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



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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. 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. Quadratic equation.

import java.util. Scarner;

public class quad {

public static void main (String args (3))

	4
	int a, b, c;
	float disc;
	Sconnex input = new Scanner (System, in);
	disc bob hade;
	System out print In [" Enter co-efficient of x square");
	a= input-rextInt(); System out printle ("Enter co-efficient of x");
	be input . next Int ();
	System out println ("Enter co-eff: the constant");
	& C= input. next and ()
	disc = b+b - uxaxc;
	if (descro) h
	System.out.println (" No sed snots exists");
	else & 16 (disc > 0) 4
	90+ moot) = (-10+ Moth. squt (disc)) ((2 xa);
	Ent smot 2 - (-6 a - Math. squt (disc)) (240);
Gor	dystern out. println ("The roots are "+ mosts "and" + mosts &
	Speed close ()
	7. clre 6
	int roots = (-b) / (2+a);
	System out println (" The proofs are equal" + 90001);
	input. close()
	3 1

```
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.

lass student-ippoh	CONTRACTOR STATE
String name;	1 Barring
strict uso:	Land Stationer and a land
int C credits;	Course
int() masks;	hotasto) more in also
int numbersub:	
	and the many that we will be a second
upid taxedetails () {	- Samuel
Scanner Input = new	Scanner (Systemin);
System out-print (" Enter	your name: ");
name = input.next Line	
bystem out print (" En	
usn = input. next Line	0.
System out print (" En	ten the number of subjects: ").
numbersub = input, nem	tInt();
Credits = new int[num	bersub]:
manks = new int (nu	

```
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 jutem out print ("Enter the mares of subject "+ (1+1))
   marks [i] = Toput next Int ();
gradepoints Of
    (marks [i] >= 90)
    neturn 10;
Che ib (montes[:]>=80)
    neturn 9;
else if (marks[i] >= 70)
   geturn 8;
else if (marks[i]>=60)
   neturn 7:
else if (marke [i] 7=50)
   neturn 6;
che if (marks 5:3>= 40)
  neturn 5:
elec
return 0;
int
CalalatesGPA(){
int total gradepoints = 0;
in total credi = 0;
```

for (int i=0; i coumber oub; i++) } total creds = total exeds + credita [1]; total grade points = total grade points + credits (i) +. gradepointed: double SGPA = total gradepoints / total weds; gicturo SGPA; public static void main (string angets) System out point In ("Your total SGPA is + Hudent Grandate SGPAO) Output Enter 00, of students 2 Enter your name: Chethan Enter your USN: 074 Enter the number of credit for subject 1: 2 Enter the number of credit for subject 1: 2 Enter the number of credit for subject 2: H

Enter the marks for subject 2: &&

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 monte 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.

Algorithm:

Import Java util Scanner;

public class Book

private string name;

private string author;

private double price;

private int num payes;

fublic Book (String name, string author, double price,

int num-pages)

this name = name;

this name = name;

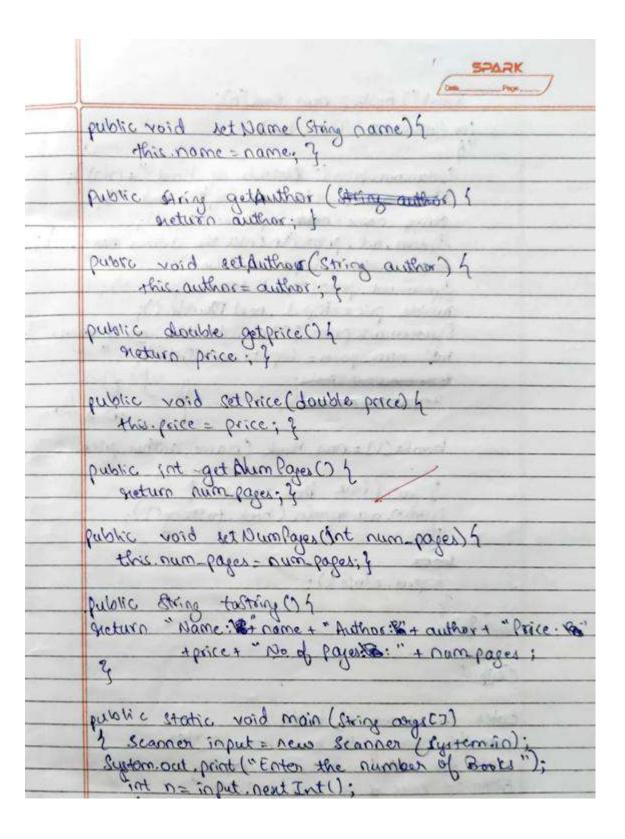
this num-pages = num-pages;

Public string got Name ()

protourn name;

protourn name;

protourn name;



```
Book () books = new Book [n];
     tox (7nt 3=0; icn; i++)
       System out Print (" Dotaily of Book"+(71);
        System out . Print (Mame of the Book: ");
        string name = not input next line 0;
        System . act. print ( n Enter the author name:"
        String author = input. next Lines;
        System out print ("In Enter the price: ");
       abouble price=input. next Double ();
        System at print (" In Enter the no of pages:"
        int num-pages = input. next Int();
        Scoppen went I Frel:
         Angut - HENELine ().
        booke (i) = new Book (name, author, price.
                             num-paper);
              in (book book "books) &
         System. ad. privala (book. to stringe);
         Toput. close U;
Output
Enter the number of books: 2
Enter the name of the book: Harry Nother Enter the author name: I'm Rowling
Enter the price of the book. 199.99
Enton the number of Jages: 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 pages: 50

Norre: Mariny Pottor
Pathor. It & loustry
Price: 199.99

Number of pages: 155

Name: The Wings of Fire
Pruther. APJ though Isolam

Price: 99.0

Number of lages: 150

12 are: Chethop & 1

260: 12M23Cioty
```

```
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.

Algorithi	n
	abstrace class shape a
	int x, y;
	abstract void printoneal);
	The same want will be a same of the same o
	of the seal was the good of
	class lengton gle extends shope h lengtongle (int l, int b) h
	Centancle (int lint 6) 2
	x=l:
	y = 6;
	3
	@ Ovverside
	word printanea(){
	int onea = x + y;
	System.out.println("drea of rectangle: "+ area);
	2 The second sec
	The Carlot of Carlot of the Ca
	class Triangle extends shaped Triangle (int b, int h) 4
_	Triangle (Port 6, Fort h) 4"
	n=6;
	y = h;
	the second of
	the season and the
	@ Ovaride
	void printareally
	double area = 0.5 xx x x u.
	System-out-println 1" Area of triangles" + area)
	301

_	Circle extends Shape &
class	Circle Con
int	cading.
Che	cle (Int Pradius) 4
-th	is nadius - nadius;
4	to the same of the
	and the second s
a Overs	ide 121
40.9	printaneal) L
Double	printaneal) L anea = 3.14 * nadius * nadius; nout printla ("The anea of cirde is: "+c
System	Song brugger and and
3 3	The state of the s
* 1	L. Cannoton A
briplic	class Geometry 1 the examic void main (Strong augs [7])
puls	The prome void interior of
8	Chape renew Pactangle (5, 10);
- 8	chape t = new Triangle (20,9);
March and	shape c= new Circle (5);
	· expantaneal);
	t. privaneal)
,	C. printareal);
. 5	matter has been reduced to the
4	A Comment of the Comm
10.630	AND
Output	or subject to the state of the
Area of	grectangle: 16 triangle: 90.0 circlois: 78.5
Area o	triangle: 40.0
tsea a	order Tr.5
244	

```
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.

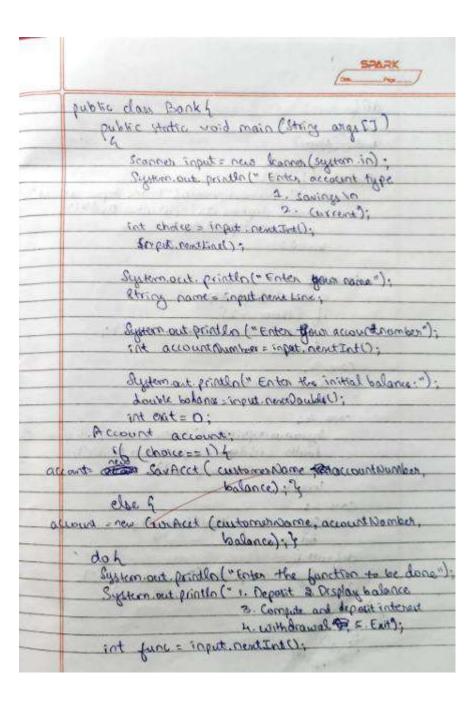
Algorithm:

	SPARK
1m	port gava, util. +;
	the state of the s
al	2stract class Accounts
1	String customorname;
	int account alumban;
	double balance
	String account Type;
Ac	count (string customorname, int account number,
	double bolance, Storny account Type)
	this untomornanc = customernane;
	this, account Dumber = account number;
	this, balance = balance;
	this acount Type = account type;
	A 21,
VO	ad deposit (double amount) (
	balance += amount;
	System. out. println ("Deposit enceful. New
	bolonce = "+ bolonce)
	ry + Saurice - + Saurice)
	Campana Market Street and
V.01	O was at a star (NO. O. "+ b. Com)
	& display () h. System out println ("Bolance." + bolance); }
	tract vaid interest():
050	tract void withdraw (double amount);

	class SavAcct extends Account 1
	double interest Rate = 0.05;
	SavAcct (String customorName fort Accountinumber,
_	super (austomer Name, account Dumber,
	"Savings", belance);
	5
	@Overvide void interest()(
	double interest = balance + interest late;
	balance += interest;
	System out println ("Interest added New balance);
	3
-	@Overside
	void withdraw (double amount) ?
-/.6	To (balance >= amount)
	balance -= com amount;
	Lystem out println(" with drawal successed,
	new balance = "+balance);
	4
	clae.
	System.out.println("Insufficient belance");
	Sales de la constante de la co
1	22

	Storing Stations
cla	us Curracet extends Accountly
	double min balance = 1000.00
	double & charge = 50.00
Lat!	double cheque transactions [] = new chequetromactions int checkid = 0; chequeid = 0;
Cu	Acct (String customer Dome, int account Number,
	double balance) {
	Steper (customer Name, account Number, "Current"
	balance).
	3
	Commission business many
00	verride
~	d interest Of
100	System out printle (" Interest corner be calculated for
18 41	Current Account").
(00)	1 errade
-	d withdraw (double amount) 4
	if (balance > = amount)
	1
	balance -= amount;
	if (balance>=1000)
	2

```
System out printen ("The explored balance is:
          else
             bolance - = schonge;
              System out printley "Penalty of 50.0 has
               been deducted. The new balance is: "
                 + balance);
                 Chequetroniactions [chequeid] = amount:
                 chequeid += 1; }
 else
   Eystern out println ( Froughtenent balance. The
                        uithbrown amount is
                        greater than balance");
public chase Bords
void display transaction ()
     for (int i=0, i == chequeid; i++)
         System out printly ("Transaction"+(i+1) + "" is"
                                + chequetramactions [1]);
  2,
```



	Switch (func) {
	Care 1: Quaternout printin ("Enter depart through
	double dep Amount = input, next Voit
	account. deposit (dep Amount);
-	break;
	Case 25
	account displayer
	i (choice $z = 2$)
	-account display to a martion ();
	loreak.
	case 3:
	account interest();
	break;
	cose k;
	System out println ("Enter withdrawal amounts")
	double withdows input next Doubles;
	account. with draw (with d)
	break;
	cau ss 2 Hill
	System out println (" Existing");
	int exit = 1;
	del autti
	System art printer ("involid input")
	3 0 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	De la Company
	400
	S. Male
	No. of the second secon

	SPARK
Enter account type (1 Savinys, 2	Custrent
2	
Costa Customer name	N. Augelia
chettan	- 4 - 1 - 2 - 4
Enter account number	Land Land
22	
Enter initial balance:	TODAY CONTRACTOR
3333	4
Enter the function to be done	Company of the Compan
t. Deposit	No. of the last of
2. Oplay Balance	Marie Laurence
3. Compute and deposit interes	Energy English
C. Wishdrawal	40-0-3-1
s. Exst	and the second second
1	Law Francisco
Enter deposit amount:	Toronto de deservo
555	Line of
Deposit successful New balance	0.3000-0
Enter the bunchin to be done	
1. Pepait	A CHARLES AND A STATE OF THE PARTY OF THE PA
2. Display Bolance	- 3
3 Compute and deposit interest	
4. Withdrawal	
6 Exit	State of the state
2000	
Balance: 3888.0	
ENER the function to be done	K 10 128/4/6
1000	with all the
2. Display falonce 3. Compute and deposit interest	
3 Compute and deposit interest	
4 withdrawal	
s. Brit	
3-	

```
Interest added New balance 4082.4
     the unition to be done
    impute and deposit interest
   withdrawal
S. Fxit
4.
Enter withdrawal amount
 566
            balance
                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	And district	Early Hay	
Package CIE;	and activities	La salay	
public class I public in public n	internals extends t() internal Mark orid setenternal N	Student &	;
1 for	int i=0; ics, internal Manks (i)=	(++){ marks[i];}	
9	t[] getInternal 1 internal Marks;	larks C15	
folkage CIE;		S. Mariana	1
3 Jane In .	name:	Shirt day day	- 40
older see	al and a shape	Charlant	
Packago SEE;	A SANSON AND A SANSON AND ASSAULT	Commence of the	
import CIE. Sty	ent;		

public int[] seeMark = new int[5]; public word setseEManks (sets) monks) {
for (int i=0; i 25; i+t) {
 seeManks (i) = monks (i); public intil getSELMonks 04 Gother seeMonder; Main import (12.4; import see. +; import jova util. Scanner, public class find Marks Calculator & public static void main (string [] coys) { Conner & = new Scanner (System.in);
System out printing Enter the number of Students.);
int n = cc. next tot(); Student[] student = new Hudent[n]; Internal : Mercallak = new Internals [7] External sections: new External ; for (int:=0; in; in) (

6tudents (i): nao student();

rotered Morte = new Internals (); Dee Manks (1) = new External (); System our print (" Enton USN for Student "+(i+1)); ethidente () una sc. nearl); Sc rentline(); System out print("Enton Abres for student" + (:41)). tildentili I name = se next Knell; System and print (goden semanter for Student "4011)); strict ent (i) som = & next Ind(); ; (Es) in even = elemental [3) tri System out-println ("Enter Internal Nanks (5 courses) for Student "+ (i+1)); for (int j=0; j Ls; j+) h internals (j) = sc. nenting(), } interpolMarks [i] . setInternal Marks (internals); int() see : new int[5]; System out println ("Entor SEE Marks (5 course) for student "+ (i+1)for (in 100 ; 105 ; 341) f See[j]=sc. neutinall; seeMarks [i] . set SEE Marks (see); System out prontle (" Intiral Marke of Students:"); for (int 7=0, : Ln; ++) 5 Systemous printles ("Instituterer" + (i+1)+";" + Student &) rom + "(USN; "+ students = cont")"); Superior printal consult Interelative It finel Moorks")-

for (int j=0: j cs ; j+t) (
int final Mark = internel Marketi] get Internel Marke () [] + SteManks (:] - get SEEMarks OG]; System oxid. println ("(ownke"+ (3+1)+ ": 1+"+
internal Marks () 3 get Internal Marks () (3) +
"H++ + see Marks () 3 get I E Marks () 3 + "+"+ -tiralMoore). 3c. close (); Enter the number of students: 1 Enter USN for students 18M23CL674
Enter pame for Student 1 (HETHAN K &
Enter Semester for student 4: 3
Enter Internal Marks (5 courses) for students. 40 39 36 35 31 Enter SEE Monks (5. coverces) for Student 1

```
45
49
Final
      Marke
                 Students.
                       USN. 1BM23CGOTE
                           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 getherimeter();
double gethereal);

class Aquare implements Polygon!

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

public double getherimeter() &
    return 11 side;

pulate double gethereal) &
    preturn side side;

}
```

_	class Triangle implements Polygon ? private double side;
\equiv	Triangle (double side) { this side = side;
_	1
	public double getferûmeter () h neturn 3 x side;
	greturn 3 x side;
	Public double getthrea() { neturn (Mark, squrt(3)/4)* Mark, paro (side, 2); }
	public class Main3 public static void main (string[] dogs) 4 double s,t; Scanner Sc=new Scanner (system in); System.out. print ("Enter the length of side of square" S=Sc. next Double (); System.out.print ("Enter the length of side of triongle t=sc.next Double ();
	System out println("Square perimeter: "+ square, get get perimeter()); System out println(* square Area: "+ square, get Area()):
	Tapas germanz

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

System out println("Triangle Personetton."+

triagetPersoneton());

System out println("Triangle Personeton());

Accelese();

3

Op

Enter the length of side of square. &

Enter the length of side of though; 5

Square Personeton: 32.0

Square Area: 64.0

Triangle Personetoneto. 0

Insorgle Area: 64.0

Triangle Area: 64.0

Triangle Personetoneto. 0

Insorgle Area: 6.125317...

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.

Zab program
Class Word Age extends Expreption &
Dublic Worm Age (Aring message) &
Class what Age extends exproption to public what Age (Aring message) to super(message);
3
The second secon
class Father 4
6 1 1 10 Agas
public father (int father Age) throws who y the h ib (bather Age < 0)
ib (bather Age < 0)
therow new warny Age ("Father's age Cannot be negative:" + pather Age);
Dea tive " 11 tf . Age)
2 gatte. Thamages;
 I I

this batherties - bathertie; symmetry printly "Fathers age set to" + this father Age? class Son extends Fathery sat songe; Public Son (int batherage, int sonage) throws wrong Agel super (bather Age); of (songe co) throw new wordy Age ("Son's age compar be negative." + sonAge); this sonAge = conAge;
System out printer ("son's age set to" + this sonAge); public class lobesception (public static void main (string [] anys) & try 1 System outprintly ("Test case 1:"); int son1 = 15; ? nt son2 = - 5; son st - new Son (batters, sons);

```
Catch (whong Age e) 1

System.out. printle (" & germin: "+ e. germanger)

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);
```

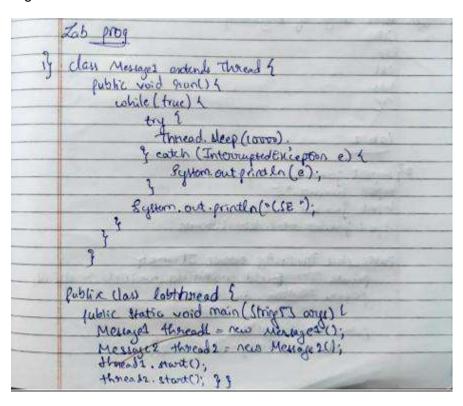
```
Test case 1:
Father's age set to 40
Son's age set to 15
Father's age set to 40
Error: Son's age cannot be negative: -5

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();
}
```

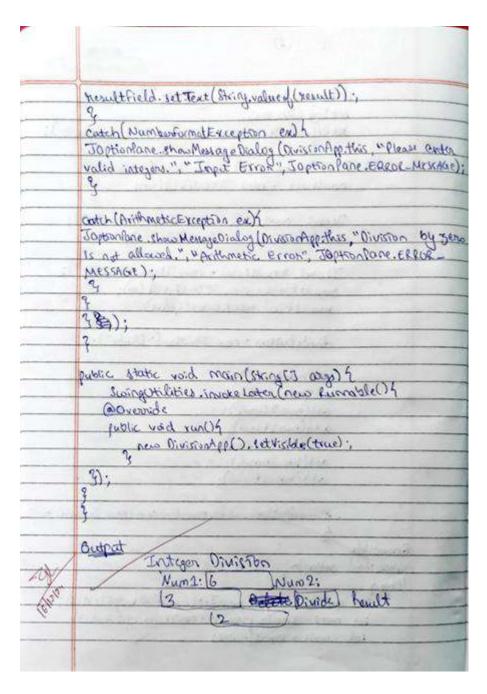
```
Chethan K S
1BM23CS074CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
```

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.

Z	import java.swing. *; import java.aust. *; import java.aust. event. Action Event;
	in fort java, aust, event, Action Event:
4	import jour aux event. Action Listeners
	Public class Division App extends I Frame 4
	private Trensfrield numbfield, numsfield, hesultifield
	(Cold) and Car Male 1984
-	public DivisionApp() {
	pet Title ("Integer Mullion App);

settayout (new Flowlayout (); set 813e (300, 200); let Default (lase Operation (IF some . EXIT ON CLOSE); Travel numbered 1 - new Travel Numb :); numbrield = new Troutfield (10); Thatel remarabel = new Thatel ("Numa."); numerield = new Trentfield (10); Thobel Menulthobel = new Thabel ("Result:"); nexult Field = new Treatfield (10); neult Field ret Editable (balle); divide Button = new Joutton ("Orvide"); add(numblabel); add(num1field); add (nam 2 cabel); add(num2 Freld); add (divide Button); add (neultrasel); add (noult Field); divide Button, add Action Listen on (new Action Listenan) Querride public void action Performed (Action Event e) { toy 5 int num1= Integer pare Int (num1 Field get Text());
int num2= Integer page Int (num2 Field get Text()); 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);
        }
    });
}
```

