sem:  
Alice  
1BM24CS100  
3  
Enter CIE marks for subject 1: 40  
Enter CIE marks for subject 2: 40  
Enter CIE marks for subject 3: 50  
Enter CIE marks for subject 4: 35  
Enter CIE marks for subject 5: 40  
Enter SEE marks for subject 1: 35  
Enter SEE marks for subject 2: 45  
Enter SEE marks for subject 3: 48  
Enter SEE marks for subject 4: 40  
Enter SEE marks for subject 5: 35  
  
Student 1  
---Final Marks---  
Subject 1: 75  
Subject 2: 85  
Subject 3: 98  
Subject 4: 75  
Subject 5: 75
```


PROGRAM 7: EXCEPTION

```
import java.util.Scanner;
class WrongAge extends Exception{
    WrongAge(){
        super(message: "Age Error");
    }
    WrongAge(String msg){
        super(msg);
    }
}

class InputScanner{
    Scanner s=new Scanner(System.in);
}

class Father extends InputScanner{
    int fatherAge;
    Father() throws WrongAge{
        System.out.println(x: "Enter the father age:");
        fatherAge =s.nextInt();
        if(fatherAge<0){
            throw new WrongAge(msg: "Age cannot be negative");
        }
    }
    public void displayFatherAge(){
        System.out.println("Father age is :"+ fatherAge);
    }
}
```

```

class Son extends Father{
    int sonAge;
    Son() throws WrongAge{
        System.out.println(x: "Enter the son age:");

        sonAge=s.nextInt();
        if(sonAge>fatherAge){
            throw new WrongAge(msg: "Son age cannot be greater than father's age");
        }
        else if(sonAge<0){
            throw new WrongAge(msg: "Age cannot be negative,throw new WrongAge");
        }
    }
    public void displaySonAge(){
        System.out.println("Son age is :"+ fatherAge);
    }
}
}

```

```

class ExceptionClass{
    public static void main(String[] args) {
        try{
            Father f=new Father();
            Son s=new Son();
            f.displayFatherAge();
            s.displaySonAge();
        }

        catch(Exception e){
            System.out.println(e.getMessage());
        }
    }
}
}

```

OUTPUT

```
Enter the father age:  
23  
Enter the son age:  
24  
Son age cannot be greater than father's age  
Press any key to continue . . .
```


PROGRAM 8: MULTITHREADING

```
class BMS extends Thread
{
    public void run()
    {
        try {
            for(int i=5;i>=1;i--){
                System.out.println("BMS COLLEGE OF ENGINEERING : " + i);
                Thread.sleep(10000);
            }
        } catch (InterruptedException e) {
            System.out.println("BMS Thread is quitting");
        }
    }
}

class CS extends Thread{
    public void run()
    {
        try {
            for(int i=5;i>=1;i--){
                System.out.println("COMPUTR SCIENCE: " + i);
                Thread.sleep(2000);
            }
        } catch (InterruptedException e) {
            System.out.println("CS Thread is quitting");
        }
    }
}
```

```
public class BMS_CS{
    public static void main(String args[])
    {
        BMS b=new BMS();
        CS cs=new CS();
        b.start();
        cs.start();
    }
}
```

OUTPUT

```
BMS COLLEGE OF ENGINEERING :5  
COMPUTR SCIENCE: 5  
COMPUTR SCIENCE: 4  
COMPUTR SCIENCE: 3  
COMPUTR SCIENCE: 2  
COMPUTR SCIENCE: 1  
BMS COLLEGE OF ENGINEERING :4  
BMS COLLEGE OF ENGINEERING :3  
BMS COLLEGE OF ENGINEERING :2  
BMS COLLEGE OF ENGINEERING :1  
Press any key to continue . . .
```