## HRUTHVIK MALLIKARJUNAPPA(1BM22C S114)

**Q1.** 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 discriminant b2-4ac is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
import java.lang.Math;
class quadratic
{public static void main(String XX[])
    int a,b,c;
    System.out.println("enter the values of a,b,c respectively\n");
    Scanner s1= new Scanner(System.in);
    a = s1.nextInt();
   b = s1.nextInt();
    c = s1.nextInt();
    double d = b*b - 4*a*c;
    System.out.println("a = " + a +" b = " + b +" c = " + c);
    if(a==0) {System.out.println("not a quadratic equation");}
    else if( d>0)
      System.out.println("the equation has two real and different solutions");
      double r1=(-b + Math.sqrt(d))/(2*a);
      double r2=(-b - Math.sqrt(d))/(2*a);
      System.out.println("r1 = " + r1);
      System.out.println("r2 = " + r2);
   else if(d==0)
      System.out.println("the equation has real and equal solutions");
      double r1= -b/(2*a);
      double r2= -b/(2*a);
      System.out.println("r1 = " + r1);
      System.out.println("r2 = " + r2);
   else if(d<0)
```

```
System.out.println("the equation has unreal solutions");
}
```

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veal solutions to the amounts.
class Quadratic
Public static void main (string [ large)
system.out. println ("Enter the values of a, b and i)  a = s. pertInt ();
b= s. nextInt(); c= s. nextInt(); int h= (b+b)-4+a+c;
System.out.println ("Ho real pots");
else
double $l=Math \cdot sqvt(K);$ $x = (-b-1)/2*a;$ $y = (-b+1)/2*a;$
5ysters - out. println ("Roots of given equations") +x+" "+y); }
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**Q2.** Develop a Java program to create a class Student with members usn, name, and array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

```
import java.util.Scanner;
class student{
   String USN , name;
    Scanner S1= new Scanner(System.in);
    int size = S1.nextInt();
    float credits[] = new float[size];
    float marks[] = new float[size];
    void accept(){
        USN= S1.next();
        name= S1.next();
        System.out.println("Marks in the following subjects are 1.Maths 2.physics
3.C progm 4.web 5.kannada 6.IDT 7.civil 8.english");
        for(int i=0;i<size;i++){</pre>
            System.out.print((i+1)+" = ");
            marks[i]= S1.nextInt();
        System.out.println("respective credits of subjects are 1.Maths 2.physics
3.C progm 4.web 5.kannada 6.IDT 7.civil 8.english");
        for(int i=0;i<size;i++){</pre>
            System.out.print((i+1)+" = ");
        credits[i]= S1.nextInt();
    void display(){
        System.out.println("USN: "+USN+" name: "+name);
        System.out.println("Marks and credits in the following subjects are
1.Maths 2.physics 3.C progm 4.web 5.kannada 6.IDT 7.civil 8.english");
        for(int i=0;i<size;i++){</pre>
            System.out.print((i+1)+" .marks = "+marks[i]+" credits="+credits[i]+"
');
    int gpa(int i){
            if(marks[i]>=90) return 10;
            else if(marks[i]>=80 && marks[i]<=89) return 9;</pre>
            else if(marks[i]>=70 && marks[i]<=79) return 8;</pre>
            else if(marks[i]>=60 && marks[i]<=69) return 7;</pre>
```

```
else if(marks[i]>=50 && marks[i]<=59) return 6;</pre>
        else if(marks[i]>=40 && marks[i]<=49) return 5;</pre>
        else if(marks[i]>=80 && marks[i]<=89) return 4;</pre>
        else return 0;
float sgpa(){
    float SGPA , sum=0;
    for(int i=0;i<size;i++){</pre>
        sum=sum+gpa(i)*credits[i];
    SGPA = sum/20;
    return SGPA;
class call{
    public static void main (String[] args) {
        student S1 = new student();
        S1.accept();
        S1.display();
        float Ans;
        Ans = S1.sgpa();
        System.out.println("SGPA of the student is : "+Ans);
```

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Q3. 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.

```
import java.util.Scanner;
class Book{
   String name, Author;
    int price,num_pages;
    Book(){};
    Book( String name, String Author, int price, int num_pages){
        this.name=name;
        this.Author=Author;
        this.price=price;
        this.num pages=num pages;
    void set(){
        System.out.println("enter details of book :");
        Scanner S1= new Scanner(System.in);
        name = S1.next();
        Author = S1.next();
        price = S1.nextInt();
        num_pages= S1.nextInt();
    void get(){
        System.out.println("name: "+name+" Author: "+Author+" price: "+price+"
num_pages: "+num_pages);
    public String toString(){
        return("name: "+name+" Author: "+Author+" price: "+price+" num pages:
 +num_pages);
class bookdemo{
     public static void main (String[] args) {
        Scanner S= new Scanner(System.in);
        System.out.print("print n: ");
        n=S.nextInt();
```

```
Book B[] = new Book[n];
B[0] = new Book("cant_hurt_me","David_googins",700,360);
B[0].get();
for(int i=1;i<n;i++){
B[i] = new Book();
B[i].set();
}
System.out.println(B[1].toString());
for(int i=2;i<n;i++){
B[i].get();
}
}</pre>
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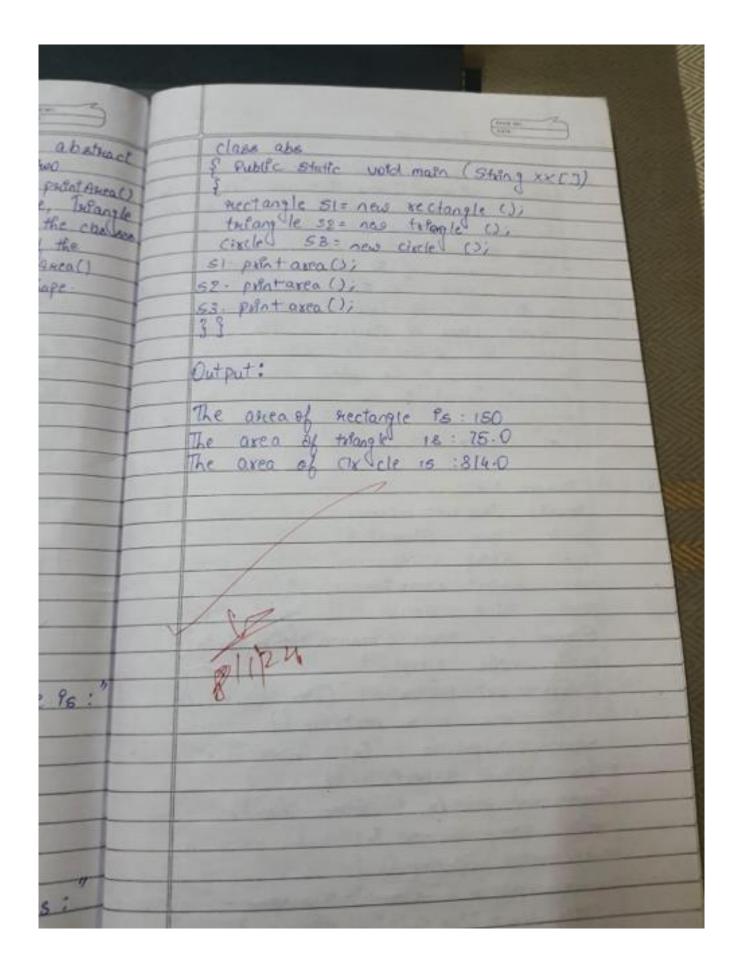
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**Q4.** Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape.

```
abstract class shape{
    int a,b;
    abstract void printarea();
class rectangle extends shape{
    rectangle(int x,int y){
        a=x;b=y;
   void printarea(){
        System.out.println("area of rectangle is : "(a*b));
class triangle extends shape{
   triangle(int x,int y){
        a=x;b=y;
   void printarea(){
        System.out.println("area of triangle is : "(0.5*a*b));
class circle extends shape{
    circle(int x){
        a=x;
   void printarea(){
        System.out.println("area of circle is : "(3.14*a*a));
class shapedemo{
    public static void main(String xx[]){
        rectangle r=new rectangle(5,4);
        triangle t=new triangle(5,4);
        circle c=new circle(7);
        r.printarea();
```

```
t.printarea();
c.printarea();
}
```

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Class circle extends shape	
System out prentle ("The one of excle is: + (3144 a, *az));	1
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**Q5.** 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 customerName;
   int accountNumber;
   String accountType;
   double balance;
   Account(String name, int accNo, String accType, double initialBalance) {
       customerName = name;
       accountNumber = accNo;
       accountType = accType;
       balance = initialBalance;
   void deposit(double amount) {
       balance += amount;
       System.out.println("Deposit of $" + amount + " successful.");
   void displayBalance() {
       System.out.println("Balance: $" + balance);
```

```
class CurAcct extends Account {
    double minBalance;
    double serviceCharge;
    CurAcct(String name, int accNo, String accType, double initialBalance, double
minBal, double charge) {
        super(name, accNo, accType, initialBalance);
        minBalance = minBal;
        serviceCharge = charge;
    void withdraw(double amount) {
        if (balance - amount >= minBalance) {
            balance -= amount;
            System.out.println("Withdrawal of $" + amount + " successful.");
        } else {
            System.out.println("Insufficient funds. Withdrawal failed.");
    void deductServiceCharge() {
        if (balance < minBalance) {</pre>
            balance -= serviceCharge;
            System.out.println("Service charge of $" + serviceCharge + " applied
due to balance below minimum.");
class SavAcct extends Account {
    double interestRate;
    SavAcct(String name, int accNo, String accType, double initialBalance, double
interest) {
        super(name, accNo, accType, initialBalance);
        interestRate = interest;
    void calculateInterest() {
        double interest = balance * interestRate / 100;
        balance += interest;
        System.out.println("Interest of $" + interest + " added.");
```

```
void withdraw(double amount) {
        if (balance - amount >= 0) {
            balance -= amount;
            System.out.println("Withdrawal of $" + amount + " successful.");
            System.out.println("Insufficient funds. Withdrawal failed.");
class Bank {
   public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
       // Creating savings account
        SavAcct savings = new SavAcct("John Doe", 123456, "Savings", 1000, 5); //
5% interest rate
       // Creating current account
        CurAcct current = new CurAcct("Jane Doe", 654321, "Current", 2000, 500,
10); // $500 minimum balance, $10 service charge
        System.out.println("Welcome to our bank!");
        while (true) {
            System.out.println("\n1. Deposit\n2. Withdraw\n3. Display Balance\n4.
Exit");
            System.out.print("Enter your choice: ");
            int choice = scanner.nextInt();
            switch (choice) {
                case 1:
                    System.out.print("Enter amount to deposit: ");
                    double depositAmount = scanner.nextDouble();
                    System.out.print("Select account (1 for Savings, 2 for
Current): ");
                    int accountChoice = scanner.nextInt();
                    if (accountChoice == 1)
                        savings.deposit(depositAmount);
                    else if (accountChoice == 2)
                        current.deposit(depositAmount);
                    break;
                case 2:
```

```
System.out.print("Enter amount to withdraw: ");
                    double withdrawAmount = scanner.nextDouble();
                    System.out.print("Select account (1 for Savings, 2 for
Current): ");
                    accountChoice = scanner.nextInt();
                    if (accountChoice == 1)
                        savings.withdraw(withdrawAmount);
                    else if (accountChoice == 2) {
                        current.withdraw(withdrawAmount);
                        current.deductServiceCharge();
                    break;
                case 3:
                    System.out.print("Select account (1 for Savings, 2 for
Current): ");
                    accountChoice = scanner.nextInt();
                    if (accountChoice == 1)
                        savings.displayBalance();
                    else if (accountChoice == 2)
                        current.displayBalance();
                    break;
                case 4:
                    System.out.println("Thank you for banking with us!");
                    System.exit(0);
                default:
                    System.out.println("Invalid choice. Please try again.");
```

12/2/24 LAB-7 \* import jour util scarrer; class Account string customer Hame; int account Humber; string account Type; double talance; Account Colving name, intaccNo, string autype, double customer Name = name; alburt Number = acc No! balance = initial Balance; void deposit (double amount) balance += amount', System. out. printle ("Deposit obs"+ amount + " successful); f word deplay Balance () Bystem out purtle (" Balance: 5" + balance); 1 1 3 200 1 1 1 1 7 1 4 6 1 Class curacit extends Allowet double minbalance, a double service charges

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class Bann ? Public state void main (strings Targe) Scarner Scanner = new garner (System is) system out println ("pelione to our bank!") while (true) System out . printer ("In 1. Deposit In 2. Withdraw In 3. Display 4. Blance to 5. But') System out println ("Enter your choice:") Port choice = scanner : next int U Switch (chaire) case 1: system. out. println (" Enter the amount to deposit:"). double deposit Amount = scannoz rust System. put. println ("Select account 1. for Barings, 2. for current out august chairs scarner next Int () Scanner nextIntly, if (cumt chair ==1 Sawings, deposit (deposit Amount); else if (account choice == 2) authent deposit [ deposit Amount); break; case 2: system. out printer ("Enter The amount to be withousen'); double withdrawn Amountz Scauler, next Double ()

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**Q6.** Create a package CIE which has two classes- Student and Internals. The class Student 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;
import java.util.Scanner;
public class student
    public String USN, name;
    public int semester;
    Scanner S1 = new Scanner(System.in);
    public void set()
        System.out.println("USN of the student is : ");
        USN = S1.next();
        System.out.println("name of the student is : ");
        name = S1.next();
        System.out.println("semester of the student is : ");
        semester = S1.nextInt();
    public void get()
        System.out.println("USN of the student is: "+USN+"name of the student is
  "+name+"semester of the student is : "+semester);
package CIE;
import java.util.Scanner;
public class internal extends student
    Scanner S1 = new Scanner(System.in);
```

```
public int internal_marks[]= new int[5];
    public void setcie()
        System.out.println("1.Java 2.maths 3.DS 4.COA 5.DBMS ");
        for(int i=0;i<5;i++)</pre>
            System.out.print("\n"+(i+1)+".");
            internal_marks[i]= S1.nextInt();
    public void getcie()
        System.out.println("1.Java 2.maths 3.DS 4.COA 5.DBMS ");
        for(int i=0;i<5;i++)
        System.out.println((i+1)+"."+internal_marks[i]);
    }
package SEE;
import CIE.student;
import java.util.Scanner;
public class external extends CIE.student
    Scanner s1 = new Scanner(System.in);
    public int see_marks[]=new int[5];
    public void setsee()
        System.out.println("1.Java 2.maths 3.DS 4.COA 5.DBMS ");
        for(int i=0;i<5;i++)
            System.out.print("\n"+(i+1)+".");
            see_marks[i]= s1.nextInt();
    public void getsee()
        System.out.println(" 1.Java 2.maths 3.DS 4.COA 5.DBMS ");
        for(int i=0;i<5;i++)</pre>
            System.out.println(i+"."+see_marks[i]);
```

```
import java.util.Scanner;
import CIE.student;
import CIE.internal;
import SEE.external;
public class fmarks
    public static void main(String XX[] )
        int n;
        System.out.println("enter number of students : ");
        Scanner S1=new Scanner(System.in);
        n=S1.nextInt();
        CIE.student S[]=new student[n];
        CIE.internal I[]= new internal[n];
        SEE.external E[]= new external[n];
        for(int i=0;i<n;i++)</pre>
            S[i] = new student();
            I[i]= new internal();
            E[i]=new external();
            System.out.println("Enter details of student : ");
            S[i].set();
            System.out.println("Enter internal marks of student (out of 50) : ");
            I[i].setcie();
            System.out.println("Enter see marks of student (out of 100) : ");
            E[i].setsee();
        for(int i=0;i<n;i++)</pre>
            System.out.println("details of student are : ");
            S[i].get();
            System.out.println("internal marks of student are : ");
            I[i].getcie();
            System.out.println("see marks of student are : ");
            E[i].getsee();
        //final marks calculation
        for (int i = 0; i < n; i++) {
            System.out.println("Marks of student " + S[i].name + ":");
            for (int j = 0; j < 5; j++) {
                int subjectTotalMarks = I[i].internal_marks[j] +
((E[i].see_marks[j])/2);
```

```
subjectTotalMarks);
        System.out.println();
  29/4/24
     Package CIF-
      Public class Student &
            Public stong used
           Public string name
           Public int sem
              Public void accept (){
              Scanner 3= news canger (system in)
              "System out winth ("Foter Hame")
              + his name = 3 next line();
               system out pantin ("Enter USH");
          this usy + 3 next line ()
               System out purtlo ("Enter sem")
              This sem=s. next lit ();
           system out println ("Marie" + this name +
                " Inush" + this word + "In sem = "+
    Parkage (IE;
   Public dess internal extures (TF Atrolant &
         Public Int m[] = new int [5]
        (IF. Student student = new
      CIE. Student ()
         Public void accept wil
          student. accept ()
```

System.out.println("Subject " + (j + 1) + " marks: " +

Date Page
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for litti=0; i<5; i++)
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Public void display Of
Student - display ();
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System out prutto ("Marks obsub")
([[] m+"="+ ([+ i])
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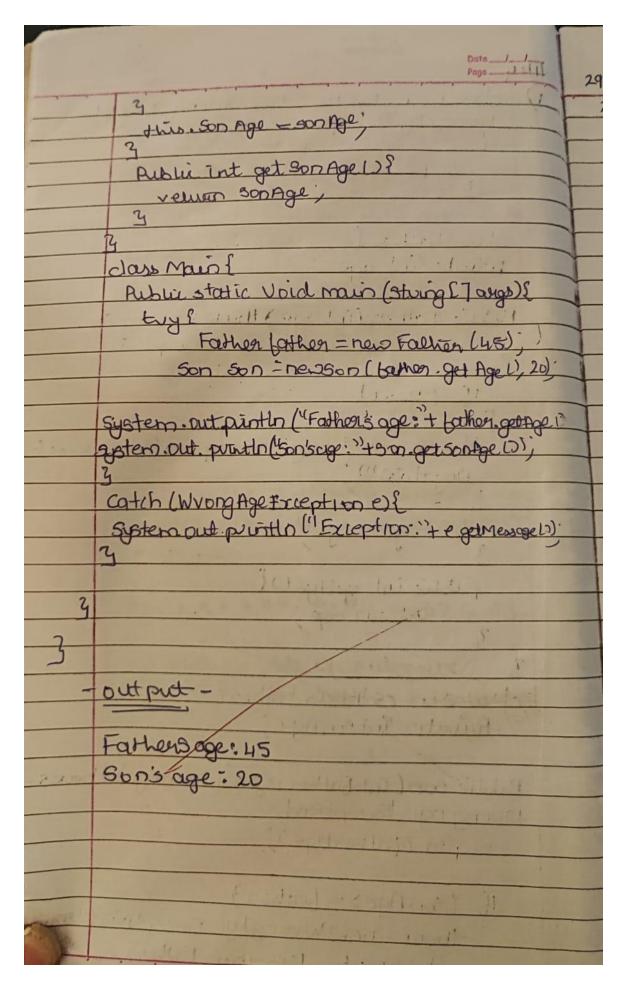
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-	Many obtained in CFE Subject 1: 90	194
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	Marks obtained in CIE subject b; 96	
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**Q7.** Write a program that demonstrates handling of exceptions 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.

```
class wrongageexception extends Exception{
    wrongageexception(String message){
        super(message);
    public String toString(){
        return "wrong age enetered";
class father{
    int age;
    father(int age) throws wrongageexception{
        if(age<0){
            throw new wrongageexception("age cannot be negative");
        this.age=age;
class son extends father{
    int sonage;
    son(int fatherage, int sonage) throws wrongageexception{
        super(fatherage);
        if(sonage >= fatherage){
            throw new wrongageexception("son age cannot be greater than father
age");
        this.sonage=sonage;
class exceptiondemo{
    public static void main(String xx[])
        try{
            father f=new father(40);
            son s=new son(f.age,25);
```

```
System.out.println("father age :"+f.age);
System.out.println("son age :"+s.sonage);
}
catch(wrongageexception e){
    System.out.println("exception:"+e.toString());
    System.out.println("exception:"+e.getMessage());
}
}
```

```
FUB-H
class burng the Exception Caturing message)
    Super (message);
class Father
private intage;
Public Father (Int age) throws wrong Age
Focieption
   if (oge < 0)
   throw new brong Age Exception ("Age cannot be
    negative")
class son Extends Father?
   Remate intomage;
Public son (int Eather rige, Int son Age) throws
Duong Age Exception !
   super (bathertage)
   if (son Age) = bother)
      throw new Wrong Age Exception ("son's age
       should be less than Father's ago, ");
```



**Q8.**Write a program to create a two threads one thread displays "BMS college of Engineering" once every ten seconds and another displays "CSE" once every two seconds.

```
class BMSthread implements Runnable{
    public void run(){
        while(true){
            try{
                System.out.println("BMS College of engineering");
                Thread.sleep(10000);
            catch(InterruptedException ie){
                System.out.println("Thread Interrupted");
class CSEthread implements Runnable{
    public void run(){
        while(true){
            try{
                System.out.println("CSE");
                Thread.sleep(2000);
            catch(InterruptedException ie){
                System.out.println("Thread Interrupted");
class display{
    public static void main(String xx[]){
        thread bms=new thread(new BMSthread);
        thread cse=new thread(new CSEthread);
        bms.start();
        cse.start();
```

LAB-6 5/2/24 \* Dute a program to create 2 threads one thread desplaying 11BMS college of Engineering " onle every second and ometer displaying "COE" once every 400 securels. Class Bras thread implements Runasp Public void vun () vouse (true) PIFF SA TA CALL KY Isol But " india System. out-pounter ( "Ons up of Eng"). 1 ... Thousands. Sleep Chassos. Chatch (Interverent es Esception

System. out printer ("BMS

Theread is intervered") class CBE Thread implements Rurrable Public void runc) voule lavues

Fy System out punter ("(E"),
Thread sleep (2000); ctach (Interrupted 0; Public Class Sisplay Public static soid main. Latving Liange Thread bms = now Theread Thread coe = now + novead Chew CBE thousand cos) tomo skut () TSE, Stout Co', education to the OUTPUT - ") all and to make BM 5 college of Figurery CBE CSE ad terretaring to desire CBE

Q9. 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 java.awt.event.*;
import java.awt.*;
import javax.swing.*;
public class ExceptionDemo extends JFrame implements ActionListener {
 private JTextField t1, t2, t3;
 private JLabel 11, 12;
 private JButton b1, b2;
 public ExceptionDemo() {
 setLayout(new FlowLayout());
 11 = new JLabel("Num1 :");
 add(11);
 t1 = new JTextField(5);
 add(t1);
 12 = new JLabel("Num2 :");
 add(12);
 t2 = new JTextField(5);
 add(t2);
 t3 = new JTextField(5);
 t3.setEditable(false);
 add(t3);
 b1 = new JButton("Divide");
 add(b1);
 b1.addActionListener(this);
 b2 = new JButton("Clear");
 add(b2);
 b2.addActionListener(this);
 setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
 setSize(300, 150); // Set an appropriate size
```

```
setVisible(true); }
public void actionPerformed(ActionEvent act) {
String str = act.getActionCommand();
if (str.equals("Divide")) {
try {
int num1 = Integer.parseInt(t1.getText());
int num2 = Integer.parseInt(t2.getText());
int num3 = num1 / num2;
t3.setText("" + num3);
} catch (ArithmeticException e) {
JOptionPane.showMessageDialog(this, "ArithmeticException: Cannot divide by
zero!");
} catch (NumberFormatException e) {
JOptionPane.showMessageDialog(this, "NumberFormatException: Please enter valid
integers for Num1 and Num2." }
} else {
t1.setText("");
t2.setText("");
t3.setText(""); } }
public static void main(String[] args) {
SwingUtilities.invokeLater(new Runnable() {
public void run() {
new ExceptionDemo();
} });}}
```

## Report For Applet Programs:

19/2/24 LAB-8 Date_/_/	
FANT Rograms - REPORT	(a)
D Button duag jours: It opens a Button game window with 3x3 tiles with	
numbers and promotes used with buttons for reset, stout and restort	
once clicked on start, usor as	
dick on two tites and summarious clicked tiles to got sumpped	6
Blant the game again.	
@ Bustonlist Fawar. It opens a	
Button Ist burdon with there buttons - yes, no, undecepted.	G
and hair a default text Hello.	
bindows tovites on the treat-	
deking NO-7 prossed No and	
Pressed un decided -> You ! "	
8 3 1 3 15 1 Jus	
Button list Jours: It opens Buttons bullons window with 3 buttons - yes, no	
Dialog to inclose appears with	
THE SARE YOU Pressed Les and as	
all soften similarly on cheking	
clicking underieled, you pressed un decided in sepulate dualing box.	
sepulate dialig box	

- (4) Division Main Java-It opens Amision of Integers. Window with helds to enter 2 numbers and a button. Result on eluhung which the two numbers analout will appear on the biodow after Result: It gives and takes numbers in gloot data type.
- Dursion Main I Java It opens al Autorion of integers window similar to last program: But the vesult provided will be integer numbers E and quotient in bloot
- TETabel Deno bundow with fullagor

  Putoling name and password on

  Clicking enter after orlining the name,

  The test box name appear after

  Name Similarly on desking enter

  after autoring the password, it

  appear heart to bussword, it

  appear heart to bussword, on solution

  some letters in name pieled and disking

  enter, the selected text appears not

  to select test in name. Pass word

  verses. The input and displayed