B.M.S. COLLEGE OF ENGINEERING
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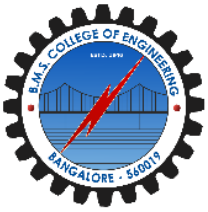
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING



LAB REPORT

On

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted By:

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1BM22CS002

In partial fulfilment of

BACHELOR OF ENGINEERING

In

COMPUTER SCIENCE AND ENGINEERING

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Faculty-In-Charge

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LAB-1:QUADRATIC EQUATION

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.

```
import java.util.Scanner; import
java.lang.Math; public class QuadEqn{
public static void main(String[] args){
        float a, b, c, dsc, r1, r2;
        System.out.println("AARUSHI SHAHI 1BM22CS002");
        Scanner reader = new Scanner(System.in);
        System.out.println("Enter the co-efficient of x^2: ");
a = reader.nextFloat();
        if (a==0){
                System.out.println("Invalid Input");
        }
        else{
                System.out.println("Enter the co-efficient of x: ");
b = reader.nextFloat();
                System.out.print("Enter the value of the constant: ");
c = reader.nextFloat();                         dsc = (float)Math.pow(b,2) - 4*a*c;
                if(dsc > 0){
                        r1 = (float)(-b + Math.sqrt(dsc))/(2*a);
                r2 = (float)(-b - Math.sqrt(dsc))/(2*a);
                        System.out.println("The roots are:" + r1+ " and " + r2);
                }
                else if(dsc==0){
                        r1 = (float)-b/(2*a);
                        System.out.println("The root is: "+ r1);
```

```
                    }
                    else{
                        System.out.println("No real roots exist for this equation");
                    }

                }
            }
}
```

OUTPUT :

```
AarushiShahi 1BM22CS002
Enter the co-efficient of x^2:
2
Enter the co-efficient of x:
4
Enter the value of the constant: 2
The root is: -1.0
```

```
Aarushi Shahi 1BM22CS002
Enter the co-efficient of x^2:
2
Enter the co-efficient of x:
7
Enter the value of the constant: 1
The roots are:-0.14921895 and -3.350781
```

```
Aarushi Shahi 1BM22CS002
Enter the co-efficient of x^2:
1
Enter the co-efficient of x:
2
Enter the value of the constant: 3
No real roots exist for this equation
```

```
Aarushi Shahi 1BM22CS002
Enter the co-efficient of x^2:
0
Invalid Input
```

LAB-2: STUDENT SGPA CALCULATION

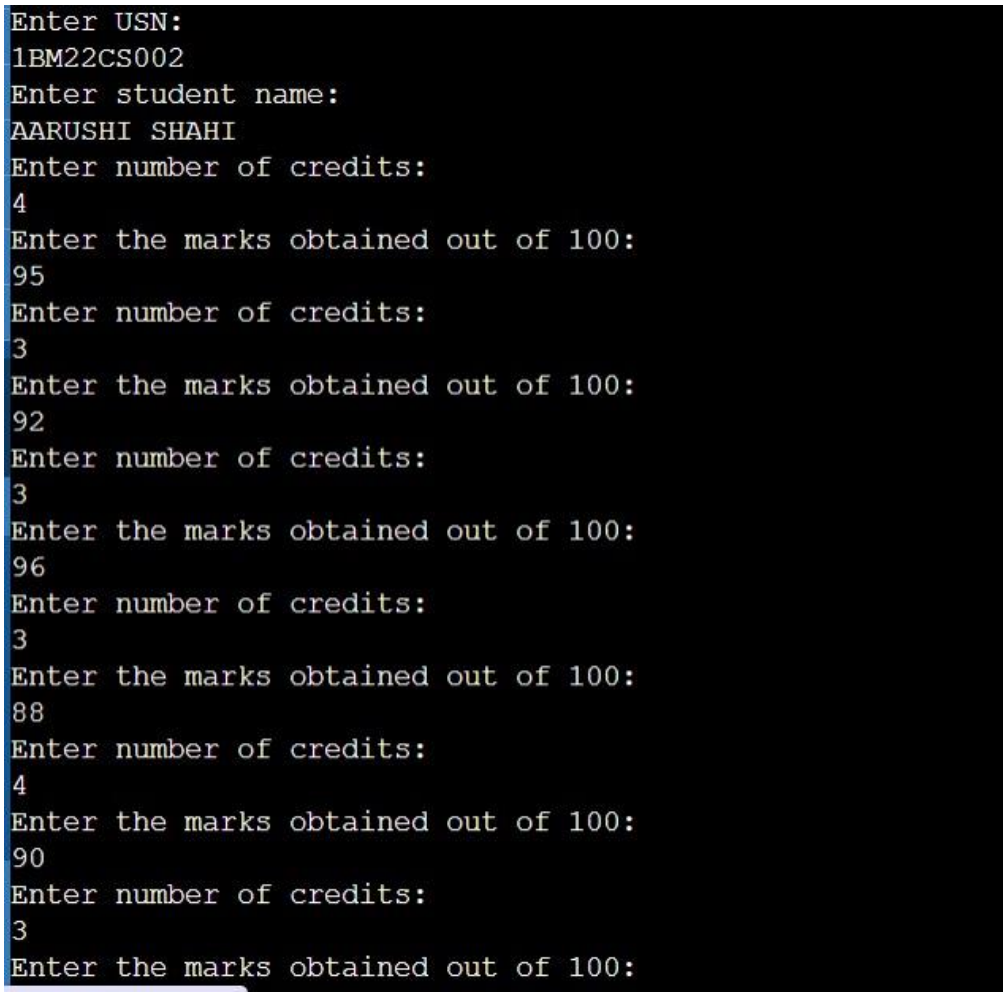
Develop a Java program to create a class Student with members usn, name, an arraycredits and an array marks. Include methods to accept and display details and amethod to calculate SGPA of a student.

```
import java.util.Scanner; import
java.lang.Math;


class Student {     int num_subs = 8;
double credits[] = new double[num_subs];
double marks[] = new double[num_subs];
double grade[] = new double[num_subs];
double sgpa, num = 0, den = 0;
   String name, usn;


   void accept_details() {
      Scanner reader = new Scanner(System.in);
System.out.println("Enter USN: ");          usn =
reader.nextLine();
      System.out.println("Enter student name: ");
name = reader.nextLine();          for (int i = 0; i <
num_subs; i++) {
         System.out.println("Enter number of credits: ");
credits[i] = reader.nextDouble();
         System.out.println("Enter the marks obtained out of 100: ");
marks[i] = reader.nextDouble();
      }
   }


   void display_details() {
```

```
        System.out.println("USN: " + usn);
        System.out.println("Name: " + name);
System.out.print("Credits: ");        for (int i
= 0; i < num_subs; i++) {
            System.out.print(credits[i] + ", ");
        }
        System.out.println("");
System.out.print("Marks: ");         for
(int i = 0; i < num_subs; i++) {
            System.out.print(marks[i] + ", ");
        }
        System.out.println("");
        System.out.println("SGPA: " + calculate_sgpa());
    }

    double calculate_sgpa() {        for (int i = 0; i <
num_subs; i++) {            if (marks[i] >= 40 &&
marks[i] <= 100) {                grade[i] =
Math.floor(marks[i] / 10) + 1;
            } else {
grade[i] = 0;
            }
        }
        for (int i = 0; i < num_subs; i++) {
num += credits[i] * grade[i];            den
+= credits[i];
        }
        sgpa = num / den;
return sgpa;
```

```
    }
}


public class SgpaCalc {     public static
void main(String[] args) {
        Student S1= new Student();
        S1.accept_details();
        S1.display_details();
        // System.out.println("SGPA is: "+S1.calculate_sgpa());
    }
}
```

OUTPUT :



```
Enter the marks obtained out of 100:
82
Enter number of credits:
4
Enter the marks obtained out of 100:
90
Enter number of credits:
1
Enter the marks obtained out of 100:
90
USN: 1BM22CS002
Name: AARUSHI SHAHI
Credits: 4.0, 3.0, 3.0, 3.0, 4.0, 3.0, 4.0, 1.0,
Marks: 95.0, 92.0, 96.0, 88.0, 90.0, 82.0, 90.0, 90.0,
SGPA: 9.76
```

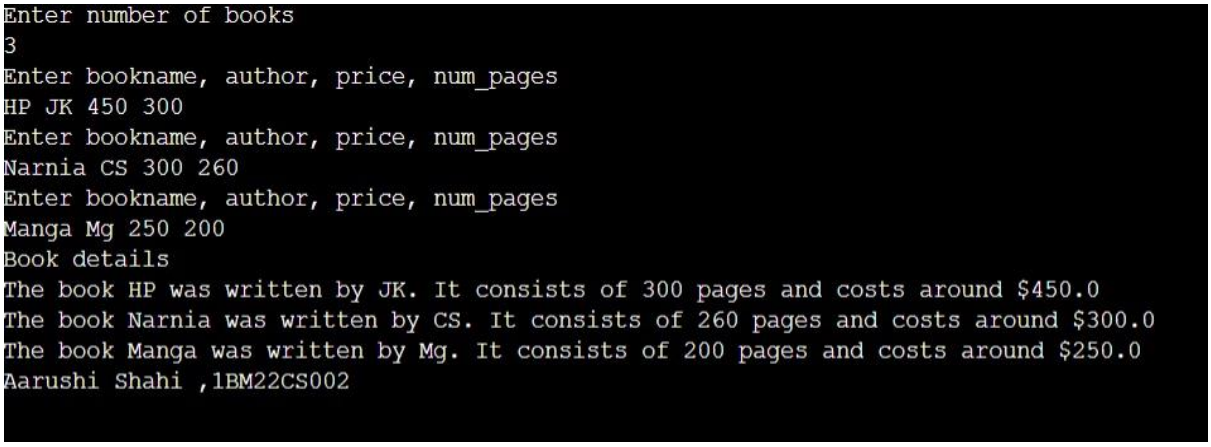
LAB-3: BOOK DETAILS

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 andget the details of the objects. Include a toString( ) method that could display thecomplete details of the book. Develop a Java program to create n book objects.

```
 import java.util.*;
class Book01 {
String name; String
author;
   float price;
   int num_pages;
void set_details({)
Scanner sc = new Scanner(System.in); // Added System.in to Scanner constructor
System.out.println("Enter bookname, author, price, num_pages");
       name = sc.next();
author = sc.next();        price =
sc.nextFloat();
num_pages = sc.nextInt();
   }
   void get_details() {
      String details = toString();
      System.out.println(details);
   }
   public String toString() {
      return "The book " + name + " was written by " + author + ". It consists of " +
num_pages + " pages and costs around $" + price;
   }
   public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
System.out.println("Enter number of books");
        int n = sc.nextInt();
        Book01 b[] = new Book01[n];
        for (int i = 0; i < n; i++) {
b[i] = new Book01();
b[i].set_details();
        }
        System.out.println("Book details");
        for (int i = 0; i < n; i++) {
b[i].get_details();
 }
 System.out.println("AARUSHI SHAHI,1BM22CS002");
   }
}
```

OUTPUT :



LAB-4: AREA CALCULATION

Develop a Java program to create an abstract class named Shape that contains twointegers and an empty method named printArea( ). Provide three classes namedRectangle, Triangle and Circle such that each one of the classes extends the classShape. Each one of the classes contain only the method printArea( ) that prints thearea of the given shape.

```
import java.util.Scanner; abstract
class Shape
{
int x,y;
abstract void PrintArea(); public
static void main(String args[])
{
System.out.println("AARUSHI
SHAHI,1BM22CS002"); Shape obj1 = new Circle();
obj1.PrintArea();
Shape obj2 = new Rectangle(); obj2.PrintArea();
Shape obj3= new Triangle(); obj3.PrintArea();

}

}

class Circle extends Shape{
Circle()
{
Scanner sc = new Scanner(System.in);
```

```
System.out.println("enter the radius of the circle");
x=sc.nextInt(); y=x;
}
void PrintArea()
{System.out.println("area of the circle is"+ 3.14*x*y);
}
}

class Rectangle extends Shape{
Rectangle()
{
Scanner sc = new Scanner(System.in);
System.out.println("enter the length and breadth of Rectangle");
x=sc.nextInt(); y=sc.nextInt();
}
void PrintArea()
{
System.out.println("area of the rectangle is"+ x*y);
}
}
class Triangle extends Shape{
Triangle()
{
Scanner sc = new Scanner(System.in);
System.out.println("enter the base and height of Triangle");

x=sc.nextInt();
y=sc.nextInt();
}
```

```
void PrintArea()
{
System.out.println("area of the triangle is"+ 0.5*x*y);
}}
```

```
Aarushi Shahi,1BM22CS002
enter the radius of the circle
3
area of the circle is28.259999999999998
enter the length and breadth of Rectangle
34
45
area of the rectangle is1530
enter the base and height of Triangle
12
8
area of the triangle is48.0
```

LAB-5: BANK ACCOUNT DETAILS

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. Thesavings 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 customerName; long accno; String accountType; double
balance; public Account (String customerName, long accno, String
accountType)
 {
this.customerName = customerName;
this.accno = accno;


this.accountType = accountType; this.balance
= 0.0;

}
public void displayBalance ()
 {
System.out.println ("Account Number: " + accno);
System.out.println ("Customer Name: " + customerName);
System.out.println ("Account Type: " + accountType);
System.out.println ("Balance: $" + balance);
}
}
class CurAcct extends Account
{
double minBalance; double serviceCharge; public
CurAcct (String customerName, long accno)
 {
```

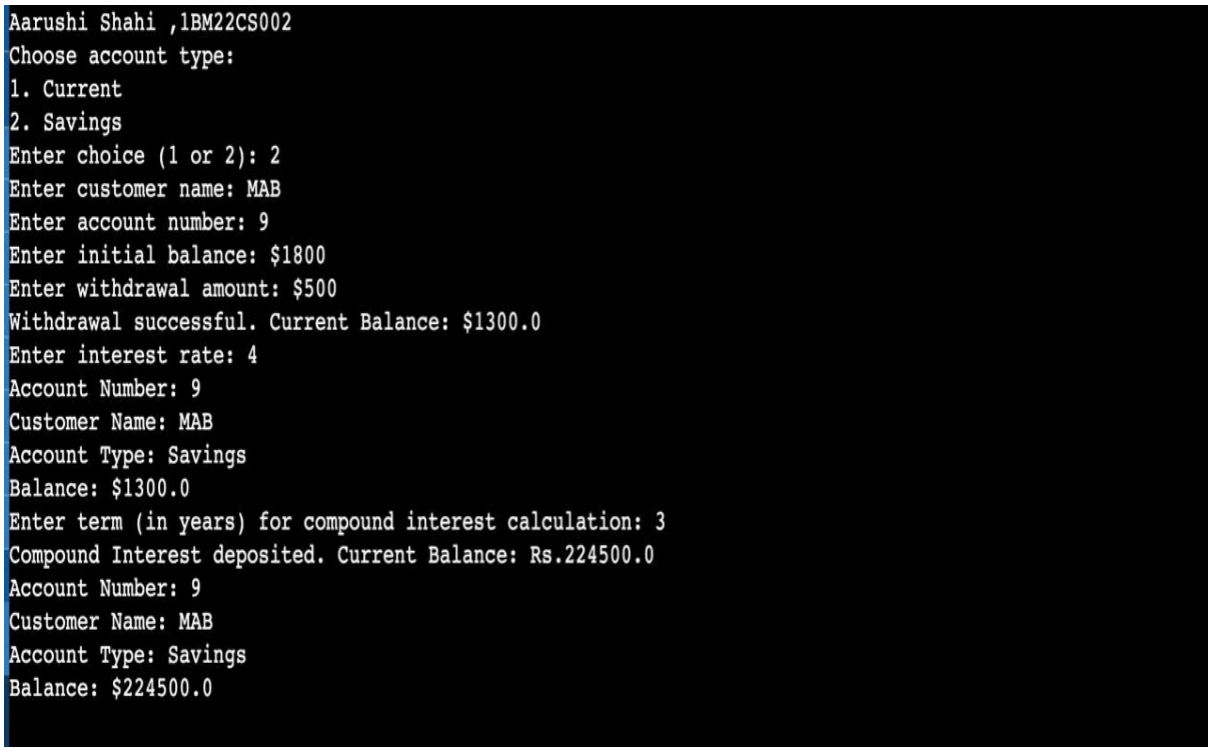
```
super (customerName, accno, "Current");
this.minBalance = 500.0
this.serviceCharge = 50.0
 }
public void withdraw (double amount)
 {
if (balance - amount >= minBalance)
 {
balance -= amount;
System.out.println ("Withdrawal successful. Current Balance: $" +balance);
}
else
 {
System.out.println ("Insufficient funds. Withdrawal not allowed.");
}
}
public void imposeServiceCharge ()
 {
if (balance < minBalance)
 {
balance -= serviceCharge;
System.out.println ("Service charge imposed. Current Balance: Rs." +balance);
}
}
}
class SavAcct extends Account
{
double interestRate; public SavAcct (String
customerName, long accno)
```

```
 {
super (customerName, accno, "Savings"); this.interestRate
= 0.05;
}
public void depositInterest ()
 {
double interest = balance * interestRate; balance
+= interest;
System.out.println ("Interest deposited. Current Balance: $" + balance);
}
public void compoundInterest (double initialAmount, int term)
 {
double compoundInterest =initialAmount * Math.pow ((1 + interestRate), term) -
initialAmount; balance += compoundInterest;
System.out.println ("Compound Interest deposited. Current Balance: Rs." +balance);
}
}
public class Bank01
{
public static void main (String[]args)
 {
Scanner scanner = new Scanner (System.in);
System.out.println("AARUSHI SHAHI,1BM22CS002");
System.out.println ("Choose account type:");
System.out.println ("1. Current");
System.out.println ("2. Savings");

System.out.print ("Enter choice (1 or 2): "); int
choice = scanner.nextInt ();
```

```
System.out.print ("Enter customer name: ");
String customerName = scanner.next ();
System.out.print ("Enter account number: ");
long accno = scanner.nextLong (); if (choice
== 1)
 {
CurAcct curAccount = new CurAcct (customerName, accno);
System.out.print ("Enter initial balance: $"); double
initialBalance = scanner.nextDouble (); curAccount.balance
= initialBalance;
System.out.print ("Enter withdrawal amount: $"); double
withdrawalAmount = scanner.nextDouble ();
curAccount.withdraw (withdrawalAmount);
curAccount.imposeServiceCharge ();
curAccount.displayBalance ();

}
else if (choice == 2)
 {
SavAcct savAccount = new SavAcct (customerName, accno);
System.out.print ("Enter initial balance: $"); double
initialBalance = scanner.nextDouble (); savAccount.balance
= initialBalance;
System.out.print ("Enter withdrawal amount: $"); double
withdrawalAmount = scanner.nextDouble ();
savAccount.balance -= withdrawalAmount;
System.out.println ("Withdrawal successful. Current Balance: $" +savAccount.balance);
System.out.print ("Enter interest rate: "); double interestRate = scanner.nextDouble ();
savAccount.interestRate = interestRate; savAccount.displayBalance ();
```

```
System.out.print ("Enter term (in years) for compound interest calculation: ");
int term = scanner.nextInt (); savAccount.compoundInterest (initialBalance,
term); savAccount.displayBalance ();
}
else
 {
System.out.println ("Invalid choice");
    }
  }
}
```

OUTPUT :



LAB-6: CALCULATION OF MARKS

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.

```
package cie;


public class Student {
public String name;
public String usn;     public
int sem;


   public void setStudent(String nam, String sn, int semester) {
name = nam;
       usn = sn;
       sem = semester;
   }
}


//Internals.java package cie; import
java.util.Scanner; public class Internals extends
Student{     public Scanner reader = new
Scanner(System.in);     public int[] inmarks = new
int[5];

   public void setInternals(){
       for(int i=0; i<5; i++){
```

```
        System.out.println("Enter internal marks of course " + (i+1) + ":");
inmarks[i] = reader.nextInt();
      }
   }
}

//see PACKAGE //Externals.java package see;
import java.util.Scanner; import cie.*; public class
Externals extends Student{    public Scanner reader
= new Scanner(System.in);    public int[] exmarks =
new int[5];    public void setExternals(){
      for(int i=0; i<5; i++){
        System.out.println("Enter external marks of course " + (i+1) + ":");
exmarks[i] = reader.nextInt();
      }
   }
}

//Marks.java import
cie.*; import see.*;
import java.util.Scanner;
import java.lang.Math;
public class Marks {
public static void
main(String[] args) {
      int i, j;
      System.out.println("AARUSHI SHAHI");
      System.out.println("1Bm22cs002");
```

```
        Scanner reader = new Scanner(System.in);
System.out.println("Enter the value of n");        int
n = reader.nextInt();
        Internals[] intarr = new Internals[n];
        Externals[] extarr = new Externals[n];
String name, usn;        int semester;

        for (i = 0; i < n; i++) {
            System.out.println("Enter name: ");
name = reader.nextLine();            name =
reader.nextLine();
System.out.println("Enter usn: ");
usn = reader.nextLine();
            // usn = reader.nextLine();
System.out.println("Enter semester: ");
semester = reader.nextInt();           Internals
studin = new Internals();
studin.setInternals();           Externals studex =
new Externals();           studex.setExternals();
studin.setStudent(name, usn, semester);
studex.setStudent(name, usn, semester);
intarr[i] = studin;           extarr[i] = studex;
        }

        for (i = 0; i < n; i++) {
            System.out.println("Name: " + intarr[i].name);
            System.out.println("USN: " + intarr[i].usn);
            System.out.println("Sem " + intarr[i].sem);
```

```
        for (j = 0; j < 5; j++) {
            System.out.println("Course " + (j + 1) + ":"
                    + (intarr[i].inmarks[j] + Math.ceil((double) extarr[i].exmarks[j] / 2)));
        }
        System.out.println("");
      }

    }
}
```

OUTPUT :

```
enter no of students:
1
Enter details1
Enter sem,usn and name:

3
1bm22cs001
Enter internal and see marks of sub1
45
45
Enter internal and see marks of sub2
46
46
Enter internal and see marks of sub3
47
47
Enter internal and see marks of sub4
48
48
Enter internal and see marks of sub5
49
49
Final marks of 1bm22cs001
Course1=90
Course2=92
Course3=94
Course4=96
Course5=98
```

LAB-7: EXCEPTION HANDLING

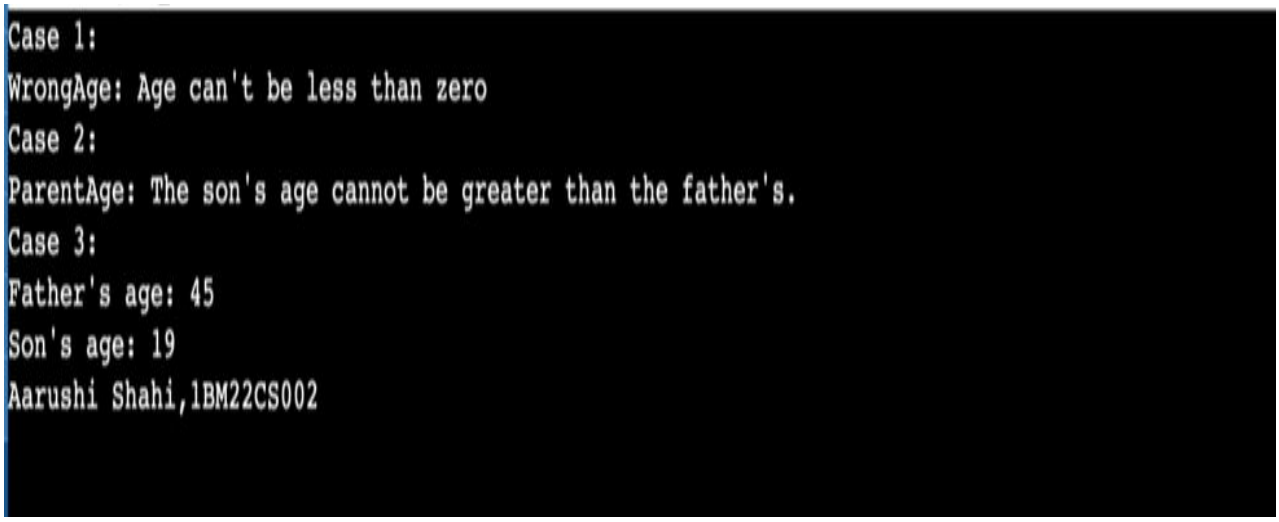
Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age<0. In Son class, implement a constructor that cases both father and son's age and throws an exception if son's age is >=father's age.

```
import java.util.Scanner;


class WrongAge extends Exception {
WrongAge(String errorMessage) {
super(errorMessage);
   }
}

class ParentAge extends Exception {
ParentAge(String errorMessage) {
super(errorMessage);
   }
}

class Father {
   int age;

   Father(int num) throws WrongAge {
      if (num < 0) {
         throw new WrongAge("Age can't be less than zero");
      } else {
         age = num;
```

```
        }
    }

    int fatherAge() {
return age;
    }
}

class Son extends Father {
    int age;

    Son(int num1, int num2) throws ParentAge, WrongAge {
        super(num1);        if (num2 > super.age) {            throw new ParentAge("The
son's age cannot be greater than the father's.");
        } else {
            this.age = num2;
        }
    }
}

public class Exception1 {     public static void main(String[] args)
throws WrongAge, ParentAge {
        Son s1 = null;
        Son s2 = null;        Son s3 = null;
progBody("Case 1: ", s1, -10, 30);
progBody("Case 2: ", s2, 10, 20);
progBody("Case 3: ", s3, 45, 19);

    }
```

```
    static void progBody(String disp, Son s1, int f_age, int s_age) {
System.out.println(disp);
        try {
            s1 = new Son(f_age, s_age);
        } catch (WrongAge errorText) {
            System.out.println(errorText);
        } catch (ParentAge errortext) {
            System.out.println(errortext);
        } finally {
if (s1 != null) {
                System.out.println("Father's age: " + s1.fatherAge());
                System.out.println("Son's age: " + s1.age);
            }
        }
    }
}
```

OUTPUT :



LAB-8: MULTITHREADING

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. class A extends Thread

```
{
   int t1,time;
A(){
t1=0;
      time=25000;
   }
   public void run()
   {
      while(t1<=time)
      {
         System.out.println("BMS COLLEGE OF ENGINEERING");
         try {
            sleep(10000);
         } catch(Exception e) {
            System.out.println("error");
         }
         t1+=10000;
      }}
}
class B extends Thread{
   int t2,time;
B(){
      time=25000;
      t2=0;
   }
```

```
    public void run()
    {
        while(t2<=time)

        {
            System.out.println("CSE");
            try{
                sleep(2000);
            }
            catch(Exception e)
            {
                System.out.println("error");
            }
            t2+=2000;
        }}
}
class program8demo
{
    public static void main(String args[])
    {
        A a=new A();
B b=new B();
        a.start();
        b.start();
System.out.println("AARUSHI SHAHI,1BM22CS002");
    }
}
```

OUTPUT :

```
Aarushi Shahi,1BM22CS002
BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
CSE
BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
CSE
CSE
BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
```

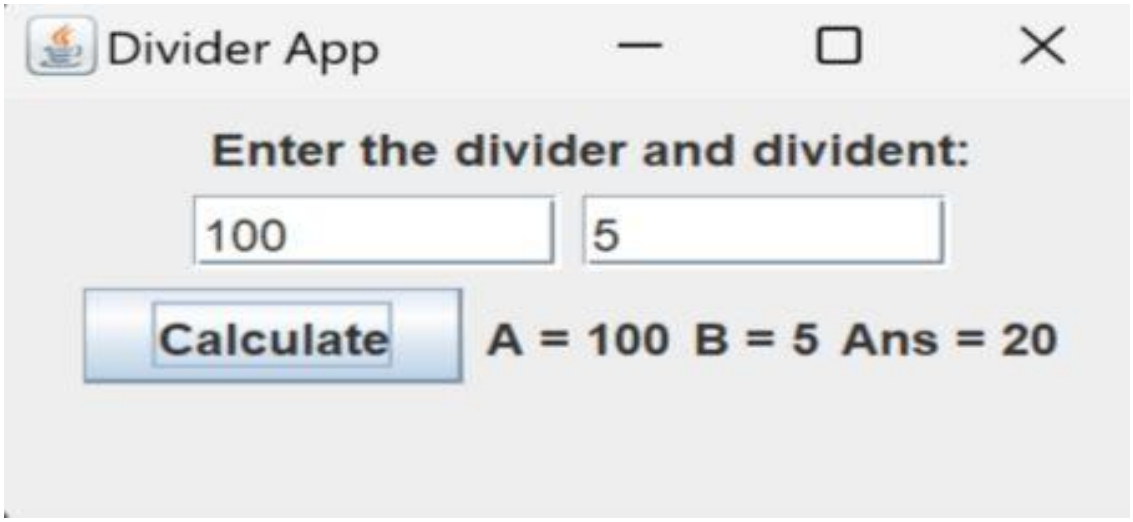
LAB-9: AWT

09) 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 would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box. 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 dividend and divisor:");
JLabel plab=new JLabel("AARUSHI SHAHI,1BM22CS002");

                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(plab);
                jfrm.add(ajtf);
jfrm.add(bjtf);
jfrm.add(button);
jfrm.add(alab);
jfrm.add(blab);
jfrm.add(anslab);

                ActionListener I=new ActionListener(){
public void actionPerformed(ActionEvent evt){
                        System.out.println("Action event from atext field");}

                };
                ajtf.addActionListener(I);
bjtf.addActionListener(I);
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("\n A="+a);
blab.setText("\n B="+b);                        anslab.setText("\n
Ans="+ans);}             catch(NumberFormatException e){
```

```
                                        alab.setText("");
            blab.setText("");
anslab.setText("");
                                        err.setText("Enter only Integers!");
                                        }
                                catch(ArithmeticException e){
                                alab.setText("");
blab.setText("");
anslab.setText("");
                                err.setText("B should ne NON zero!");}
                                }
                        });

                        jfrm.setVisible(true);
                        }

                        public static void main(String args[]){
                                SwingUtilities.invokeLater(new Runnable(){
                                public void run(){
                                        new SwingDemo();
                                System.out.println("AARUSHI SHAHI,1BM22CS002");
                                }
                        });
            }
}
```


Divider App
Enter the divider and divident:
100
5
Calculate
A = 100 B = 5 Ans = 20