VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

OBJECT ORIENTED JAVA PROGRAMMING

Submitted by

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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 programming lab**" carried out by **Pallavi Manuballa(1BM21CS124),** 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 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of Data structures Lab **- (21CS3PCOOJ)** work prescribed for the said degree.

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Index Sheet

Course Outcome

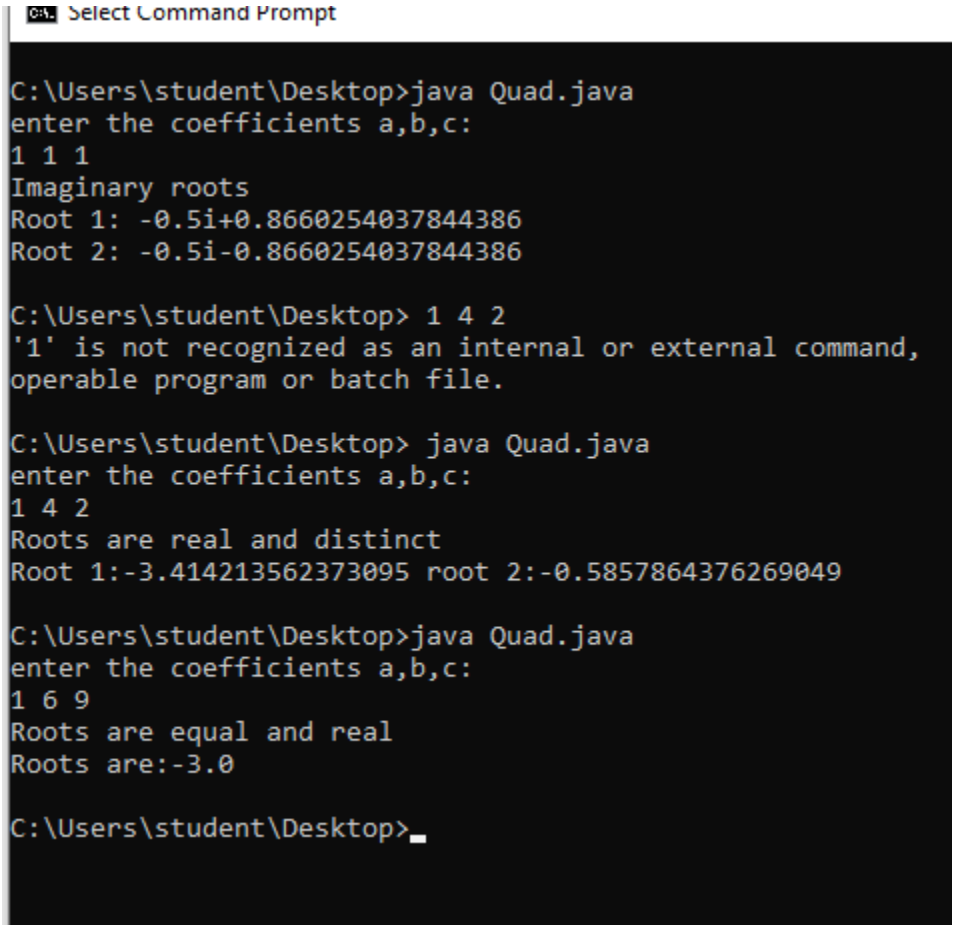
CO1	Apply the knowledge of Java concepts to find the solution for a given problem.
CO2	Analyze the given Java application for correctness/functionalities.
CO3	Develop Java programs / applications for a given requirement.
CO4	Conduct practical experiments for demonstrating features of Java.

LAB PROGRAM 1: QUADRATIC EQUATIONS

CODE:

```
import java.util.Scanner;
import java.lang.Math;
public class Trial
{
    public static void main(String[] args)
        {
            Scanner s = new Scanner(System.in);
            System.out.println("Enter the coefficients: ");
            float a = s.nextFloat();
            float b = s.nextFloat();
            float c = s.nextFloat();
            double r1,r2;
            float d = (b*b)-(4.0f*a*c);
            if(d>0)
            {
                r1=(-b+Math.sqrt(d))/(2*a);
                r2=(-b-Math.sqrt(d))/(2*a);
                System.out.println("Roots are Real");
                System.out.println("Root 1: "+r1+" Root 2: "+r2);
            }
             else if(d==0)
            {
                r1=(-b)/(2*a);
                System.out.println("Roots are Equal");
                System.out.println("Root is: "+r1);
            }


        else
```

```
        {
            double e =(-b)/(2.0f*a);
            double f =(Math.sqrt(-d))/(2*a);
            System.out.println("Roots are imaginary");
            System.out.println("Root 1: "+e+"i+"+f);
            System.out.println("Root 2: "+e+"i-"+f);
        }
    }
}
```



LAB PROGRAM 2: SGPA CALCULATION

CODE

```
import java.util.Scanner;
class Student
{
        String USN;
        String name;
        int[] credits = new int[20];
        int[] marks = new int[20];
        void input(int n)
        {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Student USN: ");
        USN = s.nextLine();
        System.out.print("Enter Student Name: ");
        name = s.nextLine();
        for(int i=0;i<n;i++)
        {
        System.out.print("Enter the Subject "+(i+1)+" marks and credits
respectively: ");
```

```
        marks[i] = s.nextInt();
        credits[i] = s.nextInt();
        }
        }
        float calculate(int n)
        {
        int sum_of_credits = 0;
        float result=0.0f;
        for(int i=0;i<n;i++)
        {
        sum_of_credits+=credits[i];
          if(calculate_grade_point(marks[i])==-1)
                return -1.0f;
        else
        {
                result = result +(float)
(calculate_grade_point(marks[i])*credits[i]);
        }
        }
        return (result/sum_of_credits);
        }
```

```
int calculate_grade_point(int marks)
{
if(marks>=90)
return 10;
else if ((marks>=80)&&(marks<90))
return 9;
else if ((marks>=70)&&(marks<80))
return 8;
else if ((marks>=60)&&(marks<70))
return 7;
else if ((marks>=50)&&(marks<60))
return 6;
else if ((marks>=40)&&(marks<50))
return 5;
return -1;
}

void display(int n,float result)
{
System.out.println("\n");
System.out.println("Student Details");
```

```
        System.out.println();
        System.out.println("Student USN: "+USN);
        System.out.println("Student Name: "+name);
        System.out.println("Student Marks and Credits");
        for(int i=0;i<n;i++)
        {
        System.out.println("Subject 1 -->\tMarks: "+marks[i]+" Credits:
"+credits[i]);
        }
        System.out.println("SGPA: "+result);
        }
}
public class Lab_02_SGPA
{
        public static void main(String[] args)
        {
        Scanner s = new Scanner(System.in);
        Student s1 = new Student();
        System.out.print("Enter the number of subjects: ");
        int n = s.nextInt();
        s1.input(n);
        float result = s1.calculate(n);
```

```
        if(result == -1.0f)
        {
        System.out.println();
        System.out.println("The Student has failed in a subject. SGPA cannot be calculated!");
        System.exit(0);
        }
        s1.display(n,result);
        }
}
```

LAB PROGRAM 3: IMPLEMENTING ARRAY OF OBJECTS

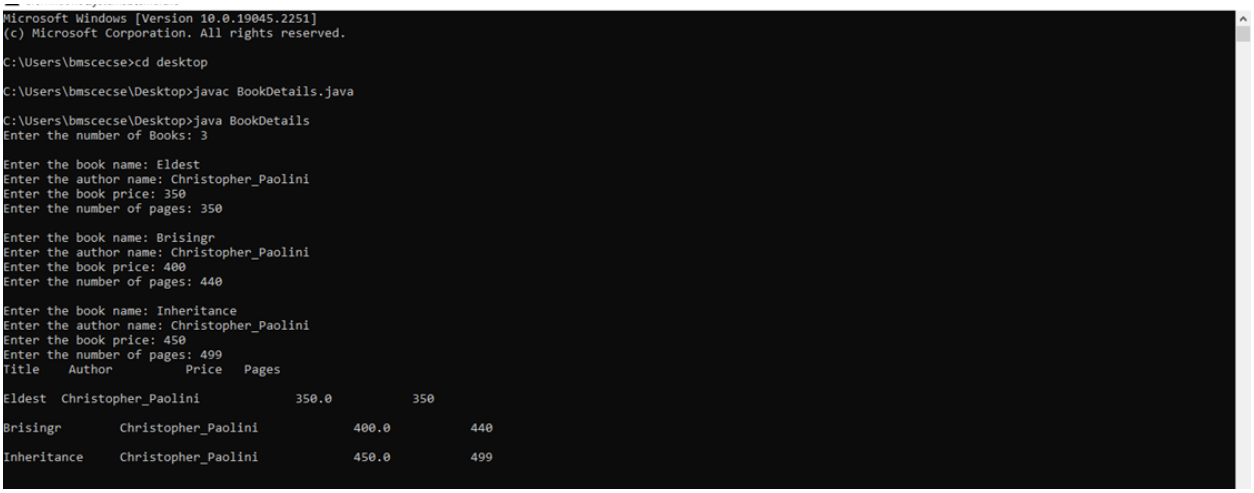
CODE

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

class Book
{
String title,author;
float price;
int num_pages;

Book()
{
title = "Default Value";
author = "Default Value";
price = 0.0f;
num_pages = 0;
}

void setTitle(String title)
```

```
{
this.title=title;
}

void setAuthor(String author)
{
this.author=author;
}

void setPrice(float price)
{
this.price=price;
}

void setPages(int num_pages)
{
this.num_pages = num_pages;
}


public String toString()
{
```

```
return title+"\t\t"+author+"\t\t"+price+"\t\t"+num_pages+"\n";
}



}

public class BookDetails

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

String t, a;
float p;
int np,n;
Scanner s = new Scanner(System.in);
System.out.print("Enter the number of Books: ");
n = s.nextInt();
Book[] b = new Book[n];
for(int i=0;i<n;i++)
{
System.out.println();
```

```
System.out.print("Enter the book name: ");
t = s.next();
System.out.print("Enter the author name: ");
a = s.next();
System.out.print("Enter the book price: ");
p = s.nextFloat();
System.out.print("Enter the number of pages: ");
np = s.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\t Author \t\t Price \t\t Pages\n");
for(int i=0; i<n;i++)
{
System.out.println(b[i]);
}
}
}
```


Microsoft Windows [Version 10.0.19045.2251]
(c) Microsoft Corporation. All rights reserved.
C:\Users\bmscecse>cd desktop
C:\Users\bmscecse\Desktop>javac BookDetails.java
C:\Users\bmscecse\Desktop>java BookDetails
Enter the number of Books: 3
Enter the book name: Eldest
Enter the author name: Christopher_Paolini
Enter the book price: 350
Enter the number of pages: 350
Enter the book name: Brisingr
Enter the author name: Christopher_Paolini
Enter the book price: 400
Enter the number of pages: 440
Enter the book name: Inheritance
Enter the author name: Christopher_Paolini
Enter the book price: 450
Enter the number of pages: 499
Title Author Price Pages
Eldest Christopher_Paolini 350.0 350
Brisingr Christopher_Paolini 400.0 440
Inheritance Christopher_Paolini 450.0 499

LAB PROGRAM 4: CALCULATING AREA OF SHAPES (ABSTRACT CLASS)

CODE

```
import java.util.Scanner;
public class Shape1
{
	public static void main(String args[])
	{
	int choice;
	Scanner s = new Scanner(System.in);
	do
	{
	System.out.println("1. Calculate Area of Rectangle\n2. Calculate Area of Triangle\n3. Calculate Area of " +
		"Circle\n4. Exit the Program\n\nEnter the choice: ");
	choice = s.nextInt();
	switch(choice)
	{
		case 1: Rectangle r = new Rectangle();
			r.printArea();
			break;
```

```
                case 2: Triangle t = new Triangle();
                        t.printArea();
                        break;
                case 3: Circle c = new Circle();
                        c.printArea();
                        break;
                case 4: System.out.println("Exiting the program!");
                        System.exit(0);
                        break;
                default: System.out.println("\nInvalid Choice!\n");
        }
        }while(true);
        }
}

abstract class Shape
{
        int a,b;
        abstract void printArea();
}

class Rectangle extends Shape
```

```
{
        void printArea()
        {
        int area;
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the length and breadth of rectangle: ");
        a = s.nextInt();
        b = s.nextInt();
        area = a*b;
        System.out.println("\nArea of Rectangle: "+area+"\n");
        }
}

class Triangle extends Shape
{
        void printArea()
        {
        float area;
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the base and height of triangle: ");
        a = s.nextInt();
        b = s.nextInt();
```

```
        area = 0.5f*a*b;
        System.out.println("\nArea of triangle: "+area+"\n");
        }
}

class Circle extends Shape
{
        void printArea()
        {
        double area;
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the radius of circle: ");
        a = s.nextInt();
        area = Math.PI*a;
        System.out.println("Area of Circle: "+area+"\n");
        }
}
```

LAB PROGRAM 5: BANK PROGRAM

CODE

```
import java.util.Scanner;

class Customer
{
        private int customer_no, qty;
        private double price , totalprice, discount , netprice;
        private String customer_name;

        public Customer()
        {
        customer_name = "Saf";
        customer_no = 10;
        qty = 3;
        price = 20000;
        totalprice = price * qty;
        discount = callDiscount(totalprice);
        show();
        }
```

```
	public Customer(String customer_name , int customer_no , int qty , double price)
	{
	this.customer_name = customer_name;
	this.customer_no = customer_no;
	this.qty = qty;
	this.price = price;
	totalprice = price * qty;
	discount = callDiscount(totalprice);
	show();
	}

	public double callDiscount(double totalprice)
	{
		if(totalprice>=50000)
		{
		discount = 0.25*totalprice;
		}
		else if((totalprice>=25000)&&(totalprice<50000))
		{
		discount = 0.1 * totalprice;
		}
```

```
            else
            discount =0;
            netprice = totalprice - discount;
            return discount;
        }

        public void show()
        {
        System.out.println("\nCustomer Name: "+customer_name);
        System.out.println("\nCustomer Number: "+customer_no);
        System.out.println("\n Item Quantity: "+qty);
        System.out.println("\nPrice per Quantity: "+price);
        System.out.println("\nTotal Price: "+totalprice);
        System.out.println("\nDiscount: "+discount);
        System.out.println("\nNet Price: "+netprice);
        }
}
class HelloWorld
{
        public static void main(String[] args)
        {
        Customer c = new Customer();
```

```
        Scanner s = new Scanner(System.in);
        String customer_name;
        int customer_no, qty;
        double price;
        int n, i=1;
        System.out.print("\nEnter the number of customers: ");
        n = s.nextInt();
        while(i<=n)
        {
        System.out.print("\nEnter the Customer Name: ");
        customer_name = s.nextLine();
        System.out.print("\nEnter the Customer Number: ");
        customer_no = s.nextInt();
        System.out.print("\nEnter the Item Quantity: ");
        qty = s.nextInt();
        System.out.print("\nEnter the Item Price: ");
        price = s.nextDouble();
        Customer cc = new Customer(customer_name , customer_no , qty ,
price);
        i++;
        }
        }
}
```

```
Microsoft Windows [Version 10.0.19044.2251]
(c) Microsoft Corporation. All rights reserved.

C:\Users\student>cd desktop

C:\Users\student\Desktop>javac Bank.java

C:\Users\student\Desktop>java Bank.java

Enter the Account Type (S for Savings , C for Current) : s

Enter the Customer Name: Rashtri km

Enter the Account Number: 12345678

Enter the Starting Amount (Minimum Amount = 5000): 5500

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 1000

Invalid Operation

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 1

Enter the amount to be deposited: 1000

Balance: 6500.0

1. Deposit
2. Withdrawal
3. Check Balance
```

```
Enter the amount to be deposited: 1000

Balance: 6500.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 2000

Invalid Operation

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 2

Enter the amount to be withdrawn: 2000

Amount Withdrawn: 2000.0
Balance: 4500.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 3

Insufficient Balance!!
Balance: 4500.0

1. Deposit
2. Withdrawal
```

```
Insufficient Balance!!
Balance: 4500.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 4

Interest Credited: 270.0
Balance :4770.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 5

Customer Name: Rashtri km
Account Number: 12345678
Amount: 4770.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 6

Exiting Transaction!

C:\Users\student\Desktop>java Bank.java

Enter the Account Type (S for Savings , C for Current) : c

Enter the Customer Name: rashtri km
```

```
Exiting Transaction!

C:\Users\student\Desktop>java Bank.java

Enter the Account Type (S for Savings , C for Current) : c

Enter the Customer Name: rashtri km

Enter the Account Number: 123456789

Enter the Starting Amount (Minimum Amount = 5000): 6000

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 1

Enter Amount to be deposited: 6000
Balance: 12000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 2

Enter Amount to withdraw: 5000

Amount Withdrawn: 5000.0
Balance: 7000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
```

```
1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 3

 Balance: 7000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 4

Cheque Book has been Issued!

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 5

Customer Name: rashtri km
Account Number: 123456789
Amount: 7000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
6. Exit Transaction

Enter your choice: 6
```

LAB PROGRAM 6: NUMBER OPERATIONS - EXCEPTION HANDLING

CODE

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

interface Z
{
    public int calc(int a,int b);
}

class Y implements Z
{
    public int calc(int a, int b)
    {
        int c = a/b;
        return c;
    }
}

public class Try_1
{
    public static void main(String[] args)
    {
```

```
        Scanner s = new Scanner(System.in);
        Y o = new Y();
        int num1,num2;
        try
        {
            System.out.println("Enter the two numbers: ");
            num1 = s.nextInt();
            num2 = s.nextInt();
            int c = o.calc(num1,num2);
            System.out.println("Quotient: "+c);
        }
        catch(ArithmeticException | InputMismatchException e1)
        {
            System.out.println("Exception: "+e1);
        }
    }
}
```

LAB PROGRAM 7: AGE EVALUATION - EXCEPTION HANDLING

CODE

```
import java.util.Scanner;

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

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 f;
	Father() throws WrongAge
	{
	System.out.print("Enter the Father's Age: ");
	f = s.nextInt();
	try
	{
	if(f<0)
	throw new WrongAge();
	}
	catch(WrongAge e1)
	{
```

```
            System.out.println(e1.getMessage());
        System.exit(0);
        }
        }
}

class Son extends Father
{
        int son;
        Son() throws WrongAge,InvalidAge
        {
        super();
        System.out.print("Enter the Son's Age: ");
        son = s.nextInt();
        try
        {
        if(son<0)
        throw new WrongAge();
        }
        catch(WrongAge e2)
        {
            System.out.println(e2.getMessage());
```

```
            System.exit(0);
        }
        try
        {
        if(son>f)
        throw new InvalidAge();
        }
        catch(InvalidAge e3)
        {
           System.out.println(e3.getMessage());
            System.exit(0);
        }
        System.out.println("Ages are appropriate");
        }
}
```

LAB PROGRAM 8: MULTI-THREADING

CODE

```
class MyThread extends Thread
{
	long time;
	private volatile boolean running = true;
	MyThread(){
	System.out.println("Default");
}
MyThread(String name, long time)
{
	super(name);
	this.time = time;
}
public void pause()
{
	running = false;
}
public void run()
{
	try
	{
		while(running)
```

```
                {
                        System.out.println(this.getName());
                        Thread.sleep(time*1000);
                }
        }
         catch(InterruptedException ie)
        {
                System.out.println("Exception caught in method");
        }

}
}

class Main
{
        public static void main(String [] args)
        {
                MyThread mt1 = new MyThread("BMS", 10);
                MyThread mt2 = new MyThread("CSE", 2);
                mt1.start();
                mt2.start();
                Try
                {
                        Thread.sleep(20*1000);
                        mt1.pause();
                        mt2.pause();
```

```
            }
            catch(InterruptedException ie)
            {
                System.out.println("Exception caught in main");
            }
        }
    }
```