B.M.S. College of Engineering

(Autonomous Institution affiliated to VTU, Belagavi)

Department of Computer Science and Engineering

LAB REPORT

OBJECT ORIENTED JAVA PROGRAMMING

23CS3PCOOJ

(December 2023-March 2024)

B.M.S. College of Engineering
Department of Computer Science and Engineering

Laboratory Certificate

This is to certify that TEJAS S has satisfactorily completed the course of Experiments in Practical OBJECT ORIENTED JAVA PROGRAMMING prescribed by the Department during the odd semester 2023-24.

Name of the Candidate:TEJAS S

USN No.: 1BM22CS308   Semester: III   Section: F

MAX MARKS   OBTAINED

10

MARKS IN WORDS:

Signature of the staff in-charge   Head of the Department
Date:

Lab Program 1

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.

```java
import java.util.Scanner;

public class Demo{

    public static void main(String[] args){

        Scanner scan = new Scanner(System.in);

        System.out.print("Enter a coefficient a: ");

        double  a = scan.nextDouble();

        System.out.print("Enter a coefficient b: ");

        double b=scan.nextDouble();

        System.out.print("Enter a coefficient c: ");

        double c=scan.nextDouble();

        double dis=b*b-4*a*c;

        if(dis>0)

        {

            double r1=(-b+Math.sqrt(b*b-4*a*c)/(2*a));

            double r2=(-b-Math.sqrt(b*b-4*a*c)/(2*a));

            System.out.println("Two real solutions: " + r1 + " and " + r2);

        }

        else if(dis==0)

        {

            double r=-b/(2*a);

            System.out.println("Both roots are equal:"+r);
```

```
                }

                else

                {

                        System.out.println("Roots are not equal since discriminate is 0");

                }

                System.out.println("Name:Tejas S.");

                System.out.println("USN:1BM22CS308.");

    }

}
```

Output:

Lab Program 2:

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.

```java
import java.util.Scanner;

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

    String usn;

    String name;

    int[] credits = {4,4,3,3,3,1,1,1};

    int[] marks = new int[8];

    public void enterdet()
    {
        System.out.print("Enter your usn : ");

        usn = s.next();

        System.out.print("Enter your name : ");

        name = s.next();

        for(int i=0;i<8;i++)
        {
            System.out.print("Enter marks for subject "+(i+1)+" : ");

            marks[i] = s.nextInt();
        }
    }

    public void displaydet()
    {
```

```java
        System.out.println("Your usn is : "+usn);

        System.out.println("Your name is : "+name);

        for(int i =1;i<8;i++)

        {

          System.out.println("Your marks for subject "+i+" is : "+marks[i]);

        }

    }

    public void sgpa()

    {

        float g = 0;

        for(int j=0;j<8;j++)

        {

          int v;

          v = credits[j]*((marks[j]/10)+1);

          g = g+v;

        }

        System.out.println("Your sgpa is : "+(g/20));

    }

}

public class Demo

{

        public static void main(String[] args) {

                student p = new student();

                p.enterdet();

                p.displaydet();
```

```
            p.sgpa();

            System.out.println("Name:Tejas S");

            System.out.println("USN:1BM22CS308");


    }

}
```

Output:

```
C:\Users\teju3\OneDrive\Desktop\JAVALAB>javac Demo.java

C:\Users\teju3\OneDrive\Desktop\JAVALAB>java Demo
Enter your usn : 1BM22CS3083
Enter your name : TEJAS
Enter marks for subject 1 : 56
Enter marks for subject 2 : 89
Enter marks for subject 3 : 45
Enter marks for subject 4 : 15
Enter marks for subject 5 : 85
Enter marks for subject 6 : 65
Enter marks for subject 7 : 74
Enter marks for subject 8 : 73
Your usn is : 1BM22CS3083
Your name is : TEJAS
Your marks for subject 1 is : 89
Your marks for subject 2 is : 45
Your marks for subject 3 is : 15
Your marks for subject 4 is : 85
Your marks for subject 5 is : 65
Your marks for subject 6 is : 74
Your marks for subject 7 is : 73
Your sgpa is : 6.55
Name:Tejas S
USN:1BM22CS308
```

Lab Program 3:

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.

```java
import java.util.Scanner;

class Book{

        String name;

        String author;

        int price;

        int no;

        public void get(int i){

                Scanner S=new Scanner(System.in);

                System.out.println("Enter the Details of the book  " +(i+1)+ " in order name,
author,price,Number of pages");

                name=S.next();

                author=S.next();

                price=S.nextInt();

                no=S.nextInt();

        }

        public String toString(){

                return "Details of Book \n"+ "Name ="+name+"\n"+"Author
Name="+author+"\n"+"Price="+price+"\n"+"Number of pages="+no;

        }

}

public class Demo{

        public static void main(String[] args){

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

```java
System.out.println("Enter the number of books:");

int a=s.nextInt();

Book b[]=new Book[a];

for(int i=0;i<a;i++)

{

        b[i]=new Book();

        b[i].get(i);

}

System.out.println();

for(int i=0;i<a;i++)

{

        System.out.println(b[i].toString());

}

System.out.println("Name:Tejas S.");

System.out.println("USN:1BM22CS308.");

    }

}
```

Output:

```
C:\Users\teju3\OneDrive\Desktop\JAVALAB>javac Demo.java

C:\Users\teju3\OneDrive\Desktop\JAVALAB>java Demo
Enter the number of books:
2
Enter the Details of the book  1 in order name, author,price,Number of pages
Book1
me
789
456
Enter the Details of the book  2 in order name, author,price,Number of pages
Book2
you
126
453

Details of Book
Name =Book1
Author Name=me
Price=789
Number of pages=456
Details of Book
Name =Book2
Author Name=you
Price=126
Number of pages=453
Name:Tejas S.
USN:1BM22CS308.
```

Lab Program 4:

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.

```java
import java.util.Scanner;

abstract class Shape{

        int a,b;

        abstract void printArea();

}

class Rectangle extends Shape{

        Rectangle(int l,int br){

                a=l;

                b=br;

        }

        void printArea(){

                double area=a*b;

                System.out.println("Area of the rectangle is:"+area);

        }

}

class Triangle extends Shape{

        Triangle(int ba,int h){

                a=ba;

                b=h;

        }

        void printArea(){
```

```java
                double area=a*b;

                System.out.println("Area of the Triangle is:"+area);

        }

}

class Circle extends Shape{

        Circle(int r){

                a=r;

        }

        void printArea(){

                double area=a*a*3.14;

                System.out.println("Area of the Circle is:"+area);

        }

}

public class Demo{

        public static void main(String[] java){

                Scanner in=new Scanner(System.in);

                System.out.println("Enter length and breadth:");

                Rectangle rec=new Rectangle(in.nextInt(),in.nextInt());

                rec.printArea();

                System.out.println("Enter base and height:");

                Triangle tr=new Triangle(in.nextInt(),in.nextInt());

                tr.printArea();

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

                Circle cr=new Circle(in.nextInt());

                cr.printArea();

        }
```

```
        }
```

Output:

Lab program 5

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.

```
import java.util.Scanner;

class account

{

   String c_name;

   int acc_num;
```

```java
    String acc_type;

    double bal=1000;


}
class savingacct extends account
{
    Scanner s1 = new Scanner(System.in);
    public savingacct(String a,int b,String c){
    c_name=a;
    acc_num=b;
    acc_type=c;
    System.out.println("Customer name is :"+c_name);
    System.out.println("Customer account number is:"+acc_num);
    System.out.println("Customer account type is:"+acc_type);
    }
    public void deposit()
    {
        System.out.println("Enter the amount to be Deposit in your saving account:");
        int A=s1.nextInt();
      bal = bal+A;
      System.out.println("Your Current balance is : "+bal);
    }
    public void withdrawl()
    {
        System.out.println("Enter the amount to be withdrawn From your saving account
: ");
        double q1 = s1.nextDouble();
```

```java
        if(q1>bal)

        {

            System.out.println("Insuficient Bal!!");


        }

        else

        {

            System.out.println("You have withdrawn "+q1);

            bal = bal-q1;

            System.out.println(" Your .00Current balance is : "+bal);

        }

    }

    public void compinterest()

    {

        double A=1/100;

            double w=bal*A;

        System.out.println("Current interest is : "+w);

    }

}

class curentacct extends account

{

    double e;

    Scanner s2 = new Scanner(System.in);

    public curentacct(String a,int b,String c){

    c_name=a;

    acc_num=b;
```

```java
        acc_type=c;

        System.out.println("Customer name is :"+c_name);

        System.out.println("Customer account number is:"+acc_num);

        System.out.println("Customer account type is:"+acc_type);

    }


    public void deposit()

    {

        System.out.println("Enter the amount to be Deposit in your current account:");

            int B=s2.nextInt();

        bal = bal+B+2000;

        System.out.println("Your Current balance is : "+bal);

    }

    public void withdrawl()

    {

        System.out.println("Enter the amount to be withdrawn from your current account
: ");

        double q2 = s2.nextDouble();

        if(q2>bal)

        {

            System.out.println("Not enough amount!!");

        }

        else

        {

            System.out.println("You have withdrawn "+q2);

            bal = bal-q2;

            System.out.println("Current balance is : "+bal);
```

```java
        if(bal<3000)

        {

            bal = bal-100;

            System.out.println("Your balance is below require balance!!,a penalty has
been imposed");

            System.out.println("Current balance is : "+bal);

        }

    }

}

public void getchq()

{

    System.out.println("Enter the amount for which cheque has to be issued");

    e = s2.nextDouble();

}

public void cashchq()

{

    if(e>bal)

    {

        System.out.println("Cheque bounced!!");

    }

    else

    {

        System.out.println("Via cashing a cheque you have withdrawn "+e);

        bal = bal-e;

        System.out.println("Current balance is : "+bal);

        if(bal<3000)
```

```
            {

                bal = bal-100;

                System.out.println("Your balance is below require balance!!,a penalty is
Applied");

                System.out.println("Current balance is : "+bal);

            }

        }

    }

}


public class Demo

{

        public static void main(String[] args) {

                Scanner s=new Scanner(System.in);

                savingacct sav = new savingacct("Abhishek",199,"Savings");

                sav.deposit();

                sav.compinterest();

                sav.withdrawl();

                curentacct cur = new curentacct("Amar",200,"Current");

                cur.deposit();

                cur.withdrawl();

                cur.getchq();

                cur.cashchq();


        }
```

```
        }
```

Output:

```
C:\Users\teju3\OneDrive\Desktop\JAVALAB>javac Demo.java

C:\Users\teju3\OneDrive\Desktop\JAVALAB>java Demo
Customer name is :Tejas
Customer account number is:199
Customer account type is:Savings
Enter the amount to be Deposit in your saving account:
189
Your Current balance is : 1189.0
Current interest is : 0.0
Enter the amount to be withdrawn From your saving account :
25
You have withdrawn 25.0
 Your .00Current balance is : 1164.0
Customer name is :TEJAS
Customer account number is:200
Customer account type is:Current
Enter the amount to be Deposit in your current account:
45
Your Current balance is : 3045.0
Enter the amount to be withdrawn from your current account :
56
You have withdrawn 56.0
Current balance is : 2989.0
Your balance is below require balance!!,a penalty has been imposed
Current balance is : 2889.0
Enter the amount for which cheque has to be issued
569
Via cashing a cheque you have withdrawn 569.0
Current balance is : 2320.0
Your balance is below require balance!!,a penalty is Applied
Current balance is : 2220.0
```

Lab Program:6

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

```java
package CIE;

import java.util.*;

public class Student

{

    public int sem;

    public String usn;

    public String name;

    public void accept()

    {

        Scanner scan = new Scanner(System.in);

        System.out.println("Enter U, N, S:\n");

        usn=scan.nextLine();

        name=scan.nextLine();

        sem=scan.nextInt();

    }

}

package CIE;


public class Internals

{
```

```java
    public int im[]=new int[5];
}
package SEE;
import CIE.Student;
public class External extends Student
{
    public int sm[]=new int[5];
}
import java.util.*;
import SEE.*;
import CIE.*;
public class FinalMarks
{
    public static void main(String args[])
    {
        int fm[]=new int[5];
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter n: ");
        int n=sc.nextInt();
        SEE.External st[]=new SEE.External[n];
        CIE.Internals s[]=new CIE.Internals[n];
        for(int i=0; i<n; i++)
        {
            st[i]=new SEE.External();
            s[i]=new CIE.Internals();
            System.out.println("Enter details "+(i+1));
```

```java
        st[i].accept();

        for(int j=0; j<5; j++)

        {

            System.out.println("Enter im and sm of sub "+(j+1));

            s[i].im[j]=sc.nextInt();

            st[i].sm[j]=sc.nextInt();

            fm[j]=s[i].im[j]+st[i].sm[j];

        }

        System.out.println("Final marks of "+st[i].name);

        for(int k=0; k<5; k++)

        {

            System.out.println("Course "+(k+1)+" = "+fm[k]);

        }

    }

  }

}
```

Output:

```
C:\Users\arbaa\Desktop\CS051>javac FinalMarks.java

C:\Users\arbaa\Desktop\CS051>java FinalMarks
Enter n:
1
Enter details for student 1
Enter USN, Name, and Semester:
1BM22CS380
Tejas
3
Enter im and sm of subject 1
34
78
Enter im and sm of subject 2
35
98
Enter im and sm of subject 3
37
78
Enter im and sm of subject 4
26
90
Enter im and sm of subject 5
29
89
Final marks of Tejas
Subject 1 = 112
Subject 2 = 133
Subject 3 = 115
Subject 4 = 116
Subject 5 = 118
Name: Tejas S.
USN: 1BM22CS308.
```

Lab Program 7:

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<0. In Son class, implement a constructor that cases both father and son's age and throws an exception if son's age is >=father's age.

```java
class WrongAge extends Exception {

  public WrongAge() {

    super("Invalid age provided");

  }

}


class Father {

  private int age;


  public Father(int age) throws WrongAge {

    if (age < 0) {

      throw new WrongAge();

    }

    this.age = age;

  }


  public int getAge() {

    return age;

  }

}
```

```java
class Son extends Father {

    private int sonAge;


    public Son(int fatherAge, int sonAge) throws WrongAge {

        super(fatherAge);

        if (sonAge >= fatherAge) {

            throw new WrongAge();

        }

        this.sonAge = sonAge;

    }


    public int getSonAge() {

        return sonAge;

    }

}


public class Demo {

    public static void main(String[] args) {

        try {

            Father father = new Father(50);

            System.out.println("Father's age: " + father.getAge());

            Son son1 = new Son(50, 25);

            System.out.println("Son's age: " + son1.getSonAge());

        } catch (WrongAge e) {

            System.out.println(e.getMessage());

        }
```

```
        System.out.println("Name:Abhishek Shivanand Halagadagi.");

        System.out.println("USN:1BM22CS008.");

    }

}
```

Output:

```
C:\Users\teju3\OneDrive\Desktop\JAVALAB>javac Demo.java

C:\Users\teju3\OneDrive\Desktop\JAVALAB>java Demo
Father's age: 50
Son's age: 25
Name:Tejas S.
USN:1BM22CS308.
```

Lab Program 8:

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.

```java
public class Lab8 {

  static class DisplayBMS extends Thread {

    @Override

    public void run() {

      while (true) {

        System.out.println("BMS College of Engineering");

        try {

          Thread.sleep(10000); // 10 seconds

        } catch (InterruptedException e) {

          e.printStackTrace();

        }

      }

    }

  }


  static class DisplayCSE extends Thread {

    @Override

    public void run() {

      while (true) {

        System.out.println("CSE");

        try {

          Thread.sleep(2000); // 2 seconds

        } catch (InterruptedException e) {
```

```java
            e.printStackTrace();

        }

      }

    }


  public static void main(String[] args) {

    DisplayBMS displayBMS = new DisplayBMS();

    DisplayCSE displayCSE = new DisplayCSE();


    displayBMS.start();

    displayCSE.start();

      System.out.println("Name:Tejas S.");

      System.out.println("USN:1BM22CS38.");


  }
}
```

Output:

```
C:\Users\teju3\OneDrive\Desktop\JAVALAB>javac Demo.java

C:\Users\teju3\OneDrive\Desktop\JAVALAB>java Demo.java
Name:Tejas.
USN:1BM22CS308.
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
```

Lab Program 9:

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program woul NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

```java
import javax.swing.*;

import java.awt.*;

import java.awt.event.*;

class SwingDemo{

    SwingDemo(){

        JFrame jfrm = new JFrame("Divider App");

        jfrm.setSize(275, 150);

        jfrm.setLayout(new FlowLayout());

        jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

        JLabel jlab = new JLabel("Enter the divider and divident:");

        JTextField ajtf = new JTextField(8);

        JTextField bjtf = new JTextField(8);

        JButton button = new JButton("Calculate");

        JLabel err = new JLabel();

        JLabel alab = new JLabel();

        JLabel blab = new JLabel();

        JLabel anslab = new JLabel();

        jfrm.add(err);

        jfrm.add(jlab);

        jfrm.add(ajtf);

        jfrm.add(bjtf);

        jfrm.add(button);
```

```java
        jfrm.add(alab);

        jfrm.add(blab);

        jfrm.add(anslab);

        ActionListener l = new ActionListener() {

            public void actionPerformed(ActionEvent evt) {

                System.out.println("Action event from a text field");

            }

        };

        ajtf.addActionListener(l);

        bjtf.addActionListener(l);

        button.addActionListener(new ActionListener() {

            public void actionPerformed(ActionEvent evt) {

                try{

                    int a = Integer.parseInt(ajtf.getText());

                    int b = Integer.parseInt(bjtf.getText());

                    int ans = a/b;

                    alab.setText("\nA = " + a);

                    blab.setText("\nB = " + b);

                    anslab.setText("\nAns = "+ ans);

                }

                catch(NumberFormatException e){

                    alab.setText("");

                    blab.setText("");

                    anslab.setText("");

                    err.setText("Enter Only Integers!");

                }
```

```java
                catch(ArithmeticException e){

                    alab.setText("");

                    blab.setText("");

                    anslab.setText("");

                    err.setText("B should be NON zero!");

                }

            }

        });

        jfrm.setVisible(true);

    }

    public static void main(String args[]){

        SwingUtilities.invokeLater(new Runnable(){

            public void run(){

                new SwingDemo();

            }

        });

    }

}
```

Output: