VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

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



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B.M.S. College of Engineering,

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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. Kavitha Sooda 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. Quadratic equation.

import java.util. Scarner;

public class quad f

public static void main (String args (3))

	1
	int a, b, c;
	float disc;
	Sconner input = new Scanner (System, in);
	duc = b+b - hxate;
	System out println (" Enter co-experient of x square");
	a= input. maxInt();
	System out printle ("Enter co-efficient of x"); b= input. nextInt();
	System act println ("Entor coeff: the constant");
	& c=input.next Int()
	disc = b+b - hxave;
	if (disc20) h
	System.out.println (" No seal smots exists");
	100000000000000000000000000000000000000
	else (disc > 0) {
	Ent month = (-b + Moth. squt (disc)) (2 xa);
and and	int shoots - (- 6 a - Math. eght (disc)) (240); dyetern out. println ("The mosts are "+ mosts "and" + mosts);
9	3
	Exput close()
	3. clse 4
	int roots = (-b) / (2+a);
	System out printle ("The groots are equal"+ groots);
	input. close()
	3 3

```
Enter co-efficient of n squake

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.

lass student-ip/of	of allering a ma
String name;	1 Sauring
string usn;	Lucis Manager de
noted credits;	Course
int() maks;	(adoll) man in all
int numbersub	
	(Oil soly assessed I was
upid takedetails () 4	- Samuel
Scanner input = new	Sconner (system.in);
System out. Print (" Enter	your name: ");
name = input.next Lin	
bystem out print (" En	
usn = input. next Line!	0:
System out print (" En	ter the number of subjects: ")
numbersub = input. nen	dIrd();
Credits = new int[nun	n bersub];
monty = new int (nu	

```
for (int i = 0; i < number sub; i++)
 System out print ("Enter the number of credits for
                   subject"+ (141) +)
   Credite [i] = in put. next Int ();
   a jetem out print ("Enter the mares of subject "+ (1+1))
   marks [i] = Toput next Int ();
gradepoints OS
   (00=< [i] estrom)
    noturn 10;
Che ib (marks[:]>=80)
    neturn 9;
else if (marks[i]>=70)
ele : ( (marks[i] >= 60)
neturn 7;
else if (marke [i] ?=50)
che if (marks 5:3>= 40)
  neturn 5:
elec.
return 0;
int
CalabatesGPA(){
int totalgradepoints = 0;
int total credi = 0;
```

for (int i=0; i coulmboroub; i++) 2 total creds = total credit (1); totalgradepoints = totalgradepoints + credits (i) +. gradepointed: double SapA = total gradepoints / total weds; gicturn SGPA; public Static void main (String angets) System out point In ("Your total SGPA is" + Hudentt Grandate SGPA()) Output Enter 00 of students 2 Enter your nome: Chethan Enter your USN: 074 Enter rumber 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 office marks for subject 3: 80 your total SGPA is: 9.0 Enter your air 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

Your stated stopped 5: 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:

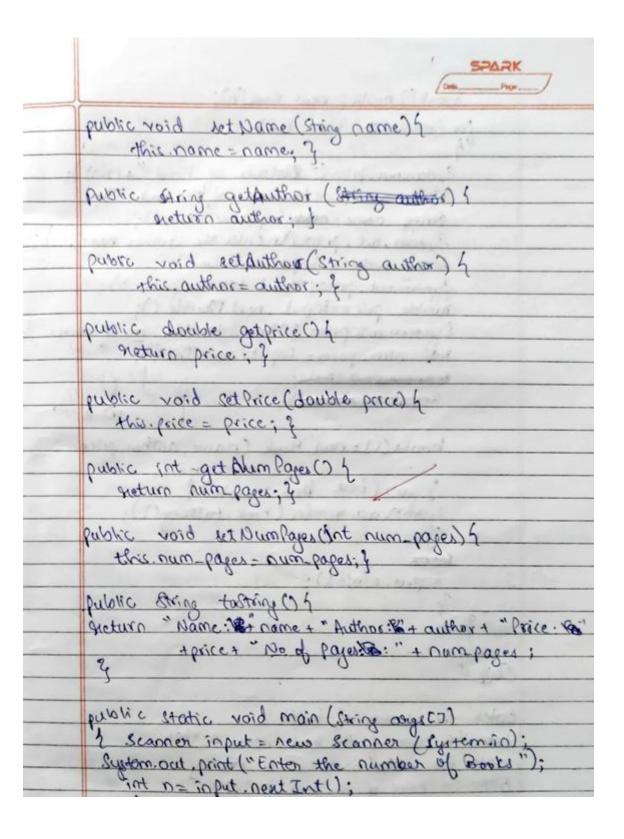
```
Enter no of students 2
Enter your name: Chethan
Enter your USN: 074
Enter number of subjects: 3
Enter the number of credits for subject 1: 2
Enter the marks for subject 1: 92
Enter the number of credits for subject 2: 4
Enter the marks for subject 2: 88
Enter the number of credits for subject 3: 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.

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, of int num-pages) this name = name; this author = author; this pace = price; this num-pages = num-pages; }	
private string name; private string author; private double price; private int num-pages; public Book (string name, string author, of num-pages) this.name = name; this.name = name; this.price = price; this.price = price;	- 2
private string author; private string author; private double price; private int num-pages; Public Book (String name, string author, of int num-pages) this name = name; this name = name; this price = price; this num-pages = num-pages:	
private string author; private double price; private int num pages; public Book (String name, string author, of num-pages) this name = name; this name = name; this price = price; this num-pages = num-pages.	6.0
private double price; private int num-pages; public Book (String name, string author, of num-pages) 4 this name = name; this num-easther; this price = price; this num-pages = num-pages.	
private int num-pages; Public Book (String name, string author, of int num-pages) This name = name; this author = author; this pace = price; this num-pages = num-pages.	
Public Book (String name, string author, of int num-pages) this name = name; this author = author; this pace = price; this num-pages = num-pages:	617 1020
this name = name; this author = author; this pace = price; this num-pases = num-pases:	1014
this name = name; this author = author; this pace = price; this num-pases = num-pases:	of const
this name = name; this author = author; this pace = price; this num-pases = num-pases:	Louble price
this name = name; this author = author; this pace = price; this num-pases = num-pases:	131 r 139
this outher = author; this price = price; this num-pages = num-pages:	N 100 S
this outher = author; this price = price; this num-pages = num-pages:	-3-1
this pace = price;	A. Mak
this num-pages = num-pages:	A
3 July - Laure Lades	L. rotes
J	Course or walked
0.15- 016 011-011	15
public string got Name () &	597.1



```
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 = new input next sine ();
       System . act. print ( " Enter the author name:"
        String author = input. next Lines);
       System-out print ("In Enter the price: ");
       abouble price=input
                           . next Double ();
       System at print (" ) or Enter the no of payor:"
       int num-pages = input. next Int();
         Input next time ().
        books [i] = new Book (name, author, price.
                              num-papes);
              - (book book : books) }
            on. ad printer (book to stringer);
         Poput. close U;
Output
Enter the number of books: 2
Enter the name of the book: Harry Dotter
Enter the author name: JK Rowling
Enter the price of the book. 199.99
Enton 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 page: 150

Name: Namy Potton

Price: 199.99

Number of page: 155

Name: The Maye of fice

Outhor APJ thous leslam

Price: 99.0

Number of lager: 150

Name: Chethap & 1

Down: (Lethap & 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	
	abstract class shape a
	int x, y;
	abstrace void printoheal);
	The same and the same
	at a treat was the gentled
	Class Contrar gle extends shape 4 Contangle (int l, int b) 4
	Centangle (int list 6)4.
	x=2:
	y=6;
	3
-	
	@ Ovvernide
	word printarea(){
	int onea = x+y;
	System.out. println (" Area of nectangle: "+ area);
- 3	9
	Part of the second of the seco
	The state of the s
	class Triangle extends snapes
	class Triangle extends shaped Triangle (int b, int h) 4
	N=6;
	y = h;
	4 Mar cart sin
	the last and add
	@ Ovaride
	void printareally
	double area = 0.5 * x * 4 4;
	System.out. println 1" Area of triangle: "+ area)
	8)

	ComePrece
0	ass Circle extends Shape &
CX	not cadius;
	secole (int gradius) 5
	this radius - radius;
-	
	the second secon
a	Override
V	oid printaneal) L
0	ouble area = 3.14 * gradius * gradius;
2	ouble area = 3.14 + nadius * radius * radius of circle is: "+0
Q	
	Company of the Samuel Company of the
P	public class Geometry 1 public etanic void main (String age (T))
1	public stanc vois maine sing
	Phape renew Pactangle (5, 1);
-	chape t = new Triangle (20,9); Shape c= new Circle (5);
	shape C= na circle (2)
	t. protanca();
-	C. printareal;
	& Principal Control
	2,
	Chen as the wife was belong toward
0	deut
Ace	a of greetangle: 16
Acc	ea d. triangle: 90.0
toe	
	V
- 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.

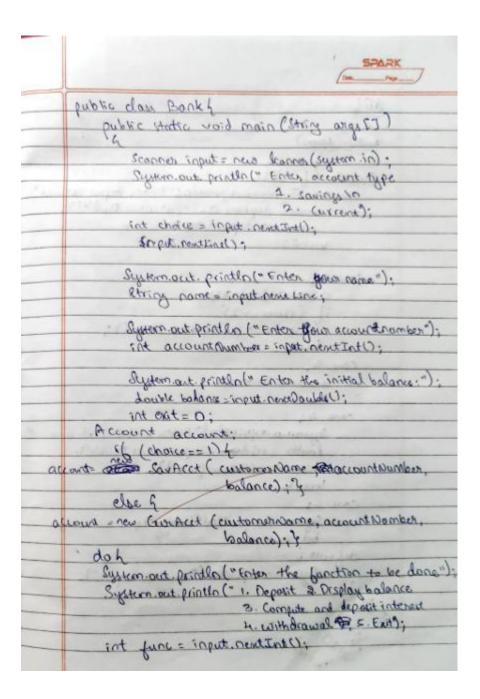
Algorithm:

	SPARK Dom Prope
impor.	t (java, util, +;
	a state of the sta
abst	act class Accounts
-	ing customerName;
	t account Dumbon;
d	ouble balance
2	tring account Type;
	3
Accou	ent (string customorname, int account Number,
	double bolance, string account Type)
	this untomorgane = customername;
	this, account Dumbon = account number;
	this, balance = balance;
	this, about Type = account Type;
	3
poor	deposit (double amount) {
	balance += amount;
	System. out. println ("Deposit encepul. New
	balance = "+ balance);
	ry .
	January Soor - Similar
void	display () h
80	display () h seem out println ("Bolance: "+ bolance); }
abetra	ct void interest();
	ct void withdraw (double amount);
2	/ Walter State of the Control of the

	MOACH.
	class SavAcct extends Account 4
	double interest Rate = 0.05;
	SavAcct (String customer Name fort accountinumbers double balance) {
	super (automor Name, account Number,
	"Savings", balance);
	E S
100	A Lorentz Committee of the Committee of
10	@ Overvide
	void interest () (
	double interest = balance & interest late;
	balance to saterest
,	System.out. println ("Interest added. New balance);
	3
-	0
-	@overside
7455	void withdraw (double amount) ?
	(balance >= amount)
	balance -= com amount;
	System out println(" with drawal successed,
	new balance = "+balance);
	Y
	class.
	hillians at a wall market of the consense
	System.out. println (" Insufficient belonce"):
	2
	2 4

-	Potring Status
cla	S Curract extends Accountly
	double min balance = 1000.00
	double & charge = 50.00
	int checkid = 0; chequeid = 0; (hequetromactions
Cun	Acct (String customer Name, int account Number,
	Super (customor Name, account Number, " "Custent", balance);
	2 sacinite),
-	Oncitation him
~	evide
Voic	interest Of
10 . /	System out printle (" 3 ntown carnot be calculated for
-	woman masure);
90v	errade
void	withdraw (double amount) 4
	if (balance > = amount)
	balance -= amount;
	if (balance >= 1000)
	4

```
System out printen ("The explored balance is:
           else
              bolance - = schonge;
               System out printing "Penalty of 50.0 has
                been deducted. The new balance is: "
                  + balance);
                 (hequetransactions [chequerd] = amount:
                  chequeid += 1; }
 else
   Egitom-out println ( Insufficient balance. The withdrawal amount is
                         greater than balance");
public chase Bords
void display + romaction ()
     for (int i=0, i == chequeid; i++)
         System out printly ("Transaction"+(i+i) + ""is
                                  + chequetramactions [i]);
  3
```



	Switch (func) {
	Care 1. Constraint printer ("Enter Deport attount)
	double des Amount = input, next, Vous
	account. deposit (dep Amount);
	break;
	Case 25
	account-displayer,
	i) (choice = = 2)
	account displayte ansaction ();
	break.
	case 3:
	account interest();
	break i
	core les
	Eyeton out printly ("Enter withdrass amount)
	double withdow = input next Double();
4.1	account. withdraw (withd)
	break,
	Cau St 2 1/4
	System out println ("Exiting");
	int exit=1;
	delaut:
	System out printer ("invalid input")
	- 4 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	7
	A San
	#01
	200
	- Par

	SPARK
Enter account type (1 Savings, 2 Cu	urent
Cotos customos namo	St. American
chettan	alas Edward
Entor account number	a land &
22	borders ve
Enter mitial bolance:	constant.
3233	4
Enter the function to be done:	And the same of
1. Deposit	1000
2 Delay Balanco	of Laurentines
3. Compute and deposit interest	and the state of
C. Withdrawal	since I is
s. Exit	LA LANGER -
1	of the said to
Enter deposit amount:	and the state of t
555	Little 17
Deposit successful New balance:	3886-0
Entor the bunches to be done:	The same
1. Pepait	
2. Display Bolance	machael I.
3. Compute and deposit interest	
4. Withdrawal	and alternal
6. Exit	Terrosperio hom
2 m de la	L MARIN MAN
Balance: 3888.0	and that
EAREN the function to be done	
1. Depost	ale alexand
3. Display Balance 3. Comput and deposit interest	
L. Withdrawal	
5. Brit	
2. 014.0	

```
Interest added New balance 4082.4
      the unition to be done
             and deposit interest
    withdrawal
S. Fixit
4.
Enter withdrawal
                  amount
 566
            balance
                  deposit interest
    Withdrawa
     Exit
```

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

String accountType;

import java.util.*;

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

this.account Number = account Number;

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
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	being transferred and agreement
Package CIE;	The same and
public class Internals a public int [] intern public void set In	atends student & al Marks - new Int (5]; tornal Marks (int 1) morks)
1	; 6 5; 1+) { nts(i)= marks(i); }
	2
fublic int[] getIng greturn internal M	arks;
	And Salarand Logar
Public Etring cun; public Etring name; public int seem;	The speciments
older SEE	
Carried San	Aug Clarific a
Package SEE;	one Course of the
import CIE. Student;	Called Charles

	public int[] seeMark = new int[s];
	multiple most set seem to see st monks) 6
	public word setseEManks (Ent E) monks) {
	for (int 1=0; 125; 1+1) { seeMarks (1) = monks (1);
	9
	2
	public souls and Mark 05
	public into get SEE Marks O's
	3
	A Samuel Council See Files Council
Main	the state of the s
=	
import	(15.4;
	SEE. V.
	112 11200
tropui	java, util. Scaener;
100	partie in a second
public	class Find Marks Calculator &
pu	ohe static void main (string [] comp) {
	Scanner Ac= Apus Acannen (Sustan in):
	System out print (Enter the number of Students:)
	int n=sc. nextInt();
1	
	Student() student : new Student [n];
1000	Internal Typernal Nak = new Internal 1707:
	Extensión sectionalis; new Externalis;
	for (int:=0;ien;in)(étuderats (i)= new studerat();
	0 Styleste [s] = Day Angle M.

reterral Morker = new Internals (); Dee Marks (1) = new External (); Bystorn out print (" Enton USN for Student "+(i+1)); Attidents (i) un = sc. nend(); Sc. rentline(); System out print("Enton Abres for soulest" + (:+1)). tridentilia.name = sc. next Kinelly System out print (conton semanter for Student "4011)); Strictmat (17 som = 50, nent Ind(); : (C) internals = rees int(5); System out-println ("Enter Internal Marks (5 courses) for Student "+ (i+i)); for (int j=0; j25; j+) } internals (j) = sc. next trot(), } internal Marks [i] . set Internal Marks (internals); int[] see : new int[s]; System out println ("Entor SEE Marts (5 course) for student "+(i+1)for (int jed ; jes ; jtt) 4 See[j]=sc. neortintl); seeMorks [i] . set SEE Marks (see); System out prontle (" Intiral Mark of Students:"); for (int 1=0; 10; i++) 5 Systemous printles (" instrudent " + (i+1) + ";" + student () rom + " (USN; " + student (")"); Suptemout printal consult interestation I thered Moorks").

for (sat 5=0; jes; jet) (int final Mark = internel Marks [i] get Internel
Marks () [j] + sreMarks [i]. get SEEMarks OG]; -finalMark). 3c. close (); Enter the number of students: 1 Enter 135N for student 1 1BM 23CL 074
Enter name for Student 1 (HETMAN K &
Enter Semester for student 4: 3
Enter Internal Marks (5 causes) for Student 1: 40 39 36 35 Enter SEE Marks (5. courses) for Student 1 49

```
45
49
Final
      Marke
                 Students.
                        USN: 1BN23CSO
                           SEE
                                  50
                                                90
                 40
                  39
                                  49
                                                83
                  36
                                  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:
                                 50
                                         90
                40
                                 49
Course 2:
                39
                                         88
Course 3:
                                 47
                36
                                         83
Course 4:
                35
                                 45
                                         80
                                 49
Course 5:
                31
                                         80
Chethan K S
1BM23CS074
```

Interfaces

```
interface lolygon h
double getPerimeter();
double getArea();

class Iquare implements lolygon!
private double side;
Square (double side) {
this. side = side;
}

public double getPerimeter() h
meturo ht side;

pulaic double getArea() \( \)
preture side \( \) side;
```

	class Triangle implements Polygon ? private double side;
	Triangle (double side) { this side = side;
_	}
	public double getlerümeter () 4 § neturn 3 x side;
	gretura 3 a sido;
	Public double gethreal) { neturn (Mark. squat(3)/4) Mark. paro(side, 2); }
-	public Class Main3 public static void main(string[] days)4 double s, t;
	Scanner Sc= new Scamper (system in); System.out. print ("Enter the length of side of square."
	System out print ("Enter the length of side of triongle tescent Double ();
	Square square = new square (s); Systemout println ("square perimeter: "+ square gottermeter()); Sustemout existent source tree: "1 square got Am());
	System out println(- Square Area: "+ square get Area());
	A SAME AND THE PARTY

```
Triangle tri = new Triangle(t);

System out println("Triangle Personettri" +

triagetPorameter());

System out println("Triangle Area" of triaget Area));

Accelose();

3

Enter the length of side of square &

Enter the length of side of thiangle; 5

Square Personeth: 32.0

Square Area: 64.0

Triangle Personethes, o

Insorple Area: 64.0

Lab & Eleption 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.

	Lab program
	Class wrong Age extends Expeption & public wrong Age (Aring message) &
	public wrong Ago (Aring message) &
	super(message);
	3
	4 man and the season of the se
	class fathor 4
	ant father Age;
	public father (int father Age) throws who y the h ib (bather Age < 0)
	ib (bother Age < 0)
	therow new warmy Age ("Father's age Cannot be negative:" + bather Age);
	Neo tive " +1 +1 - App).
	2 garringer;
_	

this bathortyc - bathortye; Systemour, printly "Fathers age set to" + this father Age ?; class Son extends Fathery sat sonAge; Public Son (int batherage, int sonage) throws wrong Agel super (bather Age); of (songe co) throw new wrong Age (" Son's age compat be negative." + sonAge); this. sonAge = conAge; System out printer ("Son's age set to" + this. sonAge); public class Pobesception & public static void main (string [] anyo) & try h System outprintly ("Text case 1:"); - the bather's = 40; int son1 = 15; ind jathers = 40. (Cnoz. Enstad) noz own - 12 noz en sz = new Son (batter2, son2);

```
Catch (whong Age e) (
System.out. Println | "Equinon: "+ e.get Mungely

Test cases:
Father's age set to ho
Jon's age set to bo
Foother's age set to be
Exron: Son's age cannot be regarive: -S.
```

```
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 father 2 = 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);
```

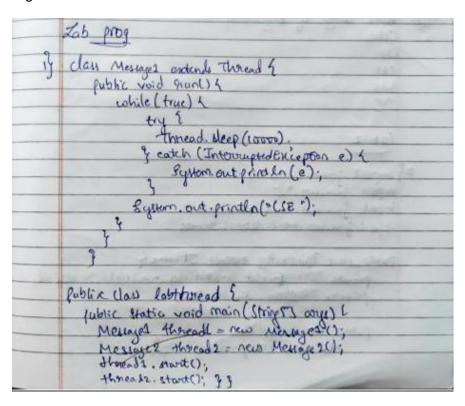
```
Test case 1:
Father's age set to 40
Son's age set to 15
Father's age set to 40
Error: Son's age cannot be negative: -5

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();
}
```

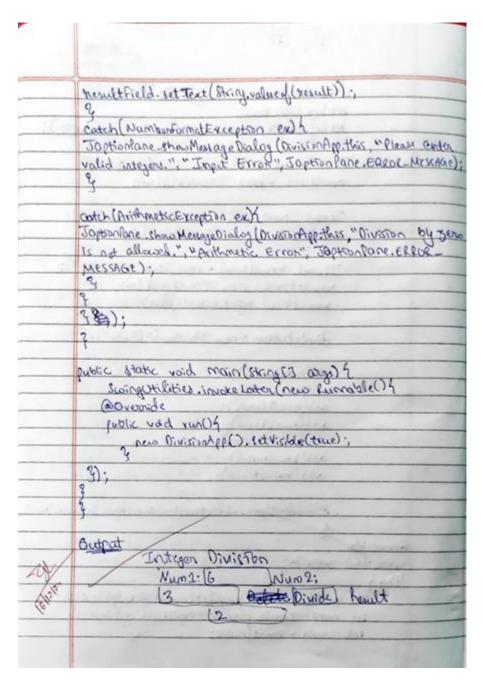
```
Chethan K S
1BM23CS074CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
```

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 im	port java.aut.*; ort java.aut.*; ort java.aut.*event.ActionEvent;
int	the jave aut
ing	out java, aust, event. Action Event;
im	port jour aux event. Action Listeners
Pul	olic class Division App extends I Frame 5
	private Trensfrield numbfield, numstield, hesultfield
	private J Button dividebutton;
	Cold Lor King Hall wan
	public DivisionApp() 4
	setTitle ("Integer Trussion App);
1	0 1111

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int num2 = Integer passuInt(num2Field.getTent()); 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);
        }
    });
}
```

