# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

# Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

StudentName (1BM23CS074)

in partial fulfillment for the award of the degree of BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING



# BENGALURU-560019 Sep-2024 to Jan-2025

# **B.M.S.** College of Engineering,

Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering



## **CERTIFICATE**

This is to certify that the Lab work entitled "Object Oriented Java Programming (23CS3PCOOJ)" carried out by **Chethan K S (1BM23CS074)**, who is bonafide student of **B.M.S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

Geetha N Assistant Professor Department of CSE, BMSCE Dr. Jyothi S Nayak Professor & HOD Department of CSE, BMSCE

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#### Github Link:

https://github.com/Chethan-K-S/OOJ\_LAB

## Program 1

Implement Quadratic Equation

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

Algorithm:

3. Caudratic equation.

import java.util. Scarner;

public class quad f

public static void main (String arge (3))

	4
	int a, b, c;
	float disc;
	Scanner input = new Scanner (System in);
	duc = bab - haare;
	System out part In 1" Enter co-elegation of x square"):
	a= input. mxxInt();
	System out printen ("Enter co-efficient of x");
	b= input . next Int();
	System out println ("Entor co off: the constant");
	& c=input.nextJrt()
	disc = 6+6 - Haadc;
	if (descro) h
	System.out-println (" No seal smots exists");
	else & 16 (disc>0) 4
	int sworld = (-b + Math. squt(disc)) ((240);
~ er	System out println ("The mosts are "+ mosts" and + mosts )
5	\$ 3
	Espect close ()
	7 clse 5
	int roots = (-b) / (2+a);
	System out println ("The groats are equal"+ groats);
	3
	input. close()
	3 3

```
Off.

Enter co-efficient of n.

Enter constant

The roots are -0.5 and -1.0
```

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

```
public class quad {
  public static void main(String[] args) {
     int a, b, c;
     float disc;
     Scanner input = new Scanner(System.in);
     System.out.println("Enter co-efficient of x square");
     a = input.nextInt();
     System.out.println("Enter co-efficient of x ");
     b = input.nextInt();
     System.out.println("Enter the constant");
     c = input.nextInt();
     disc = b * b - 4 * a * c;
     if (disc < 0) {
       System.out.println("No real root exists");
     \} else if (disc > 0) {
       double root1 = (-b + Math.sqrt(disc)) / (2 * a);
       double root2 = (-b - Math.sqrt(disc)) / (2 * a);
       System.out.println("The roots are " + root1 + " and " + root2);
     } else {
       double root1 = (-b) / (2 * a);
       System.out.println("The roots are equal " + root1);
```

```
}
    System.out.println("CHETHAN K S\n1BM23CSO74");
    input.close();
}
```

## Output

```
Enter co-efficient of x square

2
Enter co-efficient of x

3
Enter the constant

1
The roots are-0.5and-1.0
CHETHAN K S

1BM23CS074
```

```
Enter co-efficient of x square

4
Enter co-efficient of x

4
Enter the constant

2
No real root exists
CHETHAN K S

1BM23CSO74
```

```
Enter co-efficient of x square

2
Enter co-efficient of x

4
Enter the constant

2
The roots are equal -1.0
```

# Program 2 Calculating SGPA

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.

4	class student-ippof
1	Story name;
1	string usn;
	int B credits;
1	int() maks;
	int numbersub;
1	(as a superior of the
	word taxedetails () (
	Scanner input = new Scanner (system.in);
	System out . print (" Enter your name:");
	name = input.next Line ();
	Lystem out print ("Enter your cusn:");
	cun = input. next Line();
	System out print (" Enter the number of subjects:");
Щ	numbersub=input, next Int();
	Credits = New int[numbersub];
	marks = new int (number sub];

```
for (int i = 0; i < number sub; i++)
 System out print ("Enter the number of credits for subject" + (i+1) .);
   Credite [i] = in put. next Int ();
   a jetem out print ("Enter the marce of subject "+ (1+1))
   marks (i) = Toput next Int ();
gradepoints Of
   (marks [i] >= 90)
    neturn 10;
Che if (monts[:]>=80)
    neturn 9;
else if (marks[i] >= 70)
   geturn 8;
else if (marks[i]>=60)
   neturn 7;
else if (marke [i] ?= 50)
   neturn 6;
che if (marks 5:3>= 40)
  neturn 5:
elec
2 return 0;
int
CalabatesGPA(){
int total gradepoints = 0;
int total credi = 0;
```

for (int i=0; i coulonboroub; i++) & total creds = total exeds + credits [1]; totalgradepoints = totalgradepoints + credits (i) +. gradepointed; double SGPA = total gradepoints / total weds; geturn SGPA; public static void main (string ongst))
public class studena info System out print In ("Your total SGPA is + students Gladate SGPAC) Output Enter Do of students 2 Enter your name: Chethan Enter your USN: 074 Enter the number of subject : 3 Enter the number of credit for subject 1: 2 Enter the marks for subject 1: 92 Enter the number of credit for subject 2: H

Enter the marks for subject 2: 8d

Enter the number of Credits for subject 3: 3

Enter of the marks for subject 3: 80 your total SGPA is: 9.0 Enter your our oro

```
Enter the number of subject 1: 3.

Enter the montes for subject 1: 99

Enter the number of credits for subject 2: 1.

Enter the number of credits for subject 2: 1.

Enter the montes for subject 2:69

Gover total stopp is: 9.6
```

```
import java.util.Scanner;
class Student {
  String name;
  String usn;
  int[] credits;
  int[] marks;
  int numberOfSubjects;
  void takeDetails() {
     Scanner input = new Scanner(System.in);
     System.out.print("Enter your name: ");
     name = input.nextLine();
     System.out.print("Enter your USN: ");
     usn = input.nextLine();
     System.out.print("Enter number of subjects: ");
     numberOfSubjects = input.nextInt();
     credits = new int[numberOfSubjects];
     marks = new int[numberOfSubjects];
     for (int i = 0; i < numberOfSubjects; i++) {
       System.out.print("Enter the number of credits for subject " + (i + 1) + ": ");
       credits[i] = input.nextInt();
       System.out.print("Enter the marks for subject " + (i + 1) + ": ");
       marks[i] = input.nextInt();
  }
  int gradePoints(int i) {
     if (marks[i] >= 90) return 10;
     else if (marks[i] >= 80) return 9;
```

```
else if (marks[i] >= 70) return 8;
     else if (marks[i] >= 60) return 7;
     else if (marks[i] >= 50) return 6;
     else if (marks[i] >= 40) return 5;
     else return 0;
  double calculateSGPA() {
     int totalGradePoints = 0;
    int totalCredits = 0;
    for (int i = 0; i < numberOfSubjects; i++) {
       totalCredits += credits[i];
       totalGradePoints += credits[i] * gradePoints(i);
   return totalGradePoints/totalCredits;
  }
}
public class student_info {
  public static void main(String[] args) {
     Scanner input = new Scanner(System.in);
       System.out.print("Enter no of students ");
       int no=input.nextInt();
       for(int i = 0; i < no; i++)
               Student student = new Student();
               student.takeDetails();
               System.out.println("Your total SGPA is: " + student.calculateSGPA());
        System.out.print("Chethan K S\n1BM23CS074");
  }
```

#### Output:

```
Enter no of students 2
Enter your name: Chethan
Enter your USN: 074
Enter number of subjects: 3
Enter the number of credits for subject 1: 2
Enter the marks for subject 1: 92
Enter the number of credits for subject 2: 4
Enter the marks for subject 2: 88
Enter the number of credits for subject 3: 3
Enter the marks for subject 3: 80
Your total SGPA is: 9.0
Enter your name: raja
Enter your USN: 070
Enter number of subjects: 2
Enter the number of credits for subject 1: 3
Enter the marks for subject 1: 99
Enter the number of credits for subject 2: 1
Enter the marks for subject 2: 69
Your total SGPA is: 9.0
Chethan K S
1BM23CS074
```

# Program 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 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.

Algorithm:

Import java.util scanner;

public class Book

private string name;

private string author;

private double price;

private int num pages;

fublic Book (string name, string author, daude price,

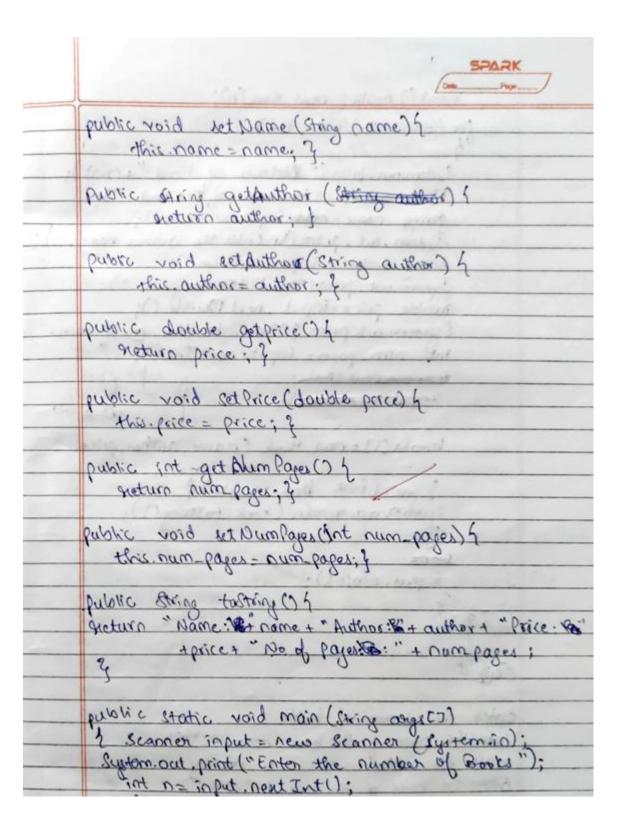
int num-pages)

this name = name;

this name = name;

this num-pages = num-pages;

public string get Name ()



```
Book [] books = new Book [n];
     for (int i=0; icn; i++)
       System out Print (" Dotails of Book"+(+1));
        System out . Print (Missame of the Book: ");
        string name = not input next line ();
        System . act. print ( Enter the author rame:"
        Stong author = input. next Lines;
        System-out. print ("In Enter the price: ");
       double price=input . next Double ();
        System at print (" In Enter the no of pages:"
        int num-pages = input. next Int();
        Scopen nent I row;
         Angui-new Line ().
        booke [i] = new Book (name, author, price.
                               num-papes);
              or (book book : books) &
         System. ad. privala (book. to string());
         Poput. close U;
Output
Enter the number of books: 2
Enter the name of the book: Harry Dotter Enter the author name: J K Rowling
Enter the price of the book. 199.99
Ento the number of lages: 155
Enter the name of the book: The Wings of Fire
```

```
Enter the author name: APJ Abdul kalam

Enter the price of the book: 99

Enter the name of lager: 150

Name: Marine Potton

Price: 199.99

Number of pape: 155

Name: The Wive of Fice

Oruthor. APJ Hodul kalam

Price: 99.0

Number of lager: 150

Name: Chetrop & 1

Dome: (Astrop & 1)

Dome: (Astrop & 1)
```

```
import java.util.Scanner;

public class Book {
    private String name;
    private String author;
    private double price;
    private int num_pages;

public Book(String name, String author, double price, int num_pages) {
        this.name = name;
        this.author = author;
        this.price = price;
        this.num_pages = num_pages;
    }

public String getName() {
        return name;
    }
```

```
public void setName(String name) {
    this.name = name:
  }
  public String getAuthor() {
    return author;
  public void setAuthor(String author) {
    this.author = author;
  public double getPrice() {
    return price;
  public void setPrice(double price) {
    this.price = price;
  }
  public int getNumPages() {
    return num_pages;
  public void setNumPages(int num_pages) {
    this.num_pages = num_pages;
  @Override
  public String toString() {
    return "\nName: " + name + "\nAuthor: " + author + "\nPrice: " + price + "\nNumber of pages: "
+ num_pages;
  }
  public static void main(String args[]) {
    Scanner input = new Scanner(System.in);
    System.out.print("\nEnter the number of books: ");
    int n = input.nextInt();
    input.nextLine();
    Book[] books = new Book[n];
    for (int i = 0; i < n; i++) {
       System.out.print("\nEnter the name of the book: ");
       String name = input.nextLine();
       System.out.print("\nEnter the author name: ");
       String author = input.nextLine();
```

```
System.out.print("\nEnter the price of the book: ");
    double price = input.nextDouble();
    System.out.print("\nEnter the number of pages: ");
    int num_pages = input.nextInt();
    input.nextLine();
    books[i] = new Book(name, author, price, num_pages);
}

for (Book book : books) {
    System.out.println(book.toString());
}

System.out.print("Chethan K S\n1BM23CS074");
    input.close();
}
```

#### Output:

```
Enter the number of books:2
 Enter the name of the book: Harry Potter
 Enter the author name: J K Rowling
 Enter the price of the book:199.99
 Enter the number of pages:155
 Enter the name of the book: The wings of fire
 Enter the author name: APJ Abdul Kalam
 Enter the price of the book:99
 Enter the number of pages:150
Name:Harry Potter
Author:J K Rowling
Price:199.99
Number of pages:155
Name:The wings of fire
Author:APJ Abdul Kalam
Price:99.0
Number of pages:150
Chethan K S
1BM23CS074
```

# Program 4

## Abstract Class Shape

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.

Algorithm	
	abstrace class shape &
	int x,y;
	abstract void printaneal);
	The same of the sa
	at the sent and the good of
	class lentrangle extends shape 4  lentrangle (int l, int b) 4
	Centangle (int lint b) 2
	x=2:
	y = b;
	3
	@ Ovverside
	word printanea()
	int onea = x + y;
	System out println ("drea of nectangle: "+ area);
	Property of the second
	class Triangle autends shared
	class Triangle extends snaped Triangle (int b, int h) 4
	N = 6;
	y = h;
	t less cost sites
	Carl and add
	@ Ovaride
	void printareally
	double area = 0.5 * x * y :
	System.out. println 1" Area of triangle: "+ area)
	281 man of many

class (incle extends shape &  int radius;  cercle (int radius) {  this radius - radius;  }  a Override  yord printaneal) L  thoughte area = 3.14 + radius & radius;  system out println! The area of circle is: "+0  g the public class Geometry!  public class Geometry!  public class Geometry!  Shape renew factorage (5, 11);  chape renew factorage (5, 11);  chape t - new Circle (5);  exprintaneal);  t. printaneal);  c. printaneal);  c. printaneal);  defeat  Output  Area of greetamyle: 16  Area of trangle: 90 0  Area of circlois: 7P.5		
Excle (int hadius) 4  this nadius - nadius;  Q Override  void printaneal) L  Boulde anea = 3.14 + hadius * nadius;  Button out println("The area of circle is: "+ of  g if  public class Geometry 1  public etanic void main (strong args[]) 4  Chape renes Pectangle (5, 11);  Chape t = new Triangle (20,9);  Shape c = new Circle (5);  . expentaneal);  t. printaneal);  c. printaneal);  Qualput  Area of greetangle: 16  Area of greetangle: 90.0		(Date
Excle (int hadius) 4  this radius - radius;   a Override  void printaneal) L  bouble area = 3.14 + hadius * gradius;  Cystem out println("The area of circle is: "+ a  g if  public class Geometry 1  public etonic void main (string ages[7]) 4  Chape renes Pectangle (5, 11);  chape t = new Triangle (20,9);  Shape c = new Circle (5);  . exprintaneal);  t. printaneal);  c. printaneal);  Quiput  Area of guertanyle: 16  Area of guertanyle: 90.0		1 (1)
Excle (int hadius) 4  this hadius - hadius & gradius;  double area = 3.14 & hadius & gradius;  Question and println("The area of circle is: "+ of  public class Geometry 1  public stone void main (8 tring ages 17) 4  Phape renew Pectangle (5, 11);  Phape t = new Triangle (20, 9);  Shape c = new Circle (5);  . Expentareal);  t. printareal);  c. printareal);  Question le: 16  Area of greetangle: 16  Area of greetangle: 90.0	class circle exter	nds shape r
Excle (int Pradius) &  This radius - radius;  a Override  word printanea() L  Boundle anea = 3.14 * madius * radius;  Rystem. out. println("The anea of circle is: "+ o  public class Geometry?  Public stanc void main (string age(T))  Phape r=new Pectangle (5, 1);  Phape t=new Triangle (50,9);  Shape c=new Circle (5);  . exprintanea();  t. printanea();  c. printarea();  Trea of greetangle: 16  Area of greetangle: 90.0	not radius;	at many many many participation
a Override  void printaneal) L  Abouble anea = 3.14 + nadius * gradius;  Apublic class Geometry?  public class Geometry?  Public etanic void main (strong agest?)  Chape renew Certangle (5, 11);  chape tenew Triangle (20,9);  Shape cenew Circle (5);  exprintaneal);  c. printaneal);  c. printaneal);  quadrat  Area of greetangle: 16  Area of greetangle: 90.0	sercle ( int hadi	us) 5
Q'Override  void printarea() L  Abouble anex = 3.14 + madius * radius;  System and println("The area of circle is: "+ of  System and println("The area of circle is: "+ of  Public class Geometry?  Public stone void main (string args (D));  Shape r= new Pertangle (5, 1);  Shape t= new Triangle (20, 9);  Shape c= new Circle (5);  or printarea();  t. printarea();  c. printarea();  quadrat  Area of greetangle: 16  Area of greetangle: 90.0	this nadius - 24	adeus;
Double area = 3.14 * madius * gradius;  Bouble area = 3.14 * madius * gradius;  System out println("The area of circle is: "+ of  Public class Germetry 1  Public etoric void main (String argst D)4  Chape r=new Pactangle (5, 10);  Phape t=new Triangle (20,9);  Ohape c=new Circle (5);  t. printarea();  t. printarea();  c. printarea();  Qualput  Area of guertangle: 16  Area of guertangle: 90.0	4	And the same of th
Double area = 3.14 * madius * gradius;  Bouble area = 3.14 * madius * gradius;  System out println("The area of circle is: "+ of  Public class Germetry 1  Public etoric void main (String argst D)4  Chape r=new Pactangle (5, 10);  Phape t=new Triangle (20,9);  Ohape c=new Circle (5);  t. printarea();  t. printarea();  c. printarea();  Qualput  Area of guertangle: 16  Area of guertangle: 90.0	The land of the second	all . Mr. W. all all all and all all all all all all all all all al
Double anex = 3.14 + named of circle is: "+0  System and println("The area of circle is: "+0  Public class Geometry 1  Public etanic void main (String agest) 4  Shape r=new Pactangle (3, 11);  Phape t=new Triangle (20,9);  Shape c=new Eircle (5);  Exprintaneal);  t. printaneal);  c. printaneal);  Printaneal;  Area of greetangle: 16  Area of greetangle: 90.0	a Override	The state of the s
public class Geometry 1  public class Geometry 1  public etanic void main (Strong ages (D) 5  Shape r=new Pactangle (5, 10);  shape t=new Triangle (20,9);  Shape c=new Circle (5);  expantaneal;  t. printaneal;  c. printaneal;  Price of greetangle: 16  Area of triangle: 90.0	void printaneal) L	2 11. x andien * gradius;
public class Geometry 1  public etanic void main (strong ages[]) 4  Chape. r=new Partangle (\$5,1);  Phape t=new Triangle (\$0,9);  Shape c=new Circle (5);  I printareal;  t. printareal;  C. printareal;  Area of greetangle: 16  Area of triangle: 90.0	double area -	of the area of cirde is: "+ a
Chape t = new Triangle (20,9);  Shape c = new Circle (5);  Area of greetangle: 16  Area of triangle: 90.0	System. out prince	all are area
Chape t = new Triangle (20,9);  Shape c = new Circle (5);  Area of greetangle: 16  Area of triangle: 90.0	3 3	April 1 Same Sale
Chape t = new Triangle (20,9);  Shape c = new Circle (5);  Shape c = new Circle (5);  C = printanea();  C = printanea();  Quadrut  Area of greetangle: 16  Area of triangle: 90.0	make day G	e prietry 1
chape t = new Triangle (20,9);  chape c = new Circle (5);  shape c = new Circle (5);  exprintanea();  t. printanea();  c. printanea();  greatangle: 16  Area of greatangle: 16  Area of triangle: 90.0	public class 9	void main (String augs []) 5
chape t = new (riangle (au, 1);  shape c = new Circle (5);  esprintanea();  t. printanea();  c. printanea();  gudput  trea of guertanyle: 16  trea of triangle: 90.0	(Character Non	a lectorale la
Shape C= new circle (3); . seprintanea(); t. printanea(); C. printanea();  Gudput  Trea of greetangle: 16 Trea of triangle: 90.0	A1 '	to a Triangle Laboriti
output  Area of greetangle: 16 Area of triangle: 90.0	Obace C=	nes Circle (5);
Output  Area of greetangle: 16 Area of triangle: 90.0	Shortare	ea().
Output  Area of grectangle: 16  Area of triangle: 90.0	t. ochtan	100().
Output  Area of greetangle: 16  Area of triangle: 90.0	C. printe	real):
Area of grectaryle: 16 Area of triangle: 90.0	the same of	a property disease of the
Area of grectaryle: 16 Area of triangle: 90.0	4	record
Area of grectaryle: 16 Area of triangle: 90.0	Jensey Small	Ches on the cold was be
Area of grectangle: 16 Area of triangle: 90.0 Asea of circlois: 78.5	Output	and appearable of the letters of
Area of grectangle: 16 Area of triangle: 90.0 Area of circlois: 78.5		0
Area of triangle: 90.0 bea of circlois: 78.5	Area of grectaryle:	16
sea of circlois: 78.5	Area of triangle: 9	0.0
,	bea of circlois: -	78.5
<b>JA</b>	V	
M. Control of the con		
	M	

```
Code:
abstract class Shape {
  int x, y;
  abstract void printarea();
class Rectangle extends Shape {
  Rectangle(int l, int b) {
     x = 1;
     y = b;
  }
  @Override
  void printarea() {
    int area = x * y;
    System.out.println("Area of rectangle is " + area);
  }
}
class Triangle extends Shape {
  Triangle(int b, int h) {
     x = b;
    y = h;
  }
  @Override
  void printarea() {
     double area = 0.5 * x * y;
     System.out.println("Area of triangle is " + area);
}
class Circle extends Shape {
  int radius;
  Circle(int radius) {
     this.radius = radius;
  @Override
  void printarea() {
     double area = 3.14 * radius * radius;
     System.out.println("Area of circle is " + area);
  }
}
```

```
public class Geometry {
   public static void main(String args[]) {
      Shape r = new Rectangle(5, 11);
      Shape t = new Triangle(20, 9);
      Shape c = new Circle(5);

      r.printarea();
      t.printarea();
      c.printarea();
      System.out.print("Chethan K S\n1BM23CS074");
    }
}
```

# Output:

```
Area of rectangle is 16
Area of triangle is 90.0
Area of circle is 78.5
Chethan K S
1BM23CS074
```

#### Program 5

Bank 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. 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

Permit withdrawal and update the balance Check for the minimum balance, impose penalty if necessary and update the balance.

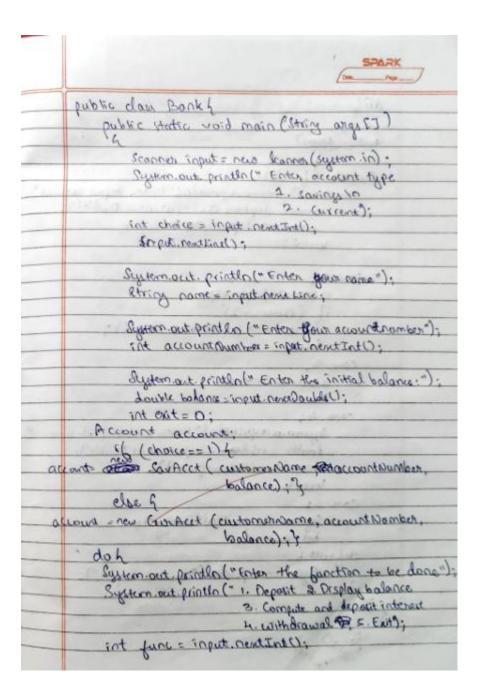
Algorithm:

import gava, with +;  abstract class Accountly  String customorname;  account account Type;  Account (string customorname, int account Number),  double balance  String account Type;  Account (string customorname, int account Number),  that, account pumber = account number;  this, account pumber = account number;  this, balance = balance;  this, account Type = account type;  y  void defosit (double amount) {  balance += amount;  System out, println ("Balance: "+ balance);  y  void display() h  System out println ("Balance: "+ balance);  destract vaid interest();  abstract vaid interest();		SPARK Does
abstract class Accountly  String customorname;  account account Type;  Account (string customorname, int account Number),  double bolance, string account Type)  this, customorname = customorname;  this, account Dumbor = account number;  this, balance = balance;  this, account Type = account Type;  y  void deposit (double amount) {  balance += amount;  System out. println ("Doposit succeiful, New balance = "+ balance);  y  void display() h  System out. println ("Balance: "+ balance); }  abstract void Interest();	imp	ort java. utll. +;
String customornous;  and account Dumber;  double balance String account Type;  Account (string customornous, int account Number,  double balance, String account Type)  this customornous = customornous;  this account Dumber = account number;  this balance = balance;  this, account Type = account type;  y  void deposit (double amount) {  balance += amount;  System out, println("Deposit succesful, New  balance = "+ balance);  y  void display() h  System out, println ("Balance: "+ balance); }  abserract void interest();		and it should not be should
String customornous;  and account Dumber;  double balance String account Type;  Account (string customornous, int account Number,  double balance, String account Type)  this customornous = customornous;  this account Dumber = account number;  this balance = balance;  this, account Type = account type;  y  void deposit (double amount) {  balance += amount;  System out, println("Deposit succesful, New  balance = "+ balance);  y  void display() h  System out, println ("Balance: "+ balance); }  abserract void interest();	ab	Stract class Accounts
double balance String account Type;  Account (String customorname, int account Number, double balance, String account Type)  this, untomorname = customorname; this, account Number = account number; this, balance = balance; this, account Type = account type;  y  void deposit (double amount) {  balance += amount; System out. println("Deposit succeiful, New balance = "+ balance);  y  void display() h  System out. println ("Balance." + balance); }  abstract vaid interest();		
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Account (String customorname, int account Number,  double balance, String account Type)  this. customorname = customername;  this. account Dumber = account number;  this. balance = balance;  this. account Type = account Type;  y  void deposit (double amount) {  balance += amount;  System. out. println("Deposit succeiful, New  balance = "+ balance);  y  void display() h  System. out. println ("Balance." + balance); }  abstract void interest();		double balance
Account (string customorname, int account Number, dauble balance, String account Type)  this, account Number: account number; this, account Number: account number; this, balance = balance; this, account Type = account Type;  y void deposit (double amount) {  balance += amount;  System. out. println("Deposit succeiful. New balance = "+ balance);  y  void display() h  System. out. println ("Balance." + balance); }  abstract vaid interest():		String account Type;
double balance, String account Type)  this. automornance = customernance;  this. account Pumber = account number;  this. balance = balance;  this. account Type = account type;  y  void deposit (double amount) {  balance += amount;  System. out. println("Deposit eucceful. New  balance = "+ balance);  y  void display() h  System. out. println ("Balance: "+ balance); }  abstract void interest():		3
double balance, String account Type)  this. automornance = customernance;  this. account Pumber = account number;  this. balance = balance;  this. account Type = account type;  y  void deposit (double amount) {  balance += amount;  System. out. println("Deposit eucceful. New  balance = "+ balance);  y  void display() h  System. out. println ("Balance: "+ balance); }  abstract void interest():	Acc	ount (String customername, int account Number,
this account Dumbon = account number;  this balance = balance;  this account Type = account Type;  y  void deposit (double amount) {  balance += amount;  System out println ("Deposit successed, New balance = "+ balance);  y  void display() h  System out println ("Balance: "+ balance);  deposit void interest();		double balance, string accountinge)
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void deposit (double amount) (  balance += amount;  System. out. println ("Deposit eucceful. New balance = "+ balance);  y  void display() h  System. out. println ("Balance: "+ balance); }  abstract void Interest();		this, account Type = account Type;
balance += amount;  System. out. println("Deposit eucceful. New balance = "+ balance);  void display() h.  System. out. println ("Balance." + balance); }  abstract void Interest();		3
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balance += amount;  System. out. println ("Deposit encentul. New balance = "+ balance);  void display () h.  System. out. println ("Balance." + balance); }  abstract void Interest();	V 09	d deposit (double amount) (
void display () h  System out println ("Bolance: "+ bolance); }  abstract void Interest();		balance += amount;
void display () h  System out println ("Bolance: "+ bolance); }  abstract void Interest();		System. out. println ("Doposit euccepul. New
void display () h.  System out println ("Balance: "+ balance); }  abstract void Interest();		balance = "+ balance)
void display () h. System out println ("Balance." + balance); } abstract void Interest():		3
abstract void interest():		
abstract void interest():	void	display () h
abstract void interest():		Bystern out printly ("Bolance." + balance); }
		0
	abet	ract void interest();

	MORE THE RESERVE OF THE PERSON
	class SavAcct extends Account 4
	double interest Rate = 0.05;
	SavAcct (String customor Name Fort account Number)
	double balance) 4
	super (automor Name, account Pumber,
	"Savings", belance);
	ge savings, savings
170	A CONTRACTOR AND
10	Querride
	void interest () (
	double interest = balance + interest late;
	balance to interest:
,	Sustern out printly ( Interest added News
	balance = "+balance);
	3
	Marine Mark Francisco Low
	@Overside
301	void withdraw (double amount) ?
- (4)	(balance >= amount)
	1
	balance -= com amount;
	System out fristlo (" with draval successed,
	New balance = "+balance);
	1
	clae
	System. out. println ("Insufficient belonce");
	system.out. printing shoulficient belonce );
	9 9

-	Potering Status
cla	us Curracet extends Accountly
	double min balance = 1000.00
	double 8 charge = 50.00
100	double cheque transactions [] = new chequetramaction
	int checkid = O: chequeid = O:
Cu	Acct (String customer Name, int account Number,
	double balance) {
	Repor ( automor Name, account Number, "Current"
	balance).
	3
	Constraction to make the
00	verride
~	d interest Of
100000000000000000000000000000000000000	System out printle (" Interest corner be calculated for
14 41	Curvent Account ").
	· · ·
(00)	s ervide
voi	d withdraw (double amount) 4
	if (balance > = amount)
	1
	balance -= amount;
	if (palance>=1000)
	2

```
System out printen ("The explored balance is:
           else
              balance - = schange;
               System out printle ("Penalty of 50.0 has
                been deducted. The new balance is: "
                  + balance);
                  (hequetronsactions [chequeid] = amount:
                  chequeid += 1; }
 else
   Egitom-out println ( Front Frient balance. The withdrawal amount is
                         greater than balance");
public chair Borton
void display tronsaction ()
     for (int i=0, i = chequeid; i++)
         System out printly ("Transaction"+(i+1) + "" is"
                                  + chequetransactions [i]);
  3
```



	Switch (func) ?
	Care 1: Cresternout scientia ( CARO) septer themony !
	double decomment = input, next, bouter,
	account. deposit (dep Amount);
	preak;
	Case 25
	account-displayer
	i (choice = = 2)
of the state of	account display to a reaction ();
	loreak.
	case 3:
	account interest();
	break i
	case to:
	Eyeron out println (" Enter withdraval answer?)
	double withdraw = input next Doubles;
day.	account. with a raw (withd);
	break,
	cau si
-	System out println ("Existing");
	int exit=1;
	delant:
	System act printer ("involid input");
	-4
4	*
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	the state of the s

	SPARK
Enter account type (1 Savings.	2 Current
	D. Sameline
Chetran customer name	Late Cate and
Entor account number	I have brought
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Entermitial bolance:	constant.
3333	ek-
Entos the function to be do	ne:
1. Deposit	147
2 Delay Balance	hand hand had
si compute and deposit into	net
C. Withdrawal	21-1-1-1
s. Exit	110 mm 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1	in his strains
Enter deposit amount:	Commission of the last
555	
Deposit successful New balo	nce: 3888-0
Enter the bunchin to be do	ne:
1. Deposit	
2. Display Bolance	and the last of th
3. Compute and deposit interest	
4. Withdrawal	antine a street
6. Exit	All Surages has
2	Use many seen.
Balance: 3888.0	
Enter the function to be don	ed we
. Depost	control street
Display Balance	
2. Display Balance 3. Compute and deposit interes	t
4. Withdrawal	
s. Brit	
3-	

```
Interest added New balance 4082.4
     the unition to be done
            and deposit interest
    withdrawal
S. Fxit
4.
                 amount
 566
            bolonce
                 deposit interest
    Withdrawal
```

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

```
abstract class Account {
    String customerName;
    int accountNumber;
    double balance;
    String accountType;
```

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

```
this.balance = balance;
  }
  void deposit(double amount) {
    balance += amount;
    System.out.println("Deposit successful. New balance: " + balance);
  }
  void displayBalance() {
    System.out.println("Balance: " + balance);
  abstract void computeInterest();
  abstract void withdraw(double amount);
class SavAcct extends Account {
  final double interestRate = 0.04;
  SavAcct(String customerName, int accountNumber, double balance) {
    super(customerName, accountNumber, "Savings", balance);
  }
  @Override
  void computeInterest() {
    double interest = balance * interestRate;
    balance += interest;
    System.out.println("Interest added. New balance: " + balance);
  }
  @Override
  void withdraw(double amount) {
    if (balance >= amount) {
       balance -= amount;
       System.out.println("Withdrawal successful. New balance: " + balance);
     } else {
       System.out.println("Insufficient balance.");
class CurAcct extends Account {
  double minBalance = 1000.00;
  double charge = 50.00;
  double[] chequeTransactions = new double[100];
  int chequeId = 0;
```

```
CurAcct(String customerName, int accountNumber, double balance) {
    super(customerName, accountNumber, "Current", balance);
  }
  @Override
  void computeInterest() {
    System.out.println("Interest cannot be calculated for a Current Account.");
  }
  @Override
  void withdraw(double amount) {
    if (balance >= amount) {
       balance -= amount;
       if (balance >= minBalance) {
         System.out.println("The updated balance is: " + balance);
       } else {
         balance -= charge;
         System.out.println("Penalty of 50.0 has been deducted. The new balance is: " + balance);
       chequeTransactions[chequeId] = amount;
       chequeId++;
     } else {
       System.out.println("Insufficient balance. The withdrawal amount is greater than balance.");
  }
  void displayTransactions() {
    for (int i = 0; i < \text{chequeId}; i++) {
       System.out.println("Transaction" + (i + 1) + ":" + chequeTransactions[i]);
  }
public class Bank {
  public static void main(String[] args) {
    Scanner input = new Scanner(System.in);
     System.out.println("Enter account type:");
    System.out.println("1. Savings");
    System.out.println("2. Current");
    int choice = input.nextInt();
    input.nextLine();
    System.out.println("Enter your name:");
     String name = input.nextLine();
```

```
System.out.println("Enter your account number:");
int accountNumber = input.nextInt();
System.out.println("Enter the initial balance:");
double balance = input.nextDouble();
Account account:
if (choice == 1) {
  account = new SavAcct(name, accountNumber, balance);
} else {
  account = new CurAcct(name, accountNumber, balance);
int exit = 0;
while (exit !=1) {
  System.out.println("\nEnter the function to be done:");
  System.out.println("1. Deposit");
  System.out.println("2. Display balance");
  System.out.println("3. Compute and deposit interest");
  System.out.println("4. Withdrawal");
  System.out.println("5. Exit");
  int func = input.nextInt();
  switch (func) {
     case 1:
       System.out.println("Enter deposit amount:");
       double depAmount = input.nextDouble();
       account.deposit(depAmount);
       break;
     case 2:
       account.displayBalance();
       break;
     case 3:
       account.computeInterest();
       break;
     case 4:
       System.out.println("Enter withdrawal amount:");
       double withdrawAmount = input.nextDouble();
       account.withdraw(withdrawAmount);
       break;
```

```
case 5:
    exit = 1;
    System.out.println("Exiting");
    break;

default:
    System.out.println("Invalid input");
}

if (choice == 2) {
    ((CurAcct) account).displayTransactions();
    }
}
System.out.print("Chethan K S\n1BM23CS074");
input.close();
}
```

```
Enter account type:
1. Savings
2. Current
Enter your name:
Chethan
Enter your account number:
Enter the initial balance:
3333
Enter the function to be done:
1. Deposit
2. Display balance
3. Compute and deposit interest
4. Withdrawal
5. Exit
Enter deposit amount:
Deposit successful. New balance: 3888.0
Enter the function to be done:
1. Deposit
2. Display balance
3. Compute and deposit interest
4. Withdrawal
5. Exit
Balance: 3888.0
Enter the function to be done:
1. Deposit
2. Display balance
3. Compute and deposit interest
4. Withdrawal
5. Exit
Interest added. New balance: 4043.52
Enter the function to be done:
1. Deposit
2. Display balance
3. Compute and deposit interest
4. Withdrawal
5. Exit
Enter withdrawal amount:
566
Withdrawal successful. New balance: 3477.52
Enter the function to be done:

    Deposit

2. Display balance
3. Compute and deposit interest
4. Withdrawal
5. Exit
Exiting
Chethan K S
1BM23CS074
```

```
Enter account type:

    Savings

Current
Enter your name:
Chethan
Enter your account number:
Enter the initial balance:
2534
Enter the function to be done:

    Deposit

2. Display balance
3. Compute and deposit interest
4. Withdrawal
5. Exit
Enter deposit amount:
Deposit successful. New balance: 5679.0
Enter the function to be done:

    Deposit

Display balance
Compute and deposit interest
4. Withdrawal
5. Exit
Balance: 5679.0
Enter the function to be done:

    Deposit

2. Display balance
3. Compute and deposit interest
4. Withdrawal
Exit
Interest cannot be calculated for a Current Account.
Enter the function to be done:
1. Deposit
2. Display balance
Compute and deposit interest
Withdrawal
5. Exit
Enter withdrawal amount:
5131655
Insufficient balance. The withdrawal amount is greater than balance.
Enter the function to be done:

    Deposit

2. Display balance
Compute and deposit interest
4. Withdrawal
5. Exit
Exiting
Chethan K S
1BM23CS074
```

## Packages

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.

folder CIE	Court dates C	to be and also
fackage CIE	· · · · · · · · · · · · · · · · · · ·	N. Salay
Public class fublic public	Internals extends of nt [] internal Marks - void set Internal Mar	tudent & new Int (S]; ks (int D marks)
fo.	(int i=0; i = 5; i+ internal Manks (i)= n	onks (i); }
Public squeb	nt[] getInternal Ma in internal Marks;	uks C) Z
Package CIE;		Alexander (Control
Public class S  public Etria  public Stria  public int	name:	ideas dasse
older see	And the same of the same of	The last of
Packago SEE		2.4
import CIE. At	dest;	

public int[] seeMank = new int[s]; public void setsEEManks (Ent [] monks) { for (int 1=0; 125; 1+1) {
seeMarks (1) = monks (1); public intly getSEE Marks 04 section seemonder; Main import (12.4; import SEE. +; import java util. Scanner, public class Find Monks Calculator & public static void main (string [] esqu) { System out print the number of students.); int n=sc. nextInt(); Student[] student = new Hudent[n]; Internal : nternal Hak = new Internals [17]; External sections: new Externaling; for (int:=0; i=n; i+){

6tuderots[i]= reso studerots();

rdenal Morket = new Internals (); Dee Manks (1) = new External (); System out - print (" Enton USN for Atudant " + (i+1)); students (1) usn= sc. nend(); Sc. rentline(); System out print("Enton Abras for Student" + (:+1)). tridentilia name = sc. next Kinelly System out: print ( conten semester for student "4011)); strictmat (17 som = & next Ind(); int [] internals = new int[5]; System out-println ("Enter Internal Marks (5 courses) for Student "+ (i+1)); for (int j=0; j Ls; j+) } internals (j) = sc. next trot(), } internal Marks [i] . set Internal Marks (internals); int[] see : new int[5]; System out println ("Enter SEE Marts (5 course) for student "+(i+0)for (in 100; jus ; jus) 4 See[j]=sc. neutingl); seeMarks [i] . set SEE Marks (see); System out prontle (" Intiral Mark of Students:"); for (int 1=0; 120; 1+1) 5 Systemous printles (" Instrudent " + (i+1) + ";" + Student () rom + " (USN; " + Student (")"); Superior printal consult interestation I thered Moorks").

for (int j=0: j c= ; j++) (
int final Mark = internel Marketi] get Internel Marks () [] + SreMarks () I. get SEEMarks OG]; System out println ("Course"+ (3+1)+ ": 1+"+

internal Marks (] get Internal Marks () [] +

"H++" + see Marks (; ], get SEE Marks (] ] + "+

+- [M 4"] -finalMasve). 3c. close (); Enter the number of students: 1 Enter USN for student 1 1BM 23CL 074
Enter pame for Student 1 (HETHAN K &
Enter Semester for student 4: 3
Enter Internal Marks (5 courses) for Student 1: 40 39 36 35 31 Enter SEE Marks (5. cources) for Studens 1 49

```
45
49
Final
      Marke
                 Students.
                       (USN: 1BM23CGOTE
           Internal
                            SEE
                                  50
                                                90
                  40
                  39
                                  49
                  36
                                                83
                                  47
                                                80
                  35
                                   45
                  31
                                  49
```

```
package CIE;

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

package CIE;

public class Internals extends Student {
    public int[] internalMarks = new int[5];

    public void setInternalMarks(int[] marks) {
        for (int i = 0; i < 5; i++) {
            internalMarks[i] = marks[i];
        }
    }

    public int[] getInternalMarks() {
        return internalMarks;
    }
}</pre>
```

```
package SEE;
import CIE.Student;
public class External extends Student {
  public int[] seeMarks = new int[5];
  public void setSEEMarks(int[] marks) {
     for (int i = 0; i < 5; i++) {
       seeMarks[i] = marks[i];
  }
  public int[] getSEEMarks() {
     return seeMarks;
  }
}
import CIE.*;
import SEE.*;
import java.util.Scanner;
public class FinalMarksCalculator {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter the number of students: ");
     int n = sc.nextInt();
     Student[] students = new Student[n];
     Internals[] internalMarks = new Internals[n];
     External[] seeMarks = new External[n];
     for (int i = 0; i < n; i++) {
       students[i] = new Student();
       internalMarks[i] = new Internals();
       seeMarks[i] = new External();
       System.out.print("Enter USN for Student" + (i + 1) + ":");
       students[i].usn = sc.next();
       sc.nextLine();
       System.out.print("Enter Name for Student" + (i + 1) + ":");
       students[i].name = sc.nextLine();
```

```
System.out.print("Enter Semester for Student" + (i + 1) + ":");
                     students[i].sem = sc.nextInt();
                    int[] internals = new int[5];
                     System.out.println("Enter Internal Marks (5 courses) for Student " + (i + 1) + ": ");
                     for (int j = 0; j < 5; j++) {
                            internals[j] = sc.nextInt();
                     internalMarks[i].setInternalMarks(internals);
                    int[] see = new int[5];
                     System.out.println("Enter SEE Marks (5 courses) for Student " + (i + 1) + ": ");
                     for (int j = 0; j < 5; j++) {
                            see[i] = sc.nextInt();
                     seeMarks[i].setSEEMarks(see);
             System.out.println("\nFinal Marks of Students:");
             for (int i = 0; i < n; i++) {
                     System.out.println("\nStudent" + (i + 1) + ": " + students[i].name + " (USN: " +
students[i].usn + ")");
                    System.out.println("Course\tInternal\tSEE\tFinal Marks");
                     for (int j = 0; j < 5; j++) {
                            int finalMark = internalMarks[i].getInternalMarks()[j] + seeMarks[i].getSEEMarks()[j];
                            System.out.println("Course" + (j + 1) + ":\t" + internalMarks[i].getInternalMarks()[j] + "internalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[i].getInternalMarks[
"\t\t" + seeMarks[i].getSEEMarks()[j] + "\t" + finalMark);
                     }
             System.out.print("Chethan K S\n1BM23CS074");
             sc.close();
       }
}
```

```
Enter the number of students: 1
Enter USN for Student 1: 1BM23CS074
Enter Name for Student 1: CHETHAN K S
Enter Semester for Student 1: 3
Enter Internal Marks (5 courses) for Student 1:
40
39
36
35
31
Enter SEE Marks (5 courses) for Student 1:
49
47
45
49
Final Marks of Students:
Student 1: CHETHAN K S (USN: 1BM23CS074)
Course Internal
                        SEE
                                 Final Marks
Course 1:
                40
                                 50
                                         90
Course 2:
                39
                                 49
                                         88
Course 3:
                36
                                 47
                                         83
Course 4:
                35
                                 45
                                         80
Course 5:
                31
                                 49
                                         80
Chethan K S
1BM23CS074
```

Interfaces

```
interface Polygon &
double getPerimeter();
double getArea();

class Aquare implements Polygon!
Private double side;
Square (double side) {
this. side = side;
}

public double getPerimeter() &
return 11 side;

public double getArea() &
preturn side side;
}
```

/	class Triangle implements Polygon ? Private double side;
	private double side;
_	Triangle (double side) {
	this side = side;
_	public double artherimeter ()4
	public double getlerûmeter () 4
5	, , , , , , , , , , , , , , , , , , , ,
	public double gethreal) ( neturn (Math. squt(3)/4) Moth. pow(side, 2);
	public class Main3  public static void main(string[] drys)4  double s, t;
	Scanner Sc= new Scamper (system.in); System.out. print ("Enter the length of side of square" S= Sc. pout Double ():
	System.out.print ("Enter the length of side of triongle tescent Double ();
	System.out. println("Square porimeter: "+ square.get get porimeter()); System.out println("Square Area: "+ square.get Area())
	System out println(* square Area: "+ square get Area())

```
Trangle tri = new Trionyle(t);

System out println("Triongle Personettri."+

teringetterameter());

System out println("Triongle Personettri."+

teringetterameter());

Ac. close();

g.

Content the length of side of square. &

Enten the length of side of thingle; 5

Square Personeth: 32.0

Square Area: 64.0

Triongle Personethere S. o

Insorgle Area: 64.0

Lab & Ecoption handling
```

```
import java.util.Scanner;
interface Polygon {
    double getPerimeter();
    double getArea();
}

class Square implements Polygon {
    private double side;

    Square(double side) {
        this.side = side;
    }

    @Override
    public double getPerimeter() {
        return 4 * side;
    }

    @Override
    public double getArea() {
        return side * side;
    }
```

```
class Triangle implements Polygon {
  private double side;
  Triangle(double side) {
     this.side = side;
  @Override
  public double getPerimeter() {
    return 3 * side;
  @Override
  public double getArea() {
    return (Math.sqrt(3) / 4) * Math.pow(side, 2);
}
public class maininterface {
  public static void main(String[] args) {
     double s, t;
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter the length of side of square: ");
     s = sc.nextDouble();
     System.out.print("Enter the length of side of triangle: ");
    t = sc.nextDouble();
     Square square = new Square(s);
     System.out.println("Square Perimeter: " + square.getPerimeter());
     System.out.println("Square Area: " + square.getArea());
    Triangle tri = new Triangle(t);
     System.out.println("Triangle Perimeter: " + tri.getPerimeter());
     System.out.println("Triangle Area: " + tri.getArea());
     System.out.print("Chethan K S\n1BM23CS074");
     sc.close();
  }
```

Enter the length of side of square: 8 Enter the length of side of triangle: 5
Square Perimeter: 32.0
Square Area: 64.0

Triangle Perimeter: 15.0 Triangle Area: 10.825317547305483

Chethan K S 1BM23CS074

## **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 uses both father and son's age and throws an exception if son's age is >= father's age.

Plan chan Are extend Exempton h
Dulot & Branches (Arion more and)
Class whom Age extends Exproption & public whom Age (Aring message) & super(message);
2 0000000000000000000000000000000000000
4 man at the state of the state
class Father 1
A A A
public father (int father Age) throug who y the his is (bather Age < 0)
il (bother Age < 0)
throw new wrong Age ("Father's age cannot be negative:" + bather Age);
negative: + hathwase):
3

SPARK this bathortie - bathortie; symmour, printle "Fathers gre set to" + this father Ages; class Son extends Fathery sat sonAge; Public Son (int batherage, int sonage) throws wrong Agel super ( bather Age); 1 ( songe co) throw new wrong Age (" Son's age compar be negative." + son Age); this. sonAge = conAge;

System out printer ("Son's age set to" + this. sonAge); public class laberception & public static void main (String [] asys) & try 1 Pystern outprintly ("Test case 1:"); int son1 = 15; ind jathers = 40. son si - new Son (batters, sons);

```
Catch (whong Age e) {

System.out. println | " Farron: " + e.get Managety

Y

Test (ases:
Father's age set to 40

Jon's age set to 15

Father's age set to 40

Exron: Son's age cannot be regarive: -5.
```

```
class WrongAge extends Exception {
  public WrongAge(String message) {
     super(message);
class Father {
  int fatherAge;
  public Father(int fatherAge) throws WrongAge {
    if (fatherAge < 0) {
       throw new WrongAge("Father's age cannot be negative: " + fatherAge);
    this.fatherAge = fatherAge;
    System.out.println("Father's age set to " + this.fatherAge);
  }
}
class Son extends Father {
  int sonAge;
  public Son(int fatherAge, int sonAge) throws WrongAge {
     super(fatherAge);
    if (sonAge < 0) {
       throw new WrongAge("Son's age cannot be negative: " + sonAge);
```

```
if (sonAge > fatherAge) {
       throw new WrongAge("Son's age cannot be greater than father's age: " + sonAge);
    this.sonAge = sonAge;
    System.out.println("Son's age set to " + this.sonAge);
  }
}
public class labexception {
  public static void main(String[] args) {
    try {
       System.out.println("Test case 1:");
       int father 1 = 40;
       int son 1 = 15;
       int father2 = 40;
       int son 2 = -5;
       try {
         Son s1 = new Son(father1, son1);
       } catch (WrongAge e) {
         System.out.println("Error: " + e.getMessage());
       try {
         Son s2 = new Son(father2, son2);
       } catch (WrongAge e) {
         System.out.println("Error: " + e.getMessage());
       }
       System.out.println("\nTest case 2:");
       int father3 = -30;
       int son 3 = 10;
       try {
         Son s3 = new Son(father3, son3);
       } catch (WrongAge e) {
         System.out.println("Error: " + e.getMessage());
       }
       System.out.println("\nTest case 3:");
       int father4 = 40;
       int son 4 = 50;
       try {
         Son s4 = new Son(father4, son4);
```

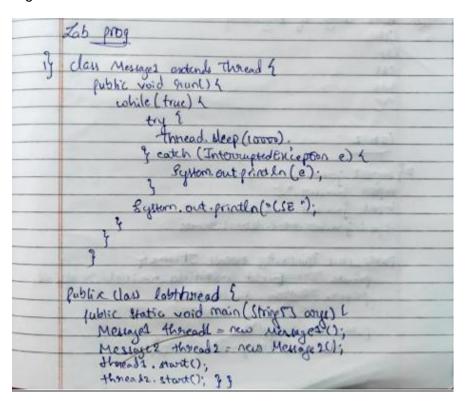
```
Test case 1:
Father's age set to 40
Son's age set to 15
Father's age set to 40
Error: Son's age cannot be negative: -5

Test case 2:
Error: Father's age cannot be negative: -30

Test case 3:
Father's age set to 40
Error: Son's age cannot be greater than father's age: 50
Chethan K S
1BM23CS074
```

### Threads

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 Message1 extends Thread {
  public void run() {
    while (true) {
       try {
         Thread.sleep(10000);
       } catch (InterruptedException e) {
         System.out.println(e);
       System.out.println("BMS College of Engineering");
  }
class Message2 extends Thread {
  public void run() {
    while (true) {
       try {
         Thread.sleep(2000);
       } catch (InterruptedException e) {
         System.out.println(e);
       System.out.println("CSE");
  }
```

```
public class labthread {
  public static void main(String[] args) {
    Message1 thread1 = new Message1();
    Message2 thread2 = new Message2();
    System.out.print("Chethan K S\n1BM23CS074");
    thread1.start();
    thread2.start();
}
```

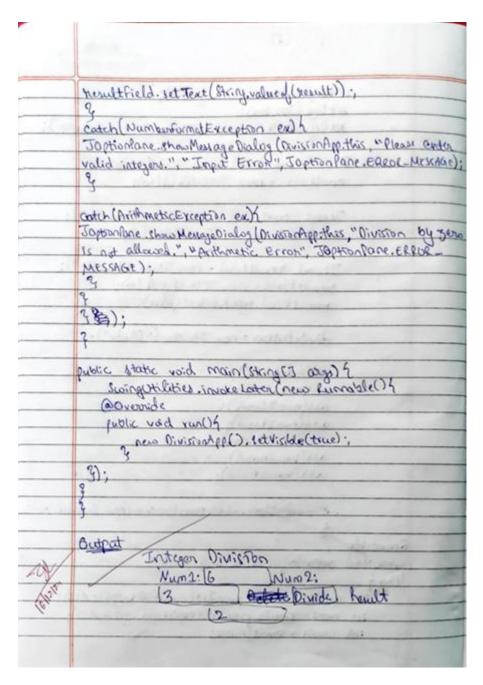
```
Chethan K S
1BM23CS074CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
```

GUI – Java Swing

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.

2	import joux, swing. *;
	import java.aust. event. Action Event;
	import jova, aux-event. Action Listeners
	Public class Division App extends I Frame 4
	private Trensfrield numsfield numsfield results of
	private Joutton dividebutton;
	public DivisionApp()4
	pet Title ("Integer Duision App);
	Albert Haulb

settayout (new Flowlayout (); set 8130 (300, 200); let Default (lase Operation (IF some . EXT ON CLOSE); Travel numblated 1= new Travel "Nums:"); sumbfield = new Trentfield (10); Thatel numberabel = new Thatel ("Num?"); numeriald = new Trentfield (10); Thobel neuthabel = new Thabel ("Result:"); neult Field = new Trentfield (w); neult Field . ret Editable (false); divide Button = new Joutton ("Orvide"); add(numblabel); add(num1 Field); add (num 2 cabel); add(num2 Freld); add (divide Button); add (neultrasel); add (noult Field); dividebattor, addactron Listener (new Acion Listener) Querride public void action Performed (Action Event e) ( toy 5 int num1 = Integer parsuInt (num1Field get Tent());
int num2 = Integer passe Int (num2Field get Tent()); int nexult = mind (num2;



import javax.swing.\*;
import java.awt.\*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class DivisionApp extends JFrame {
 private JTextField num1Field, num2Field, resultField;
 private JButton divideButton;

```
public DivisionApp() {
    setTitle("Integer Division App");
    setLayout(new FlowLayout());
    setSize(300, 200);
    setDefaultCloseOperation(JFrame.EXIT ON CLOSE);
    JLabel num1Label = new JLabel("Num1:");
    num1Field = new JTextField(10);
    JLabel num2Label = new JLabel("Num2:");
    num2Field = new JTextField(10);
    JLabel resultLabel = new JLabel("Result:");
    resultField = new JTextField(10);
    resultField.setEditable(false);
    divideButton = new JButton("Divide");
    add(num1Label);
    add(num1Field);
    add(num2Label);
    add(num2Field);
    add(divideButton);
    add(resultLabel);
    add(resultField);
    divideButton.addActionListener(new ActionListener() {
       @Override
      public void actionPerformed(ActionEvent e) {
         try {
           int num1 = Integer.parseInt(num1Field.getText());
           int num2 = Integer.parseInt(num2Field.getText());
           int result = num1 / num2;
           resultField.setText(String.valueOf(result));
         } catch (NumberFormatException ex) {
           JOptionPane.showMessageDialog(DivisionApp.this, "Please enter valid integers.",
"Input Error", JOptionPane.ERROR_MESSAGE);
         } catch (ArithmeticException ex) {
           JOptionPane.showMessageDialog(DivisionApp.this, "Division by zero is not allowed.",
"Arithmetic Error", JOptionPane.ERROR MESSAGE);
         } finally {
           System.out.println("Chethan K S\n1BM23CS074");
         }
       }
```

```
});
}

public static void main(String[] args) {
    SwingUtilities.invokeLater(new Runnable() {
        @Override
        public void run() {
            new DivisionApp().setVisible(true);
        }
    });
}
```

