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B.M.S COLLEGE OF ENGINEERING

OBJECT ORIENTED JAVA PROGRAMMING

Bachelor of Engineering
in
Computer Science and Engineering

LAB REPORT

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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.

CODE:

```
import java.util.Scanner;
class quadratic
{
    public static void main (String args[])
    {
      int a; int
      b; int c;
      double
      d;
      Scanner s1=new Scanner(System.in);
      System.out.println("Enter coefficients of quadratic
      equation"); a=s1.nextInt(); b=s1.nextInt(); c=s1.nextInt();
      d=(b*b)-(4*a*c); if(d>0.0)
    {
        double r1=((-b) + Math.pow(d,0.5))/(2.0*a);
        double r2=((-b) - Math.pow(d,0.5))/(2.0*a);
        System.out.println("Roots are real and distinct");
        System.out.println("Root1="+r1+"Root2="+r2);
    }
      else if(d==0.0)
      {
          double r3=(-b)/(2.0*a);
          System.out.println("Roots are real and equal");
          System.out.println("Roots="+r3);
      }
      else
      {
          System.out.println("Roots are imaginary");
      }

    }

}
```

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Quadratic

1) Develop a java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$ Read a, b, c and use the quadratic formula. If discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions

=>
```
import java.util.Scanner;
import java.lang.Math;
public class quadratic {
    public static void main (String[] args) {
float a,b,c;
 Scanner s = new Scanner(System.in)
 System.out.println("enter value of a, b and c");
  a = s.nextFloat();
   b = s.nextFloat();
    c = s.nextFloat();
    float root1, root2;
  Float desc = (float) (pow(b,2) - 4*a*c);
 if (desc>0){
 root1 = (float) (-b/(2*a) - sqrt(desc)/(2*a));
 root2 = (float) (-b/(2*a) + sqrt(desc)/(2*a));
 System.out.println("root1=" + root1 + "\n root2=" +
                    root2);
 }
 else if (desc<0){
    System.out.println("no real solution exists");
 }
 else
  System.out.println("root1=root2" + (-b/(2*a)));
  }
  }
```

Output

enter a, b, c

1 2 3

no real solutions

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

CODE:

```
import java.util.Scanner;

class Details { int usn; String
    name; int[] marks = new
    int[8]; int[] credit = new int[8];
    int[] credit_points = new int[8];
    Scanner s1 = new Scanner(System.in);

    void acceptDetails() {
        System.out.println("Enter student usn:");
        usn = s1.nextInt();
        System.out.println("Enter student name:");
        name = s1.next();
        System.out.println("Enter marks in order of
        credits"); for (int i = 0; i < 8; i++) { marks[i] =
        s1.nextInt();
        }
        System.out.println("Enter order of credits ");
        for (int i = 0; i < 8; i++) {
            credit[i] = s1.nextInt();
        }
    }

    void calculate() {
        for (int i = 0; i < 8; i++) {
            if (marks[i] >= 90) {
                credit_points[i] = 10 * credit[i];
            } else if (marks[i] >= 80) {
                credit_points[i] = 9 * credit[i];
            } else if (marks[i] >= 70) {
                credit_points[i] = 8 * credit[i];
            } else if (marks[i] >= 60) {
                credit_points[i] = 7 * credit[i];
```

```
            } else if (marks[i] >= 50) {
                credit_points[i] = 6 * credit[i];
            } else if (marks[i] >= 40) {
                credit_points[i] = 5 * credit[i];
            }
        }
        int sum = 0; int count = 0;
        double SGPA; for (int j = 0; j <
        8; j++) { sum = sum +
        credit_points[j];
                count=count+credit[j];
        }
        SGPA = sum/count;
        System.out.println("SGPA is : " + SGPA);
    }
}

class SGPA {
    public static void main(String[] args) {
        Details d = new Details();
        d.acceptDetails();
        d.calculate();
    }
}
```

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SGPA

25. 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.

->
```
Import java.util.Scanner;
class func{
    float sgpa;
    public void calcusgpa(int marks[], int credits[])
    {
        int sum=0;
        int num=0;
        for (int i=0; i<5; i++){
            sum += credits[i];
        }
        for(int i=0; i<5; i++){
            int reduce;
        if(marks[i]>90 && marks[i]<=100){
            reduce=10;
        else if (marks[i]>80 && marks[i]<=90){
            reduce=9;
        }
        else if (marks[i]>70 && marks[i]<=80){
            reduce=8;
        }
        else if (marks[i]>70 && marks[i]<=80){
            reduce=8;
        }
        else if (marks[i]>60 && marks[i]<=70){
            reduce=7;
        }
```

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```
else if (marks[i]> 50 && marks[i] <=60){
    reduce=6; }

elseif (marks[i]>40 && marks[i] <= 50){
        reduce=5;
    }
 num = credits[i] * reduce;
 }
 sgpa = (float)* num/sum;
 }
 public float getsgpa(){
        return sgpa;
    }
}
class student{
  public static void main(String[] args){
     String usn,name;
     int credit[] = new int[];
     int marks[] = new int[5];
   Scanner s = new Scanner(System.in);
   System.out.println("Enter the usn");
   usn = s.next();
   System.out.println("Enter the name");
     name = s.next();
   System.out.println("Enter the marks");
   for(int i=0;i<5;i++){
     System.out.print("marsk [i+1]");
     marks[i] = s.nextInt();
 }
```

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```
System.out.println("Enter the credits");
for(int j=0; j<5;j++){
    System.out.print("credits["+j+"]");
        credits[j]=s.nextInt();
    }

    fun f=new fun();
     f.calcsgpa(mark,credit);
    System.out.println(f.sgpa());
  }
}
```

output

```
Enter the usn 1BM22CS149
Enter the name mallikarjun
Enter the marks
    99
    99
    99
    99
    9
Enter the credits in the credits array
    5
    5
    5
    5
    5
SGPA: 8.8
```

Program3:
Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book.
Develop a Java program to create n book objects.

CODE:

```
import java.util.Scanner;

class book {
    String name;
    String author;
    double price;
    int pages;

    book(String name, String author, double price, int pages) {
        this.name = name;
        this.author = author;
        this.price = price;
        this.pages = pages;
    }

    void setDetails() {
        Scanner S = new Scanner(System.in);
        System.out.println("Enter name of books:");
        this.name = S.nextLine();
        System.out.println("Author:");
        this.author = S.nextLine();
        System.out.println("Enter price");
        this.price = S.nextDouble();
        System.out.println("Enter no.of.pages");
        this.pages = S.nextInt();
    }

    void getDetails() {
        System.out.println("Book name:" + this.name);
        System.out.println("Author:" + this.author);
        System.out.println("Price:$" + this.price);
        System.out.println("Number of pages" + this.pages);
    }
```

```
    public String toString() {
        return "Book Details:\n" + "Name:" + name + "\n" + "Author:" + author + "\n" + "Prices : $" +
price + "\n"
                + "Number of pages:" + pages;
    }
}

class BookDemo2 {
    public static void main(String args[]) {
        Scanner S1 = new Scanner(System.in);
        System.out.println("Enter number of
        books"); int n = S1.nextInt(); book[] b = new
        book[n]; for (int i = 0; i < n; i++) {
            System.out.println("\n Enter details for book" + (i + 1) + ":");
            b[i] = new book(" ", " ", 0.0, 0);
            b[i].setDetails();
        }
        System.out.println("\n Details of books");
        for (int i = 0; i < n; i++) {
            System.out.println("\n Book" + (i + 1) + ":");
            b[i].getDetails();
        }
        System.out.println("\n Complete details of all books:");
        for (int i = 0; i < n; i++) {
            System.out.println("\n Book" + (i + 1) + ":\n" + b[i]);
        }
    }
}
```

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Book

3 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;
void setDetails (String name, String author,
                 int price, int num-pages) {
    this.price = price;
    this.num-pages = num-pages;
    this.name = name;
    this.author = author;
}
public string toString() {
  return ("name:"+name+"\nauthor"+author+
      "\nprice"+price+"\nnum-pages"+num-pages);
        }
}

public class First() {
      public static void main (String[]args) {
      book b1[] = new book[4];
      Scanner s = new Scanner(System.in);
      for (int i=0; i<4; i++) {
        System.out.println("name=");
        String name = s.next();
        String author = s.next();
```

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```
System.out.println("price=");
  int price= S.nextInt();
  System.out.println("num_pages=");
  int num_pages = S.nextInt();
   b1[i] = new book();
   b1[i].setDetails(name,author, price,
                    num_pages);
}
 System.out.println("Display complete details");
  for(int i=0; i<4; i++){
      System.out.println(b1[i]);
  }
}
}
```

Output

name = AA
author = E
price = 10000
num_pages = 500
name = BB
author = F
price = 9999
num-pages = 1000
name = CC
author = G
price = 500
num-pages = 500
name = DD
author = H
price = 500
num-pages = 200

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Page No.
Date : / /

display complete details
name = A A
author = E
price = 10000
num-pages = 500
name = BB
author = F
num-pages = 1000
name = CC
author G
price 500
num-pages = 500
name = DD
author = H
price = 500
num-pages = 200

11/24

program4 :

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

CODE:

```
import java.util.Scanner;
abstract class shape
{
    int a; int b; abstract void
    printArea();
}
class rect extends shape
{
    void printArea()
{
    System.out.println("Area of rectangle is:"+(a*b));
}
}
class tri extends shape
{
    void printArea()
    {
        System.out.println("Area of triangle is:"+(0.5*a*b));
    }
}
class cir extends shape
{
    void printArea()
    {
        System.out.println("Area of circle is:"+(314*a*a));
    }
}
class AbstractDemo
{
    public static void main (String args[])
    {
        Scanner s1=new Scanner (System.in);
        System.out.println("Press:\n 1.Rectangle \n 2.Triangle \n
        3.Circle"); int choice; choice=s1.nextInt(); switch(choice)
```

```
        {
            case 1: System.out.println("Enter l and b of
            Rectangle"); int l=s1.nextInt(); int br=s1.nextInt(); rect
            r=new rect();
            r.a=l;
            r.b=br;
            r.printArea(); break; case 2: System.out.println("Enter
            l and b of Triangle"); int h=s1.nextInt(); int
            bre=s1.nextInt(); tri t=new tri(); t.a=h;
            t.b=bre;
            t.printArea();
            break;
            case 3: System.out.println("Enter r of
            Circle"); int rad=s1.nextInt(); cir c =new cir();
            c.a=rad;
            c.printArea(); break;
            default:System.out.println("Enter valid
            choice");
        }
    }
}
```

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abstract class

Develop a Java program to creat an abstract class named shape that contains two integers and an empty method name 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

```
import java.util.Scanner;
abstract class shape {
        int a;
        int b;
      abstract void printarea();
   }
class Rectangle extends shape {
      void printarea()
        {
          int c= a*b;
         System.out.println("area of rectangle:"+c);
        }
   }
class Triangle extends shape {
   void printarea()
         {
           float c= (float) 0.5 *a*b;
        System.out.println("area of Triangle="+c);
         }
}
```

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```
class circle extends shape {
  void printarea()
  {
    float c= (float)3.14*a*a;
    System.out.println("area of circle="+c);
  }
}
class main
{
public static void main(String[] args)
    { int a,b;
      int choice;
do {
System.out.println("enter choice\n1. rectangle\n
          2. triangle\n 3. circle\n 4. exit");
Scanner s=new Scanner(System.in);
  choice= s.nextInt();
 switch (choice) {
case 1: Rectangle r= new Rectangle();
        System.out.println("enter length and
                                  .breadth);
        a= s.nextInt();
        b=s.nextInt();
        r.a=a;
        r.b=b;
        r.printarea(); break;
case 2: Triangle t= new Triangle();
      System.out.println("enter height and base");
        a= s.nextInt();
        b= s.nextInt();
         t.a=a;
         t.b=b;
        t.printarea(); break;
```

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```
case 3: circle c= new circle();
        System.out.println("enter radius of circle");
          a= s.nextInt();
          c.a=a;
          c.printarea();break;
case 4: system.exit(0); break;
  }
 } while(true);
}
}
```

Output

```
enter choice
1.rectangle
2.triangle
3.circle
4.exit
1 enter length and breadth
3
4
area of rectangle=12
enter choice
1.rectangle
2.triangle
3.circle
4.exit
3
enter radius of circle
5
area of circle=78.5
```

9/1/24

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.

CODE:

```
import java.util.Scanner;

class Account { String

customerName; int

accountNumber; String

accountType;


double balance;


    public Account(String customerName, int accountNumber, String accountType, double
balance) { this.customerName =

        customerName; this.accountNumber =
```

```
        accountNumber; this.accountType =
        accountType; this.balance = balance;
    }
    public void deposit(double amount) {
        balance += amount;
        System.out.println("Deposit of $" + amount + " successful.");
    }

    public void displayBalance() {
        System.out.println("Balance: $" + balance);
    }
}
class CurAcct extends Account {
    double minBalance; double
    penaltyCharge;

    public CurAcct(String customerName, int accountNumber, double balance)
        { super(customerName, accountNumber, "Current", balance);
        minBalance = 1000; penaltyCharge = 50;
    }

    public void withdraw(double amount) { if
        (balance - amount >= minBalance) {
        balance -= amount;
            System.out.println("Withdrawal of $" + amount + " successful.");
```

```
        } else {
            System.out.println("Insufficient balance. Withdrawal failed.");
        }
    }
}

class SavAcct extends Account { double interestRate; public SavAcct(String
    customerName, int accountNumber, double balance) {
    super(customerName, accountNumber, "Savings", balance); interestRate =
    0.05; // 5% interest rate for savings account
    }
    public void depositInterest() { double
        interest = balance * interestRate;
        balance += interest;
        System.out.println("Interest of $" + interest + " deposited.");
    }
    public void withdraw(double amount)
        { if (balance - amount >= 0) {
        balance -= amount;
            System.out.println("Withdrawal of $" + amount + " successful.");
        } else {
            System.out.println("Insufficient balance. Withdrawal failed.");
        }
    }
}
```

```
public class BankDemo { public static
    void main(String[] args) { Scanner
    scanner = new Scanner(System.in);

        System.out.println("Enter details for current account:");
        System.out.print("Customer Name: ");
        String currentCustomerName = scanner.nextLine();
        System.out.print("Account Number: "); int currentAccountNumber =
        Integer.parseInt(scanner.nextLine()); System.out.print("Initial Balance:
        $"); double currentInitialBalance =
        Double.parseDouble(scanner.nextLine());
        CurAcct currentAccount = new CurAcct(currentCustomerName, currentAccountNumber,
currentInitialBalance);
        System.out.println("\nEnter details for savings account:");
        System.out.print("Customer Name: ");
        String savingsCustomerName = scanner.nextLine();
        System.out.print("Account Number: "); int savingsAccountNumber =
        Integer.parseInt(scanner.nextLine()); System.out.print("Initial Balance:
        $"); double savingsInitialBalance =
        Double.parseDouble(scanner.nextLine());
        SavAcct savingsAccount = new SavAcct(savingsCustomerName, savingsAccountNumber,
savingsInitialBalance);
        System.out.print("\nEnter deposit amount for current account: $"); double
        depositAmountCurrent = Double.parseDouble(scanner.nextLine());
        currentAccount.deposit(depositAmountCurrent);
```

```
        System.out.print("Enter withdrawal amount for current account: $"); double
        withdrawAmountCurrent = Double.parseDouble(scanner.nextLine());
        currentAccount.withdraw(withdrawAmountCurrent);
        currentAccount.displayBalance();

        System.out.print("\nEnter deposit amount for savings account: $"); double
        depositAmountSavings = Double.parseDouble(scanner.nextLine());
        savingsAccount.deposit(depositAmountSavings);

        savingsAccount.depositInterest();
        savingsAccount.displayBalance();

        System.out.print("Enter withdrawal amount for savings account: $"); double
        withdrawAmountSavings = Double.parseDouble(scanner.nextLine());
        savingsAccount.withdraw(withdrawAmountSavings);

        savingsAccount.displayBalance();
    }
}
```

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Bank program

10) 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 maintains 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 that provides from this derive the classes cur-acct and sav-acct to make it 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 balance
b) Display the balance
c) compute and deposite interest
d) permit withdrawal and update the balance

```
import java.util.Scanner;
class Bank {
    double accno;
    String name;
    String type;
    double balance;
public Bank( double acc.no, String name,
                String type, double balance)
{ this.acc.no = acc.no;
    this.name = name;
    this.type= type;
    this.balance = balance;
```

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```
}
public void display() {
    System.out.println("current balance is" + balance);
}
public void deposit(double deposit) {
    this.balance += deposit;
    System.out.println("updated balance" + balance);
}

class String extends Bank {
    double rate;
    int time;
  public void withdrawal(double amount) {
    balance -= amount;
  System.out.println("After withdrawing the
                balance is:" + balance);
  }
}

class saving extends Bank {
    double rate;
    int time;
  public saving(double accno, String name,
        double balance, int time, double rate) {
    super(accno, name, "saving", balance);
    this.time = time;
    this.rate = rate;
}

public void calculateInterest() {
    balance += (balance * time * rate)/100;
}
```

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```
class current extends Bank{
 double minbalance;
 public current(double acno, String name,
        double balance, double minbalance){
  super(acno, name, "current", balance);
        this.minBalance = minbalance;
  }
public void applyServicecharge(){
        if (balance < minbalance)
        {
    System.out.println("service charge of 5% is
      applied");
      balance -= balance*0.05;
    }
  }
}
class main{
 public static void main(String[] args){
    double acno;
    String name;
    double balance;
 Scanner S = new Scanner(System.in);
 System.out.println("Enter acno");
  acno = S.nextDouble();
  name = S.next();
  balance = S.nextDouble();

 saving sav = new saving(acno, name,
        balance, 5, 5);
```

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current cur = new current(accno, name, balance 2000);

Sav.calculateInterst();
Cur.applyservicecharge();

Bank Ba = new Bank();
Ba.deposit(2000);
Ba.withdraw(2000);
Ba.display();
Ba.withdrawal(2000);
Ba.display();

output:
enter name
mk
enter accno
123
enter acctype
saving

Interset = 250.0

5-1. of extra charge applied
remaining balance = 950.0

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.

CODE:

Pack/CIE/Internal.Java

```
package CIE;


import java.util.Scanner;


public class Internal extends CIE.Student{
    public int m[] = new int[5];
    CIE.Student student = new
    CIE.Student(); public void accept(){
    student.accept();


        Scanner s1 = new Scanner(System.in);
        System.out.println("Enter Internal
        Marks:"); for(int i=0;i<5;i++){ m[i] =
        s1.nextInt();
```

```
        }
    }

    public void display(){
        student.display();
        for(int i=0;i<5;i++){
            System.out.println("Marks of sub" + (i+1) + " = " + m[i]);
        }
    }
}
```

Pack/CIE/Student.Java

```
package CIE;

import java.util.Scanner;


public class Student{ public

            String usn; public

            String name; public

            int sem; public void

            accept(){

        Scanner s = new Scanner(System.in);
        System.out.println("Enter Name:");
```

```
        this.name = s.nextLine();
        System.out.println("Enter usn:");
        this.usn = s.nextLine();
        System.out.println("Enter sem");
        this.sem = s.nextInt();
           }

           public void display(){
        System.out.println("Name: " + this.name + "\nUSN: " + this.usn + "\nSem: " + this.sem);
           }
}
```

Pack/SEE/External.Java

```
package SEE;
import java.util.Scanner;

import CIE.Internal; import CIE.Student;

public class External extends CIE.Student{

public int x[] = new int[5]; public void

accept(){

        Scanner s2 = new Scanner(System.in);
```

```
        System.out.println("Enter External Marks:");
        for(int i=0;i<5;i++){
            x[i] = s2.nextInt();
            }
            }

            public void display(){
        super.display();

        for(int i=0;i<5;i++){
            System.out.println("Marks of sub" + (i+1) + " = " + x[i]);
            }
            }

}
```

Pack/Final.Java import

```
java.util.Scanner;

import CIE.Student;
import CIE.Internal;
import SEE.External;
```

```
public class Final{ public static void
        main(String[] args) {
    Scanner n = new Scanner(System.in); System.out.println("Enter n:"); int y = n.nextInt();

    CIE.Internal[] c1 = new CIE.Internal[y];
    SEE.External[] c2 = new SEE.External[y];

    for(int i=0;i<y;i++){ c1[i] =
        new CIE.Internal(); c2[i] =
        new SEE.External();

        c1[i].accept();
        c2[i].accept();

        // c1[i].accept();c2[i].accept();
        c1[i].display();c2[i].display();

        for(int j=0;j<5;j++){ double calc =
            c1[i].m[j]+((c2[i].x[j])/2);
            System.out.println("Final marks of sub["+(i+1)+"]= "+calc);
        }
        }
        }
}
```

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PACKAGE

6 Create a package CIE which has 2 classes Student and Internals the class personal has members like USN, name, Sem. The class internal has an array that stores the internal marks 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 5 courses of the current semester of the student. Import the final marks of n students in all cases

```
Package CIE;
public class student {
 public String usn;
 public String name;
 public int sem;
 public Student (String u, String n, int s)
    {
     this.usn = u;
     this.name = n;
     this.sem = s;
    }
}
public class internals extends CIE.student
 { public double imarks[];
    public internals(String u, String n,
    double m[]) { super(u, n, s);
```

OPPO F21s Pro 5G
thekambarr | Bengaluru,Bangalore Division | 2024.02.21 22:14

```
    this.imarks = m;
  }
}

package SEE;
import CIE.students;
public class external extends CIE.Student
  {
    public double smarks[];
    public externals (string u, string n, int s,
      double m[]){
        super(u,n,s);
        this.smarks = m;
    }
}

package result;
import CIE.students;
import CIE.internals;
import SEE.externals;
public static void main(string args[]){
double internals[] = {43,43,47,44,41};
double external[] = {90,82,65,97,43};
Student s1 = new student("1BM2214",
    "Jose", 3);
internal i1 = new internals("1BZ215", 3,
  -nals);
external e1 = new external("1BZ216", 150, 3
  external);
```

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EXCELLENT
Page No.
Date / /

```
System.out.println("usn:"+ s1.usn+ "name:")+
 s1.name+ "sem:"+ s1.sem);
System.out.println("internals marks");
  for(i=0; i<; i++)
  {
system.out.println(" internal marks"+(i+1)+
  ":"+s1.imarks[i]);
  }
System.out.println("external marks");
 for(int i=0; i<5; i++)
  {
   System.out.println("external marks"
    +(i+1)+ e1.smarks[i]);
  }
 }
}
```

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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.

CODE:

```
import java.util.Scanner; class
WrongAgeException extends Exception
{
    public WrongAgeException(String message)
    {
       super(message);
    }

}
class father
{
    private int FatherAge; public father(int age)
    throws WrongAgeException
    {
        if(age<0)
        {
            throw new WrongAgeException("Age cannot be Negative");
        }
        this.FatherAge=age;
    }
}
class son extends father
{
    private int sonAge; public son(int FatherAge, int sonAge) throws
    WrongAgeException
    {
        super(FatherAge);
        if(sonAge >= FatherAge)
        {
            throw new WrongAgeException("son's age should be less than Father's age");
        }
        this.sonAge=sonAge;
        System.out.println("Father's Age:"+FatherAge);
```

```
        System.out.println("son's Age:"+sonAge);
    }
}
public class ExceptionDemo
{
    public static void main(String[] args)
    {
        Scanner Scanner= new Scanner(System.in);
        try
        {
            System.out.println("Enter Father's
            age:"); int FatherAge=Scanner.nextInt();
            father father=new father(FatherAge);
            System.out.println("Enter son's Age:");
            int sonAge= Scanner.nextInt(); son son=
            new son(FatherAge,sonAge);
        }
        catch(WrongAgeException e)
        {
            System.out.println("Exception:"+e.getMessage());
        }
    }
}
```

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Exception HANDLING

5 write a program that demonstrates handling of exception 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 have the age and throws the exception wrongage() when the i/p age < 0 in son class implement a constructor that takes both father and son's age and throws an exception if son's age >= father's age

```
class MyException extends Exception {
 int detail;
 public myexception (int age, String exe)
    {
      this.detail = age;
      System.out.println(exe + "given age is:" +
      age + " please enter again");
    }
 public String getmassage() {
      return "exception:" +details;
 }
}
class Father {
   int age;
 public Father(int age) throws myexception
 {
   if(age<0) throws new myexception
   (age, "age cannot be less than 0");
```

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```
    this.age = age;
}
}
class son extends father{
    int age;
    public son(int fatherage, int sonage)
  throws myexception(age, "Age of
    son cannot be more than father");
}
}

public class father_son{
public static void main (String[] args)
 {
 try{
      father f1 = new father(1);
       son s1 = new son(30,31);
   }
catch(myexception e)
    {
       System.out.println("exception
      caught "+ e.getmessage());
   }
}
}
```

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.

CODE:

```
class NewThread1 implements Runnable
{
Thread t1;
NewThread1()
{
    t1 = new Thread(this,"Thread1");
    System.out.println("CT:"+t1);
    t1.start();
}
public void run()
{ try
    {
      for (int n=5; n>0;n--)
      {

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

Thread.sleep (10000);
}
}
    catch( InterruptedException ie)
{
    System.out.println("Thread1 interrupted");
}

System.out.println ("Thread I quitting");
}
}
class NewThread2 implements Runnable
{
    Thread t2;
    NewThread2()
    {
```

```
        t2=new Thread (this,"Thread2");
        System.out.println("CT:"+t2);
        t2.start();
    }
    public void run()
    { try
        {
            for (int n=5; n>0;n--)
            {
                System.out.println("cse");
                Thread.sleep(2000);
            }
        }
        catch(InterruptedException ie)
        {
            System.out.println("Thread 2 Interrupted");
        }
        System.out.println ("Thread 2 quitting");
    }
}
class MainThread {
    public static void main(String args[]) {
        new NewThread1();
        new NewThread2();

        try {
            Thread.sleep(40000);
            System.out.println("MainThread is awake\n");
        } catch (InterruptedException ie) {
            System.out.println("MainThread Interrupted");
        }
        System.out.println("MainThread exiting");
    }
}
```

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Threads

9 (8) write a java program which creates 2 threads one displaying "BMS college of Engineering once every ten seconds. and another displaying "CSE". once every two seconds

```
class DisplayThread extends Thread {
    private String message;
    private int interval;
    public DisplayThread (String message,
                          int interval)
    {
        this.message= message;
        this.interval = interval;
    }
public void run()
    {
    while(true) {
        try {
            system.out.println(message);
            thread.sleep(interval);
        }
        catch (InterruptedException e) {
                e.printStackTrace();
        }
    }
}
```

OPPO F21s Pro 5G
thekambarr | Bengaluru,Bangalore Division | 2024.02.23 19:08

```
class Displaymessage1
    public static void main(String args[])
        {
            Thread t = new DisplayThread(
                    "Bms college", 10000);
        Thread CSEThread = new DisplayThread(
                    "CSE", 2000);
            t.start();
            CSEThread.start();
        }
    }
```

Output:

```
Bms college
CSE
CSE
CSE
CSE
CSE
Bms college
CSE
CSE
CSE
CSE
CSE
Bms college
```

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 would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

CODE:

```
import java.awt.*;

import java.awt.event.*;

public class DivisionMain1 extends Frame implements ActionListener {
    TextField num1, num2;
    Button divideButton;
    Label resultLabel;


    public
        DivisionMain1
        () {
        setLayout(ne
        w
        FlowLayout());

        divideButton = new Button("Divide");
        Label number1 = new
        Label("Number 1:", Label.RIGHT);
        Label number2 = new
        Label("Number 2:", Label.RIGHT);
        num1 = new TextField(5); num2 =
        new TextField(5); resultLabel =
        new Label("Result:",
        Label.RIGHT);
```

```
    add(number1);
    add(num1);
    add(number2);
    add(num2);
    add(divideButt
    on);
    add(resultLabe
    l);
    divideButton.a
    ddActionListen
    er(this);

    addWindowListener(new WindowAdapter() {
        public void
            windowClosing(WindowEvent we) {
            System.exit(0);
        }
    });
}

public void
    actionPerformed(Action
    Event ae) { try {
        int n1 =
        Integer.parseInt(num
        1.getText()); int n2 =
        Integer.parseInt(num
        2.getText()); if (n2
        == 0) {
            throw new ArithmeticException("Cannot divide by zero");
        }
        int result = n1 / n2;
        resultLabel.setText("Res
        ult: " + result);
    } catch (NumberFormatException e1) {
        showErrorDialog("Number Format Exception: Please
        enter integers only");
    } catch (ArithmeticException e2) {
        showErrorDialog("Arithmetic Exception:
        " + e2.getMessage());
    }
}
```

```
    private void
       showErrorDialog(String
       message) { Dialog dialog =
       new Dialog(this, "Error",
       true); dialog.setLayout(new
       FlowLayout()); Label label =
       new Label(message); Button
       okButton = new
       Button("OK");
       okButton.addActionListener(
       new ActionListener() {
          public void actionPerformed(ActionEvent e) {
             dialog.dispose();
          }
       });
       dialog.add(label);
       dialog.add(okBut
       ton);
       dialog.setSize(30
       0, 100);
       dialog.setVisible(
       true);
    }

    public static void main(String[] args) {
       DivisionMain1 divisionMain = new
       DivisionMain1(); divisionMain.setSize(new
       Dimension(400, 200));
       divisionMain.setTitle("Integer Division");
       divisionMain.setVisible(true);
    }
}
```

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9) AINT Program

```
import java.awt.*;
import java.awt.event.*;
public class Divisionmain extends Frame implements actionListener
{
  TextField num1, num2;
  Button dResult; Label outResult;
  String out = " ";
  double resultNum;
  int flag=0;
public Divisionmain()
{
  setLayout(new FlowLayout());
  dResult = new Button("Result");
  Label number1 = new Label("Number1:", Label.Right);
  Label number2 = new Label("Number2", Label.Right);
  num1 = new TextField(5);
  num2 = new TextField(5);
  outResult = new Label("Result", Label.Right);
  add(number1);
  add(num1);
  add(number2);
  add(num2);
  add(dResult);
  add(outResult);
  num1.addActionListener(this);
  num2.addActionListener(this);
  dResult.addActionListener(this);
  addWindowListener(new WindowAdapter()
  { public void window(Closing(Window
      Event we) {System.exit(0);}
```

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```
public void action performed (ActionEvent ae)
  {
   double n1, n2;
   try {
     if (ae.getSource() = dResult) {
   n1 = Double.parseDouble(num1.getText());
   n2 = Double.parseDouble(num2.getText());
   Out = n1 + " " + n2;
  Out = String.valueOf(resultNum);
    repaint();
   }
  catch (ArithmaticException e2)
    {
      flag=1;
    out = "Divide By 0 exception!" + e2;
    repaint();
    }
   catch (NumberFormatException e1)
     {
       flag=1;
     out = "NumberFormat Exception!" + e1;
     repaint();
    }
  }
public void print(Graphics g) {
    if (flag == 0)
   g.drawString(out, outResult.getX() +
    out.Result.getWidth(), out.Result.getY()
    + out.Result.getHeight()-8);
else {
    g.drawString(out, 100, 200);
       flag='0'
```

OPPO F21s Pro 5G
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```
public static void main (String args[]){
    Division main dm= new Division main();
    dm.setSize(new Dimension(800, 400));
    dm.setTitle("Division of Integers");
    dm.setVisible(true);
}
```

o/p:

Number 1: [12] Number 2: [0]

[Result]

Result: 1200 infinity

Number 1: [12] Number 2: [∞]

[Result] Result:

NumberFormatException:
java.lang.NumberFormatException
for input string 'a'

Number 1 [0] Number 2: [12]

[Result]

Result: 0 + 0 12.000

Result 1: [1] Number 2: [2]

[Result]

Result: 1 20.5000

23/4/24