**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**
**"JnanaSangama", Belgaum -590014, Karnataka.**

# LAB REPORT
**on**

# OBJECT ORIENTED JAVA LAB
# (22CS3PC00J)

***Submitted by***

**Anagha K S**
**(1BM21CS021)**

***in partial fulfillment for the award of the degree of***
**BACHELOR OF ENGINEERING**
***in***
**COMPUTER SCIENCE AND ENGINEERING**

**B.M.S. COLLEGE OF ENGINEERING**
**(Autonomous Institution under VTU)**
**BENGALURU-560019**
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**B. M. S. College of Engineering,**
**Bull Temple Road, Bangalore 560019**

(Affiliated To Visvesvaraya Technological University, Belgaum)
**Department of Computer Science and Engineering**


# CERTIFICATE

This is to certify that the Lab work entitled "**OBJECT ORIENTED JAVA LAB** (22CS3PCOOJ)" carried out by Anagha K S**(1BM21CS021),** who is bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a object oriented java lab(22CS3PCOOJ) work prescribed for the said degree.

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# Index

**PROGRAM -01**

**QUESTION:** Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions.

**CODE:**

```
importjava.util.*;

                class QuadraticEquation{

                public static void main(String args[]){

                        Scanner sc = new Scanner(System.in);

                                System.out.println("Enter value of a: ");
                                double a = sc.nextDouble();

                                System.out.println("Enter value of b: ");
                                double b = sc.nextDouble();

                                System.out.println("Enter value of c: ");
                                double c = sc.nextDouble();

                                double d = (b*b)-(4*a*c);

                                if (d>0)
                                {
                                        double r1 = (-b+Math.sqrt(d))/(2*a);
                                        double r2 = (-b-Math.sqrt(d))/(2*a);

                                        System.out.format("Root 1: %.2f", r1);
                                        System.out.format("Root 2: %.2f", r2);
                                }

                                else if (d==0)
                                {
                                        double r1,r2;
                                        r1= r2 = -b/(2*a);
```

```
                System.out.format("Root 1 = Root 2 = %.2f", r1, r2);
            }

            else
            {
                double real = -b / (2 * a);
                double imaginary = Math.sqrt(-d) / (2 * a);
            System.out.format("Root1 = %.2f+%.2fi", real, imaginary);
                System.out.format("Root2 = %.2f-%.2fi", real,
imaginary);

            }

        }
```

**OUTPUT:**

```
C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>javac quad.java

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java QE
Enter the value of a: 1
Enter the value of b: 2
Enter the value of c: 3
Roots are not real.

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java QE
Enter the value of a: 1 4 2
Enter the value of b: Enter the value of c: The roots are -0.5857864376269049 and -3.414213562373095

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java QE
Enter the value of a: 1
Enter the value of b: 6
Enter the value of c: 9
The root is -3.0

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>
```

**PROGRAM-02**

**QUESTION:** Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

**CODE:**

```
import
java.util.Scanner;

                class student {
                        String usn;
                        String name;
                        int credits[];
                        double marks[];

                        student() {
                                Scanner s=new Scanner(System.in);
                                int n;
                                System.out.println("Enter no. of subjects: ");
                                n=s.nextInt();
                                this.credits=new int[n];
                                this.marks=new double[n];

                        }

                        void getsd() {
                                Scanner x=new Scanner(System.in);
                                System.out.println("Enter USN, Name, Credits, Marks for
subjects");
                                usn=x.nextLine();
                                name=x.nextLine();
                                for(int i=0;i<6;i++) {
                                        credits[i]=x.nextInt();
                                }
                                for(int i=0;i<6;i++) {
                                        marks[i]=x.nextDouble();
                                }

                        }

                        void putsd() {
                                System.out.println("USN: "+this.usn);
```

```
        System.out.println("Name: "+this.name);
        System.out.println("Marks: ");
        for(int i=0;i<6;i++) {
            System.out.print(this.marks[i]+" ");
        }
        System.out.println("\nCredits: ");
        for(int i=0;i<6;i++) {
            System.out.print(this.credits[i]+" ");
        }
    }

    void sgpa() {
        double marks=0;
        double t_credits=0;
        for(int i=0;i<6;i++) {
            if(this.marks[i]>=90) {
                marks=marks+(10*(this.credits[i]));
            }
            else if(this.marks[i]>=80) {
                marks=marks+(9*(this.credits[i]));
            }
            else if(this.marks[i]>=70) {
                marks=marks+(8*(this.credits[i]));
            }
            else if(this.marks[i]>=60) {
                marks=marks+(7*(this.credits[i]));
            }
            else if(this.marks[i]>=50) {
                marks=marks+(6*(this.credits[i]));
            }
            else if(this.marks[i]>=40) {
                marks=marks+(5*(this.credits[i]));
            }
            else if(this.marks[i]>=30) {
                marks=marks+(4*(this.credits[i]));
            }
            else {
                marks=marks+0;
            }
            t_credits=t_credits+(this.credits[i]);
        }
        double sgp=(marks/t_credits);
        System.out.println("\nYour SGPA is: "+sgp);
    }
```

```
}

class smain {
        public static void main(String xx[]) {
                student s1=new student();
                s1.getsd();
                s1.putsd();
                s1.sgpa();
        }
}
```

**OUTPUT:**

```
C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>javac SGPA.java

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java Main
Enter number of students: 2
Enter your Name:
Nisarga Gondi
Enter your USN:
1BM21CS069
Enter marks for subject 1 :
95
Enter credits for subject 1 :
1
Enter marks for subject 2 :
79
Enter credits for subject 2 :
3
Enter marks for subject 3 :
90
Enter credits for subject 3 :
1
Name: Nisarga
USN: 1BM21CS069
SGPA: 8.8
Enter your Name:
HAAID QAZI
Enter your USN:
1BM1CS070
Enter marks for subject 1 :
78
Enter credits for subject 1 :
1
Enter marks for subject 2 :
34
Enter credits for subject 2 :
1
Enter marks for subject 3 :
20
Enter credits for subject 3 :
3
Name: HAAID
USN: 1BM1CS070
SGPA: 1.6
```

**PROGRAM-03**

**QUESTION:** Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program to create n book objects.

**CODE:**

```
importjava.io.*
;
                import java.util.*;



                class Book {

                        String title, author;
                        double price;
                        int numPages;

                        Book() {

                                title="Default";
                                author="Default";
                                price=0.0;
                                numPages=0;
                        }
                        void setTitle(String t) {

                                title=t;

                        }
                        void setAuthor(String a) {


                                author=a;

                        }
                        void setPrice(double p) {


                                price=p;
```

```
	}
	void setPages(int np) {


		numPages=np;
	}

	public String toString() {

		return title+"\t"+author+"\t"+price+"\t"+numPages+"\n";
	}
}

class BookDetails {

	public static void main(String args[]) {
		String t, a;
		double p;
		int np,n;
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the number of Books");
		n = sc.nextInt();
		Book b[]= new Book[n];
		for(int i=0; i<n;i++) {
			System.out.println("Enter the Title of  the Books");

			t= sc.next();
			System.out.println("Enter the Author of  the Books");

			a= sc.next();
			System.out.println("Enter the Price of  the Books");

			p= sc.nextDouble();
			System.out.println("Enter the Number of pages of  the
Books");
			np= sc.nextInt();

			b[i] = new Book();
			b[i].setTitle(t);
			b[i].setAuthor(a);
			b[i].setPrice(p);
			b[i].setPages(np);
		}
```

```
                System.out.println("Title \t Author \t Price \t Pages\n");
                for(int i=0; i<n;i++) {
                        System.out.println(b[i]);
                }

        }
}
```

**OUTPUT:**

```
Microsoft Windows [Version 10.0.22621.819]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Acer>cd Desktop

C:\Users\Acer\Desktop>javac BookDetails.java

C:\Users\Acer\Desktop>java BookDetails
Enter the number of Books
2
Enter the Title of  the Books
Harry
Enter the Author of  the Books
Rowling
Enter the Price of  the Books
500
Enter the Number of pages of  the Books
150
Enter the Title of  the Books
Captain
Enter the Author of  the Books
Rowling
Enter the Price of  the Books
400
Enter the Number of pages of  the Books
200
Title    Author          Price   Pages

Harry   Rowling 500.0   150

Captain Rowling 400.0   200


C:\Users\Acer\Desktop>
```

**PROGRAM-04**

**QUESTION:** Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea( ). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

**CODE:**

```
import
java.util.*;


                abstract class Shape {

                int a, b;

                public Shape(int a, int b) {
                   this.a = a;
                   this.b = b;
                        }
                        abstract void Printarea();
                        }

                class Circle extends Shape {

                   Circle(int a, int b) {
                      super(a, b);
                   }

                   void Printarea() {
                      System.out.println("area of circle is " + (3.14 * a * a));
                   }

                }

                class Rectangle extends Shape {
                 public Rectangle(int a, int b) {
                   super(a, b);
                }

                void Printarea()
                {
                   System.out.println("area of rectangle is " + (a * b));
```

```
}

}

class Triangle extends Shape {
public Triangle(int a, int b) {
   super(a, b);
}

void Printarea()

{

   System.out.println("area of triangle is " + (0.5 * a * b));

}

}

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

        Scanner in = new Scanner(System.in);

        System.out.println("Enter dimension 1: ");
        int x = in.nextInt();
        System.out.println("Enter dimension 2: ");
        int y = in.nextInt();


   Shape b;
   b = new Circle(x, y);
   b.Printarea();

   b = new Rectangle(x, y);
   b.Printarea();

   b = new Triangle(x, y);
   b.Printarea();
}
}
```

**OUTPUT:**

```
C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java Main
For Rectangle
enter the height and breadth:
55
67
the area of rectangle is:3685
For Triangle
enter the height and breadth:
43
21
the area of triangle is:451.5
For Circle
enter the radius:
32
the area of circle is:3215.36

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>
```

**PROGRAM-05**

**QUESTION:** Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: a) Accept deposit from customer and update the balance. b) Display the balance. c) Compute and deposit interest d) Permit withdrawal and update the balance Check for the minimum balance, impose penalty if necessary and update the balance.

**CODE:**

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

```
class Account
{
	String name;
	int type;
	long accno;
	double balance;
	void setA()
	{
		Scanner s=new Scanner(System.in);
		System.out.print("Enter customer name: ");
		name=s.nextLine();

		System.out.print("Enter account number: ");
		accno=s.nextLong();
		System.out.println("Account Balance Should Not Be Less
than 5000");
		System.out.print("Enter bank balance: ");
		balance=s.nextDouble();
	}

	void display()
	{
		System.out.println("Customer name is: "+name);
		if(type==1) {
			System.out.println("Customer account type is:
Savings");
		}
		else {
			System.out.println("Customer account type is:
Current");
		}
		System.out.println("Customer account number is: "+accno);
		System.out.println("Current balance is: "+balance);
	}
	void deposit()
	{
		System.out.print("Enter the amount to be deposited: ");
		Scanner x=new Scanner(System.in);
		double amt=x.nextDouble();
		balance+=amt;
		System.out.println("Updated Balance: "+balance);
	}
}
```

```
class Sav_acct extends Account
{
	double interest;
	Scanner s=new Scanner(System.in);

	Sav_acct() {
		type=1;
	}
	void cinterest()
	{
		int timey;
		float irate;
		int times;
		System.out.println("Compound Interest details:");

		System.out.println("Enter time in years: ");
		timey=s.nextInt();
		System.out.println("Enter rate of interest: ");
		irate=s.nextFloat();
		System.out.println("Enter number of times: ");
		times=s.nextInt();
		System.out.println("Interest will be compunded "+times+"
times a year");

interest=balance*(Math.pow((1+irate/times),(times*timey)));
		balance+=interest;
		System.out.println("Balance:"+balance);
	}
	void withdraw()
	{
		System.out.println("Enter the amount to be withdrawn: ");
		double amt=s.nextDouble();
		if(balance>amt)
		{balance-=amt;
			System.out.println("Updated Balance: "+balance);
		}
		else
		{System.out.println("Amount to be withdrawn greater than
balance!!!");
			balance=balance-(balance/10);
			System.out.println("10% penalty has been
charged!!!");
```

```
                        System.out.println("Updated Balance: "+balance);
                }
        }

}

class Curr_acct extends Account
{
        double check_amt;

        Curr_acct() {
                type=2;
        }

        void cheque()
        {
                System.out.print("Enter the cheque amount: ");
                Scanner s=new Scanner(System.in);
                check_amt = s.nextDouble();
                if(check_amt>balance)
                {
                        System.out.println("Rs. 500 penalty imposed...Is it ok
to proceed? Enter y for yes and n for no");
                        String option=s.next();
                        if(option.equals("y"))
                                {balance=balance-500;}
                        else {System.out.println("no Check debited");}
                }
                else
                {
                        System.out.println("Rupees "+check_amt+"
debited");
                        balance-=check_amt;
                        System.out.println("Updated Balance: "+balance);
                }
        }
        void withdraw()
        {
                System.out.println("Enter the amount to be withdrawn: ");
                Scanner s=new Scanner(System.in);
                double amt=s.nextDouble();
                if(balance>amt)
                {balance-=amt;
                        System.out.println("Updated Balance: "+balance);
```

```
                }

                else
                {       System.out.println("Amount to be withdrawn greater
than balance!!!");
                        balance=balance-(balance/10);
                        System.out.println("10% penalty has been
charged!!!");
                        System.out.println("Updated Balance: "+balance);}
        }
}

class Bank {
        public static void main(String ss[]) {
                String op1,op2;
                Scanner s=new Scanner(System.in);
                System.out.println("1. Savings or   2. Current");
                int q;
                q=s.nextInt();
                if(q==1) {
                        Sav_acct s1 = new Sav_acct();
                        while(true) {
                        System.out.print("\n1. Set the values for Savings
Account\n2. Display\n3. Deposit\n4. Interest\n5. Withdraw\n6. Exit\n
Cheque Facility Not Available!!\n");
                        System.out.println("Enter the choice: ");
                        op1=s.next();
                        switch(op1)
                        {
                        case "1":s1.setA();
                                 break;
                        case "2":s1.display();
                                 break;
                        case "3":s1.deposit();
                                 break;
                        case "4":s1.cinterest();
                                 break;
                        case "5":s1.withdraw();
                                 break;
                        case "6":System.exit(0);
                        }
                        }
                }
                else if(q==2) {
```

```
                    Curr_acct c1 = new Curr_acct();
                    while(true) {
                    System.out.print("Enter the choice: \n1. Set the
values for current account\n2. Display\n3. Deposit\n4. Cheque
Facility\n5. Withdraw\n6. Exit\n");
                    op2=s.next();
                    switch(op2)
                    {
                    case "1":c1.setA();
                        break;
                    case "2":c1.display();
                        break;
                    case "3":c1.deposit();
                        break;
                    case "4":c1.cheque();
                        break;
                    case "5":c1.withdraw();
                        break;
                    case "6":System.exit(0);
                    }
                    }
                }
        }
}
```

**OUTPUT:**

```
C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>javac bank.java

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java account

1.Savings account
2.Current account
1
Enter your name
Nisarga Gondi
Enter the balance amount
5000
Name : Nisarga Gondi
Cheque service not available
Do you want to deposit(1 for yes ,2 for no)
1
Enter the amount to be deposited
60000
Amount in bank insufficient
Current balance : 5000.0
Enter the rate of interest
5
Enter the number of times interest applied per time period
3
Enter the time elapsed
1
Compound interest is 1.0E12
Enter the amount to be withdrawn
4000
Withdrawn : 4000.0
Current balance : 1000.0

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java account

1.Savings account
2.Current account
2
Enter your name
Nisarga
Enter the balance amount
30000
Name : Nisarga
Cheque service available
Do you want to deposit(1 for yes ,2 for no)
1
Enter the amount to be deposited
25000
Current balance : 55000.0
Enter the amount to be withdrawn
60000
Balance insufficient

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>
```

**PROGRAM-06**

**QUESTION:** Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called “Father” and derived class called “Son” which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age=father’s age,

**CODE:**

```
import
java.util.*;

                class WrongAge extends Exception
                {
                   public String getMessage()
                   {
                      return "Age Cannot Be Negative";
```

```
    }
}

class InvalidAge extends Exception
{
    public String getMessage()
    {
        return "Son's Age cannot be greater than Father's!";
    }
}

class Father
{
    Scanner s = new Scanner(System.in);
    int fatherAge;
    Father() throws WrongAge
    {
        System.out.print("Enter the Father's Age: ");
        fatherAge = s.nextInt();

        try
        {
                if(fatherAge<0)
            throw new WrongAge();
        }

        catch(WrongAge e1)
        {
            System.out.println(e1.getMessage());
            System.exit(0);
        }
    }
}

class Son extends Father
{
    int sonAge;
    Son() throws WrongAge,InvalidAge
    {
        super();
        System.out.print("Enter the Son's Age: ");
        sonAge = s.nextInt();
        try
        {
```

```
            if(sonAge<0)
              throw new WrongAge();
            }

            catch(WrongAge e2)
            {
               System.out.println(e2.getMessage());
            }

            try
            {
              if(sonAge>fatherAge)
               throw new InvalidAge();
            }

            catch(InvalidAge e3)
            {
               System.out.println(e3.getMessage());
            }
        }
    }

    class Agecheck
    {
       public static void main(String[] args) throws WrongAge,InvalidAge
       {
          new Son();
       }}
```

**OUTPUT:**

```
C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>javac age.java

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java Age
Enter father age
50
Enter son's age
20
Entered Age is Valid!!!

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java Age
Enter father age
30
Enter son's age
40
caughtWrongAge[Son's age is greater than or equal to Father's age]

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java Age
Enter father age
-45
Enter son's age
34
caughtWrongAge[Son's age or Father's age is less than or equal to zero]

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>
```

**PROGRAM-07**

**QUESTION:** Write a program which creates two threads, one thread displaying “BMS College of Engineering” once every ten seconds and another displaying “CSE” once every two seconds.

**CODE:**

```
import
java.util.Scanner;

class BMSCE extends Thread {
        synchronized public void run()
        {
                try
                {
                        int i=0;
                        while (i<5)
                        {
                                sleep(10000);
                                System.out.println("BMS College of
Engineering ");
                                i++;
                        }
                }

                catch (Exception e) {
                }
        System.out.println("Exiting Thread 1");
        }
}

class CSE extends Thread
        {
        synchronized public void run()
        {
                try
                {
                        int i=0;
                        while (i<5)
                        {
                                sleep(2000);
                                System.out.println("CSE");
                                i++;
                        }
                }
```

```
                catch (Exception e) {
                }
        System.out.println("Exiting Thread 2");

        }
}


class Multithreading
{
        public static void main(String args[])
        {
                BMSCE t1 = new BMSCE();
                CSE t2 = new CSE();
                t1.start();
                t2.start();
        }
}
```

**OUTPUT:**

```
C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>javac thread.java

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>java Thread1
CSE
BMS College of Enginnering
CSE
CSE
CSE
CSE
BMS College of Enginnering
CSE
CSE
CSE
CSE
CSE

C:\Users\Gagandeep K\OneDrive\Documents\Nisarga Gondi>
```