## VISVESVARAYATECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



#### LAB REPORT

on

# ObjectOrientedJavaProgramming (23CS3PCOOJ)

Submitted by

ABDUL AHAD (1BM23AI002)

in partial fulfillment for the award of the degree of

#### **BACHELOR OF ENGINEERING**

in

#### COMPUTER SCIENCE AND ENGINEERING



#### **B.M.S. COLLEGE OF ENGINEERING**

(Autonomous Institution under VTU)
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#### **B.M.S.** College of Engineering,

**Bull Temple Road, Bangalore 560019** 

(Affiliated To Visvesvaraya Technological University, Belgaum)

#### **Department of Computer Science and Engineering**



#### **CERTIFICATE**

This is to certify that the Lab work entitled "OBJECT ORIENTED JAVA PROGRAMMING" carried out by **ABDUL AHAD(1BM23AI002)** 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 Artificial Intelligence (23CS5PCAIN) work prescribed for the said degree.

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#### **Program 1**

```
Code:
import java.util.Scanner;
public class lab1{
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter coefficient a: ");
     double a = sc.nextDouble();
     System.out.print("Enter coefficient b: ");
     double b = sc.nextDouble();
     System.out.print("Enter coefficient c: ");
     double c = sc.nextDouble();
     double discriminant = b * b - 4 * a * c;
       if (discriminant < 0) {
          System.out.println("The equation has no real solutions.");
        \} else if (discriminant == 0) {
          double root = -b / (2 * a);
          System.out.println("The equation has one real solution: " + root);
        } else {
          double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
          double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
          System.out.println("The equation has two real solutions:");
          System.out.println("Root 1: " + root1);
          System.out.println("Root 2: " + root2);
  }
```

1414	Quadratic Equation
1	Develop a java gragiam that prints all real solution
	to the quadratic equation and + bx + c = 0. Read
	in a, b, c and use the quadratic formula Ef
	the discriminate b'- 4ac is negative, display a message stating that there is no real solutions
	message stating that there is no real solutions
	import java util : Scanner;
	public class Main ?
	public static void Main (Strings [] args) ?
	Scanner scan = new Scanner (By stem, in);
	System out println ("enter the first us=");
	double a = scan.next Double ();
	System. out. println ("enter the second no");
	double b = sean nortDouble ();
	System out println (" enter the third no=");
	double c = sean nextDouble ();
	double discriminant = (6*b)-(4*a*c);
4	if (discriminant >0) {
	double root! = (- b+ Math. sqr + (discriminant))
	(2*a);
	double root2 = (-b - Math. egyt (discriminant))
	(2 *a);
	System. out printly ("The roots are exped="+
	System.out. println ("The roots are excel="+ root1+","+ root2).
	else'if (discriminant ==0) {
	double root 1= (-6)/12 *a);
	double root 2 = (-b)/(2*a);
	System. out. println("The rook are equal="+
	** ** ** ** ** ** ** ** ** ** ** ** **
	3

eto else { Sycken. out. println ("store of discreminant is negative");
Sycken. out. println ("no rooks"); Owport will sight have adole litelate enter the first no = 2 enter the second no = 5 enter the Wird no = 2 the rook are = -0.5, -2.0 enter the first no - 11 enter the second no = 1. enter the third no = 22

```
C:\Users\lenovo\Desktop\package\lab>javac lab1.java
C:\Users\lenovo\Desktop\package\lab>java lab1.java
Enter coefficient a: 1
Enter coefficient b: 2
Enter coefficient c: 1
The equation has one real solution: -1.0
C:\Users\lenovo\Desktop\package\lab>java lab1.java
Enter coefficient a: 4
Enter coefficient b: 2
Enter coefficient c: 6
The equation has no real solutions.
C:\Users\lenovo\Desktop\package\lab>java lab1.java
Enter coefficient a: 3
Enter coefficient b: 5
Enter coefficient c: 1
The equation has two real solutions:
Root 1: -0.2324081207560018
Root 2: -1.434258545910665
```

```
PROGRAM 2:
import java.io.*;
import java.util.Scanner;
public class student{
    Scanner sc=new Scanner(System.in);
    String usn;
   String name;
   int [] credit;
   int [] marks;
   public student(int numsubjects){
    credit=new int[numsubjects];
    marks=new int[numsubjects];
    }
    void accept(){
           System.out.println("enter usn=");
           usn=sc.nextLine();
           System.out.println("enter name=");
           name=sc.nextLine();
           for(int i=0;i<credit.length();i++){
                  System.out.printf("enter credit of subject%d=",i);
                  credit[i]=sc.nextLine();
           for(int j=0;j<marks.length();j++){
                  System.out.printf("enter marks of subject%d=",i);
                  marks[i]=sc.nextLine();
   void display(){
           System.out.println("usn="+usn);
           System.out.println("name="+name);
           for(int i=0;i<credit.length();i++){
                  System.out.printf("credit of subject%d=%d",i,credit[i]);
           for(int j=0;j<marks.length();j++){
                  System.out.printf("marks of subject%d=",i,marks[j]);
           }
    void calc(){
           int totalcredit=0;
           int wmarks;
           for(int i=0;i<credit.length();i++){</pre>
                  int mmars=(marks[i]/10)+1;
                  totalcredit=totalcredit+credit[i];
                  wmarks=wmarks+mmarks*credit[i];
           }
```

n/11/24	Date Page
	Lab Program - 2
Linant	Develop a jour on
-	an array marks. Include method by
	an array marks. Include method to accept and
1	metrod to calculate as as
	of a student
	import java util Scanner;
	Class Student &
	String words usn;
	String name;
	int[7 credits;
	int[] marks;
	student (int numsubjects) ?
	credits = new int[numqubjects];
	marks = new int[numsubjects];
	3
	void acceptaletails() &
	Scanner Sc = new Scanner (System. in).
	System. out. print ("Enter USN:");
	usn = sc nextline ();
	System out print ("Enter name:");
	name = sc. nextline ();
	tor Cint i=0; i < credits length; i+1 ?
	System. Out. print ("Enter credits for subject"
	+(i+1)+":");
	credits [i] = se: next Int();
	System out print (" Futer marks for subject"
	+ (i+1) +":");
	marks[i] = se. nortline();
	2
	2

void displaydebails 198 System. ait. println! "In Student Details:") System. out . printen ("USN!" + usn ); aystem out grintly ("Name: " + name?", System out printen (" Subjects, towards credits, market) for lint i= 0; i < Ordits length; i+ + ) = {

System.out. printler ("Subject" + (i+1) + ": Credits" + credits(i) +", Marks =" + markern) double calculate (G. PA () { double total (xedite = 0; double weighted Marks = 0; for for (inti-o; is credits length; i++) { Int doubte adjusted Marks = (marks [i] /10] +1; weighted Markes + = adjusted Markes \* credits []; total (redik + = credik [i]; if (total(redits == 0) { return 0; rehum weighted Marke / total redite; public class Main & public static void main ( string () args)? Scanner se = new Scanner (System in); int numsubjects = se nortent (); Student student = new Student (num onlypects);

	CHAIN THE THE
,	Data Poge
	Stralent, accept details ();
-	acplayabaile():
	apa = student colvulationali.
kst),	System. out. println ("InscrPA:" + capa);
3	3
115 to	A self-balling the self-balling the self-balling
477	Output
	Enter the number of subjects: 35
	Enter USN: 1BM21 CSOS6
38 -	Enter name: Utk
	Enter credits for subject 1:4
	Enter marks for subject 1:93
	Enter credits for subject 2: 4.
;	Enter marks for subject 2 82
i);	Enter credits for subject 3: 3: 9! Enter marks for subject 3: 9!
	100 las valuet 1.
	i wheth
	The Children of the Children o
	la late culaplic
	SGPA: 9.2600
	a profit
	Mark Sand 3

```
Enter number of subjects:
Enter USN:
1bm2cs056
Enter name:
abc
Enter credit of subject 1: 4
Enter credit of subject 2: 3
Enter credit of subject 3: 4
Enter marks of subject 1: 98
Enter marks of subject 2: 87
Enter marks of subject 3: 95
USN: 1bm2cs056
Name: abc
Credit of subject 1: 4
Credit of subject 2: 3
Credit of subject 3: 4
Marks of subject 1: 98
Marks of subject 2: 87
Marks of subject 3: 95
GPA: 9.73
```

```
PROGRAM 3
import java.util.Scanner;
class Book {
  private String name;
  private String author;
  private double price;
  private int numPages;
  public Book(String name, String author, double price, int numPages) {
     this.name = name;
    this.author = author;
    this.price = price;
    this.numPages = numPages;
  }
  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 numPages;
  }
  public void setNumPages(int numPages) {
    this.numPages = numPages;
  @Override
  public String toString() {
    return "Book Name: " + name + "\n" +
```

```
"Author: " + author + "\setminusn" +
         "Price: $" + price + "\n" +
         "Number of Pages: " + numPages;
}
public class BookManager {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter the number of books: ");
     int n = sc.nextInt();
     sc.nextLine();
     Book[] books = new Book[n];
     for (int i = 0; i < n; i++) {
       System.out.println("Enter details for Book " + (i + 1) + ":");
       System.out.print("Enter book name: ");
       String name = sc.nextLine();
       System.out.print("Enter author name: ");
       String author = sc.nextLine();
       System.out.print("Enter price: ");
       double price = sc.nextDouble();
       System.out.print("Enter number of pages: ");
       int numPages = sc.nextInt();
       sc.nextLine();
       books[i] = new Book(name, author, price, numPages);
     System.out.println("\nDetails of all books:");
     for (int i = 0; i < n; i++) {
       System.out.println("\nBook " + (i + 1) + ":");
       System.out.println(books[i].toString());
```

26/11/2027		
	Lab-program-3	7
	Create a class Book which contains four members	
	name, author, price, num pages. Include a complex. etor to set the values for the members. Include	16.13
	methods to de set and get the details of the	
	objects Include a wilking () method that	CALL COL
	could display the complete details of the book	
	Develop a java program to create in book objects	TAN AN
	The state of the s	
	import java util Scanner;	
	public class Brok &	
	private String name;	
	private String author;	
	private int price;	
	privale int num pages;	
	1/Constructor	
	public Book (String name, String author,	
	int price, int numpages) ?	
	10	
	Kris name = name;	1-
	this author = author;	
	Ris price = price;	
	this numpages = numpages	
	public (tring getName ?) ?	
	public string getName () {  return name;	+
	35	-
	public void set Name (String Name) {	-
	public void set Name (String Name) {  Ruis name = name;	
	}	
	public String getAuthor ()?	
	public String getAuthor () ?	
	2	
	,	
		FILL

guldic void setAuthor (String Author) & this author - author; public int gettrice () ? return price; public void setPrice (int Price) { this price - price public int getNum pages () ? public void seton setnum pages () { this num pages = num pages; public string tostring () { return "Name" + name + "In Autrox" + Author +" In Price: "+ price + " In Num pages: " + Numpages i public cats class Prok Store ? Scanner SC = new Scanner ( System . in); System. out. printle ("Enter the noof book:"); int n = sc, nextInt (). Book[] books = new Brok[n]; for (inti=0; i<n; i++){ System. out println l'Euter the name of Book: name = sc. nextline (); System out printer (" Enter the name of Author ") author = sc. noetline ();

Sychem out printin (" Enter the price: "); grice = SC. nortInt(); System. out. println (" Enter the no of pages:"). book [i] = new Book (name, author, price, numpage tor ( int i= 0; i< n; i+ ) ? System. out. println (books i7. to string ()); Output: Enter the number of Books: 1 Enter the detail of Book 1: Enter the name of Book: Java Enter the name of author: abc Enter the price of book: 200 Futer Kne number of pages: 500 Same of Book: Java Name of author: abe Price of book : 200

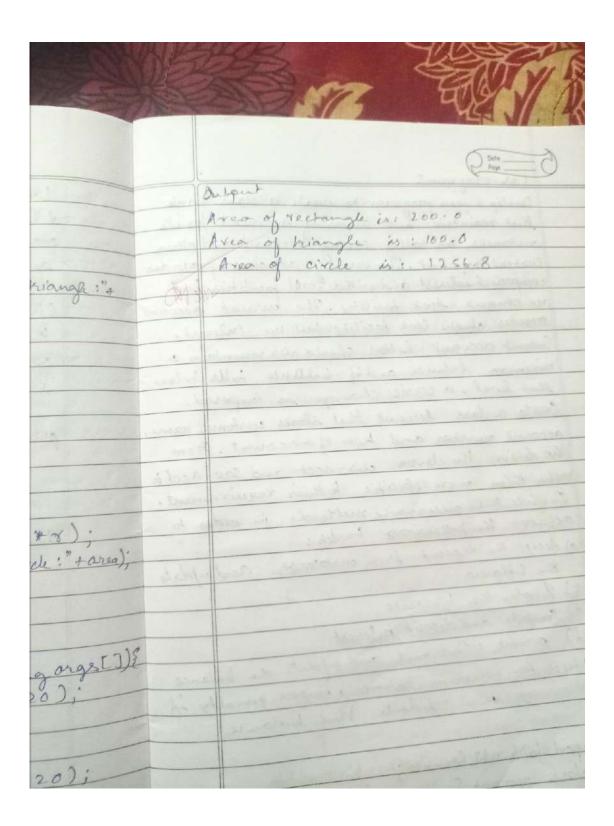
#### **OUTPUT**:

```
Enter the number of books: 2
Enter details for Book 1:
Enter book name: The Great Gatsby
Enter author name: F. Scott Fitzgerald
Enter price: 10.99
Enter number of pages: 180
Enter details for Book 2:
Enter book name: To Kill a Mockingbird
Enter author name: Harper Lee
Enter price: 12.50
Enter number of pages: 281
Details of all books:
Book 1:
Book Name: The Great Gatsby
Author: F. Scott Fitzgerald
Price: $10.99
Number of Pages: 180
Book 2:
Book Name: To Kill a Mockingbird
Author: Harper Lee
Price: $12.5
Number of Pages: 281
```

```
PROGRAM 4
import java.util.Scanner;
abstract class Shape {
  int l,b,r;
  abstract void printArea();
}
class Rectangle extends Shape {
  Rectangle(int length, int breadth) {
     this.l = length;
     this.b = breadth;
  }
  void printArea() {
     System.out.println("Area of Rectangle: " + 1* b);
  }
}
class Triangle extends Shape {
  Triangle(int base, int height) {
     this.l = base;
     this.b = height;
  void printArea() {
     System.out.println("Area of Triangle: " + (0.5 * 1 * b));
  }
class Circle extends Shape {
  Circle(int radius) {
     this.r = radius;
  void printArea() {
     System.out.println("Area of Circle: " + (Math.PI * 1 * 1));
  }
}
public class area{
  public static void main(String[] args) {
    Rectangle r1=new Rectangle(10,20);
    r1.printArea();
    Triangle t1=new Triangle(10,20);
    t1.printArea();
    Circle c1=new Circle(20);
   c1.printArea();
  }
}
```

	Date Page
	Lab-program-4
11	Whelep a land Promote !
");	class named chape that contains two integers
	and an empty male I
umpage);	Mires classes no C . Rande
	Circle such that each one of the Triangle and
(1);	
	only the method printArea () that prints the
	area of the given shape
	public abstract dass Shape &
	public abstract printArea ();
	double l. b. a t.
	double l, b, p 1;
	class Rectangle extends Shape {
11-11-11-11	double l;
	double b;
	public Rechangle (double l, double b) ?
	# Huis, 1 = 2;
1/20	Mis, b = b;
	1 Part 3 mark and and and
	public void printArea () ?
	double area= l*b;
	System; out println ("The area of Rectaugh:"+
	orea);
	7
	3
	3
	class Triangle extends Strape &
	double li
	1 10 11
	Public briangle (double I, abuse 6) ?
	Jenis, l=l;
-	
The state of the s	AND THE RESIDENCE OF THE PARTY

1			
		Mus b = b	
		2 A STATE OF THE S	Short
		- 10 will orly Mrea COF	ALE
	N. X	double area = ons # 6 * 1;	43-56
	1	System. out, println (" The area of kriange :"	
	The last	area);	-04
		3	
	The same	3	
		class circle extends shape ?	- 1
		double v;	44 955
8		public Circle (double 8) }	
		His. 8 = 8;	100000
		3	
		and and order Mars 125	71 100
		public voibl printAveal)?	* 5,000
		double area = 3.142 * (x * x).	
		System.out.printen l"Area of circle:" + area);	1 1
	11 37	3	17.162
	HEET	alli des As S	
		gublic class Area ?	
		public static void main ( string orgs []) Shape rec = new Rectangle (10,20);	120
	77	shape 810 = new Keclangle (10,20);	1 100
		rec. printAreal);	200
		Alberta Huak	
-	Same of the same of	shape bri = new Trangle (10, 20);	
-		tw. print Area ()	
-			
-		shape cir = new Circle (20);	
		cin printAreal);	
		3	
		3	
		dush I demis a familia familia deme	
112	The Park		13.78



#### **OUTPUT:**

C:\Users\lenovo\Desktop\CODING\java>cd "c:\Users\lenovo\Desktop\CODING\java\" && javac area.java && java area

Area of Rectangle: 200 Area of Triangle: 100.0

Area of Circle: 1256.6370614359173

```
PROGRAM 5
import java.util.Scanner;
class Account {
  String name;
  int accNo;
  double balance;
  public Account(String name, int accNo, double balance) {
    this.name = name;
    this.accNo = accNo;
    this.balance = balance;
  }
  public void deposit(double amount) {
    balance += amount;
    System.out.println("Deposit successful! Current balance = " + balance);
  public void display() {
    System.out.println("Current balance = " + balance);
}
class SavAccount extends Account {
  public SavAccount(String name, int accNo, double balance) {
    super(name, accNo, balance);
  }
  public void calculateInterest() {
    double rate = 0.05;
    double interest = rate * balance;
    balance += interest;
    System.out.println("Interest applied! Current balance = " + balance);
  }
  public void withdraw(double amount) {
    if (amount <= balance) {
       balance -= amount;
       System.out.println("Withdrawal successful! Current balance = " + balance);
       System.out.println("Insufficient balance.");
  }
class CurAccount extends Account {
  int minBalance = 1000;
  int penalty = 50;
  public CurAccount(String name, int accNo, double balance) {
```

```
super(name, accNo, balance);
  }
  public void withdraw(double amount) {
     if (balance - amount >= minBalance) {
       balance -= amount;
       System.out.println("Withdrawal successful! Current balance = " + balance);
     } else {
       balance -= penalty;
       System.out.println("Penalty applied! Current balance = " + balance);
}
public class Bank {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     SavAccount sav = new SavAccount("Abe", 203, 1000);
     CurAccount cur = new CurAccount("Abc", 204, 2000);
     int choice;
     while (true) {
       System.out.println("Press 1 for Savings Account, 2 for Current Account, 0 to Exit:");
       choice = sc.nextInt();
       if (choice == 1) {
          System.out.println("1 - Display Balance\n2 - Withdraw\n3 - Deposit\n4 - Calculate
Interest");
          int option = sc.nextInt();
          if (option == 1) {
            sav.display();
          \} else if (option == 2) {
            System.out.print("Enter amount to withdraw: ");
            double amount = sc.nextDouble();
            sav.withdraw(amount);
          \} else if (option == 3) {
            System.out.print("Enter amount to deposit: ");
            double amount = sc.nextDouble();
            sav.deposit(amount);
          } else if (option == 4) {
            sav.calculateInterest();
          } else {
            System.out.println("Invalid option.");
       \} else if (choice == 2) {
          System.out.println("1 - Display Balance\n2 - Withdraw\n3 - Deposit");
          int option = sc.nextInt();
          if (option == 1) {
            cur.display();
          \} else if (option == 2) {
```

```
System.out.print("Enter amount to withdraw: ");
    double amount = sc.nextDouble();
    cur.withdraw(amount);
} else if (option == 3) {
    System.out.print("Enter amount to deposit: ");
    double amount = sc.nextDouble();
    cur.deposit(amount);
} else {
    System.out.println("Invalid option.");
}
else if (choice == 0) {
    System.out.println("Exiting program.");
    break;
} else {
    System.out.println("Invalid choice.");
}
```

}

Develop a java program to create a class bank

Phoetomers, one called saving account and other
curtomers, one called saving account provides
current account. The saving account provides
compound interest and withdrawal facilities but
no chaque book facility. The current account provides chaque book facility but no interest. Current account holders should also maintain a minimum balance and if ballence falls below this level, a cervice charge is imposed. Create a class Account that stores curtomer name account number and type of account. From this derive the clarker eur-acct and sav-acct & make them more specific to their requirement. Include the necessary methods in order to achieve the following turks: a) Accept the deposit from custometr and update the balance b) Display the balance c) compute and deposit interest d) permit withdrawl and update the balance check for minimum balance , impose genally if necessary and epidate the balance Import java util, Scanner; class account ? Etring name; int accuo; double balance; public Assaccount (string name, int accus, double balance

	Date Page
K	this, name a name;
to	this acino = acino;
nes	this balance = balance:
ides	this balance = balance;
	public void deposit (double amount)?
bunt	balance = balance + amount;
	System. out. printle ("Deposit successfull
or _	current balance: "+ balance);
low	3 manufactured and and
	public void display () {
ame,	Syllen out and less 1"Count to lave = + "balance"
n	System. out. printen ("Current balance = +"balance)
ct to	class source count sourcet extends account ?
rt.	public sewacet ( String Name, Intaccus,
0	double balance ) 1 ?
0	super ( name, aceno, balance);
ate	3
are .	public void cal inter () ?
	double ordered = 0.05;
	double interest = rati * balance;
	balance = balance + luterest;
11	Custern out println ("Interest applied
4	current balances "+ balance);
	3
	public void withdraw (double amount)?
1 300	1 Camanat = parent
(0)	
Cheri &	System. out. println (" withdrawl  System. out. println (" withdrawl  encessful & # " + armount + " Current balance:"
	System. our ' Current balance "
of two	
	+ balance);
	else {
	else { System.out.printer ("Insufficient balance"); 3
	3

public class our acet extends account ? public curraced ( string name, but accomo, super (nome, accua, balance); int minhalance = 1000 i int penalty = 50; public void withdraw double amount ) ? if (amount > = mixioneum minbalance) ? balance -= amount; balance - = penalty System, out, printle (" Penalty applied current balance = " + balance ). Debe ? balance - & amount: System. out printer ("withdrawl successful" airrent balance = "+ balance) 3 class Bank & quelie static vold main ( string [ ] arge) { Scanner St = new Scanner ( System, in); int " int i= 0: como savacet sav = new savacet ("Boog Abe", 203, 1000); curracet ar = new curracet ("Abe", 203,2000) while ( i= 0) 9 System.out.println ("Press 1 for saving account in 2 for current account ); x = sc. nort Int ().

	Date Page
	A(x==1) &
no	Sout ("1-shalance; 2 - w/mdraw; 3-sdeposit;
	4 -> interest );
	X = sc. nextInt ();
	if (x = = 1) ?
	Sout (" to batance; 2 > w/thdraw
3	Sc. display ();
	3
	else if (x = = 2) {
ied	Sout ("Extra amount:");
	antry = Sc. nort Int ();
	sc. withdraw (y);
	3
3 had	else if $(n=23)$ ?
110	Sout ("Enter amount:");
M.	inty = sconextInt();
	se . eleposit (inty);
	elx if 1x==4)-8
13	sc. (al inter 1);
	3
1369	else f
	break i
nast.	- what was and the second constants
100 11	3
Abe"	else if (n = 2) {
00);	Sout ("10 balance; 2 > willdrav, 3-deposit);
203,2000;	n=sc.nextInt();
	WESC MEASON
count lu	4 (x==1) {
	Sc. display ();
	else if (4==2)? the amount: ");
	else if (4 = = 2)? Sout ("Enter the amount:");

	15 41)
	inty = se . noxt Int ();
48	are. wi indraw (y);
	else if 14= = 3) ?
	Sout ("Enter the amount: ");
	17.1/7.1
	aur. deposit (inty);
	3
	else E
	break;
	3 - 11 11 11 11 11 11 11 11 11 11 11 11 1
	- Constitution of the second
	Output
	Fenter 1 -> Saving acc; 2 -> currentacc
	Enter 1 -> balance; 2 -> deposit; 3 ->
	willdraw, 4 > Enterest \$ 50 5 > out
	current balance = 1000
	F + 3
	Enter amount 200
	Deposit successfull current bakance = 1200.
	3
	Enter amount
	200
	with draw successful; current balance= 1000
	Jy , current
	testing to all a second
Himak	tuterest applied current balance = 1050
	AND THE REAL PROPERTY OF THE PARTY OF THE PA
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	3(1000)
	and the death to

#### **OUTPUT:**

```
C:\Users\lenovo\Desktop\CODING\java>cd "c:\Users\lenovo\Desktop\CODING\java\" && javac Bank.java && java Bank
Press 1 for Savings Account, 2 for Current Account, 0 to Exit:
1 - Display Balance
2 - Withdraw
3 - Deposit
4 - Calculate Interest
Current balance = 1000.0
Press 1 for Savings Account, 2 for Current Account, 0 to Exit:
1 - Display Balance
2 - Withdraw
3 - Deposit
4 - Calculate Interest
Enter amount to withdraw: 100
Withdrawal successful! Current balance = 900.0
Press 1 for Savings Account, 2 for Current Account, 0 to Exit:
Invalid choice.
Press 1 for Savings Account, 2 for Current Account, 0 to Exit:
1 - Display Balance
2 - Withdraw
3 - Deposit
4 - Calculate Interest
Interest applied! Current balance = 945.0
Press 1 for Savings Account, 2 for Current Account, 0 to Exit:
```

```
PROGRAM 6:
package CIE;
public class Student {
  public String USN;
  public String Name;
  public int Sem;
  public Student(String USN, String Name, int Sem) {
    this.USN = USN;
    this.Name = Name;
    this.Sem = Sem;
  }
  public void displayDetails() {
    System.out.println("USN: " + USN);
    System.out.println("Name: " + Name);
    System.out.println("Semester: " + Sem);
  }
}
package CIE;
import java.util.Scanner;
public class Internals extends Student {
  public int[] marks = new int[5];
  Scanner input = new Scanner(System.in);
  public Internals(String USN, String Name, int Sem) {
    super(USN, Name, Sem);
  }
  public void setMarks() {
     System.out.println("Enter the internal marks for 5 subjects:");
    for (int i = 0; i < 5; i++) {
       marks[i] = input.nextInt();
  }
  public void displayMarks() {
     System.out.print("Internal Marks: ");
    for (int mark : marks) {
       System.out.print(mark + " ");
    System.out.println();
  }
```

```
package SEE;
import CIE.Internals;
import java.util.Scanner;
public class External extends Internals {
  protected int[] externalMarks = new int[5];
  protected int[] finalMarks = new int[5];
  Scanner input = new Scanner(System.in);
  public External(String USN, String Name, int Sem) {
    super(USN, Name, Sem);
  }
  public void setMarksSEE() {
     System.out.println("Enter the external marks for 5 subjects:");
    for (int i = 0; i < 5; i++) {
       externalMarks[i] = input.nextInt();
  }
  public void calcFinalMarks() {
     System.out.println("Final Marks:");
    for (int i = 0; i < 5; i++) {
       finalMarks[i] = marks[i] + externalMarks[i];
       System.out.println("Subject " + (i + 1) + ": " + finalMarks[i]);
  }
import SEE.External;
import java.util.Scanner;
public class Main {
  public static void main(String[] args) {
    int n = 3;
    External[] students = new External[n];
     Scanner scanner = new Scanner(System.in);
    for (int i = 0; i < n; i++) {
       System.out.println("Enter details for student " + (i + 1) + ":");
       System.out.print("Name: ");
       String name = scanner.nextLine();
       System.out.print("USN: ");
       String usn = scanner.nextLine();
       System.out.print("Semester: ");
       int sem = scanner.nextInt();
```

```
students[i] = new External(usn, name, sem);

students[i].setMarks();
students[i].setMarksSEE();

scanner.nextLine(); // Clear the newline
}

System.out.println("\nStudent Details and Final Marks:");
for (External student : students) {
    student.displayDetails();
    student.displayMarks();
    student.calcFinalMarks();
}

scanner.close();
}
```

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	Date
	Tap brodus - c
	Create a package CIE which has two classes -
	Student and internals. The class personal has
	members like USN, name, sem. The days
	sisternals has an array that stores the
	internal marks scored in five courses of the
	current comester of the student, Create another
	Package OZE SEE which has the class
	external which is a derived class of brident.
	This class has an array that Hoves the
	SEE marks scored in the courses of the
	current semester of the chident. Import the
tacc	ho packages in a like that delates he
	him marks of a students in all time courses
> exit	The state of the s
City	import java.uhil. *;
	Dackers CIE
	1 - 1 L'in a love shudent 1
	public string USN;
0'	pulotic String Name;
	public int Sem;
	public in usa chains Name, int Sem) &
11000	Student (String USD, String Name, int Sem) {
1000	This USN - 4514
	His. Name = Name;
	Mis Sem = Sem:
	2 111
	*
CHARLES TO SEE	

parliage tops (IE; public ches Titermals extends student ? Scanner input = new Scanner ( System in ) 0. public int [ Tmarks = new int [5]; public void selmarks ()? for Ciutieo; iss; itt) ? System. out printer ("Enter Re marks of subjet Monarks [, ] = input next Intl). import CIE. Internals; import jour util Scanner; public class External extends Futurnals ? protected Int [ ] external marks = New int [5]; protected jutio tinal marks = new jutis); Scanner input = new Scanner (System. in). public vote setmonles (EF() { System.out. printer ("Futer the marks of seubjects tor ( int i=0; i < 5; i++) { externalmarles [i] = input. next Int (); public void calcfinalmarks () { torlanti=0; i<5; i++) { Hirdmarks EiJ = Maths [; ] + external Model Hi System. out. printly (finalmarks [1]]

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	Impart of 5
	import set externals;
	import java util Scanner;
	simport CIE internal:
	public states will amis Call
	public static vaid main (String [Targs) ? int n=3;
Subject	External [] chudents = new External [n];
	Scanner S = new Scanner (System. in);
	tor(inti=0; i <n; i+)="" td="" {<=""></n;>
	Students [i] = new External();
	System out println ("Name: ");
	String name = S. nertline();
	System.out. println ("USN:");
	String USN = s. nextline();
	System. out println ("Sem:");
	int marks = s. next(n+1);
	Students[i] o Student (USN, Name, Sem);
	Students[i] setMarks ();
	Skidents [i]. Selmarks SEE();
	Students [i] calctinalmarks ();
, 21)	3
·").	333
	Enter the number of students:
	Et. delil of student!
	Enter detail of student!
	Enter USN:
	1BM2CCSOOB
7:	Enter Name:
	Amax
	Enter Sem:

7000	Enter marks for course 1:
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	Enter marks for course?
M	22
N. W.	Enter marks for courses:
	18
	Enter marks for course 4:
	25
MICH	
AILE	Enter marks for course S:
MAR	24
NAN	Enter External marks for 5 courses:
MINI	Enter marks for course !
	SS CHARLES MAN AND AND AND AND AND AND AND AND AND A
	Enter marks for course 2:
	60
	Enter marks for course 3:
	50"
	Enter marks for course 4:
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	Enter marks for course s:
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	Student Details
	USW: 1BM21CSOO8
	d'Nan: Amar
1/1/2/A	Semester: 5
	Tuteral Marks:
	Course 1:20
	Course 2: 22
	course 3:18
	course 4: 20
	Maria and Maria

	Dute Page
	External Marks
	course): cc
	(Durse 2 : 60
1	Course 3: < 0
	course 4: 70
	Course 5:65
	Final marks
	course 1:75
	court 2:82
	Course 3: 68
	course 4:95
	couse 5:89
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```
Enter the USN:
1RV22CS001
Enter the Name:
John Doe
Enter the Semester:
Enter the internal marks for 5 subjects:
20
22
18
19
24
Enter the external marks for 5 subjects:
60
65
55
70
75
Final Marks:
Subject 1: 80
Subject 2: 87
Subject 3: 73
Subject 4: 89
Subject 5: 99
```

```
PROGRAM 7
import java.util.Scanner;
class wrongage extends Exception{
  public wrongage(String msg){
     super(msg);
  }
class father{
  int age;
  public father(int age)throws wrongage{
    if(age < 0){
       throw new wrongage("age can not be negative");
    this.age=age;
class son extends father{
  int sage;
  public son(int fage,int sage) throws wrongage{
    super(fage);
    if(sage < 0){
       throw new wrongage("son age can not be negative");
    if(sage>=fage){
       throw new wrongage("son age can not be greater than father age");
    this.sage=sage;
public class lab7{
  public static void main(String[] args){
     Scanner sc=new Scanner(System.in);
     System.out.print("enter father age=");
    int fage=sc.nextInt();
     System.out.print("enter son age=");
    int sage=sc.nextInt();
    try{
       son son=new son(fage,sage);
       System.out.print("the difference is");
       System.out.print(fage-sage);
     catch (Exception e){
       System.out.println(e.getMessage());
  }
```

0	lab gragram - ?
	to a demonstrates handling of excels 3
	with a program that demonstrates handling of exception ?
	in Inheritance tree treate a france class called "Father" in and derived class called "an" which ordered the pu
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	1 1 Maria Maria Maria Maria
	of son rest as greaters in g.
	Class Wrongage Keplion extends 1- reprison
1	qualic wrongaget-xception ( string msg &
	super (meg);
	3
	class Father &
	intage;
	public Father (int age) throws wrongage Friphas
	111 1000 (0)
	Hurow new Wrongaget xuption ("Father's age  3 can not be -ve?")  Ris age - age:
	3 cannot be -ve!
	3 Ris. age = age;
	3
	class son extends Father {
<b>2</b>	int son Age;
4	public son (int tage, int sage) throws wrongagetruphs
	super (fage);
	if (sage 40)
	throw new Wrongage Exception ("Son's age canothe
	throw new Wrongagetxerption ("son's age canote" -ve");
	ief (sonage > tatherage)
	Herow new WrongageException "Son's age count
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THE STATE OF	be greater than that of father's age?;
	wye 1;

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3	Date Page
	Mis sage = sage;
ng of exception	3 mgs
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ade the	import java util *;
mikulbor	public class Main &
wangages	Public Static Void main (String [ ] angel knows
ta constructor	Programme S
an exception	scanner sc - new Scanner ( System in):
peran	out of inter talker's age ';
on s	and tage = cc.nosetant();
159 28	System. out prinker ("Enter son's age:");
	int sage = Sc next Ent();
	try?
	sons = new son ( tage, sage);
	System. out. Printen ("The difference is:");
	System out printen (tage-sage);
agage Exception ?	
11 - 2	Catch (wrongaget replien e) { Syekm.out.println(e.getMessage());
"Father's age	System.out.println(e.getHerrage())
M1')	3
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	the same have the same
	O/P: Enter faller's age: 15
	Enter son's age: 21.
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rongageException	Wrongage Exception: Son's age can't be greater than that
	Wrongage Exception: Son's age can't be greater than mas
-	The state of the s
's age canot be	
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C 18 01 10	
father's	
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C:\Users\lenovo\Desktop\CODING\java>cd "c:\Users\lenovo\Desktop\CODING\java\" && javac lab7.java && java lab7 enter father age=28 enter son age=9 the difference is19 C:\Users\lenovo\Desktop\CODING\java>cd "c:\Users\lenovo\Desktop\CODING\java\" && javac lab7.java && java lab7 enter father age=25 enter son age=29 son age can not be greater than father age

```
PROGRAM 8:
class mythread1 extends Thread{
  public void run(){
    try{
       while(true){
         System.out.println("Bmsce");
         Thread.sleep(10000);
    catch(Exception e){
       System.out.println("Thread 1 in interrupted");
  }
class mythread2 extends Thread{
  public void run(){
    try{
       while(true){
         System.out.println("CSE");
         Thread.sleep(2000);
    catch(Exception e){
       System.out.println("Thread 2 in interrupted");
  }
public class lab8{
  public static void main(String[] args){
    mythread1 t1=new mythread1();
    mythread2 t2=new mythread2();
    t1.start();
    t2.start();
  }
}
```

20	Laborogran - 8
	Write a greggram to create 2 threads come thread ()  Displaying "BMC colloge of Engineering ance ()  every lose and other displaying "C SE" once
44	displaying "BMC college of Engineering once
	every losic and other displaying once
	every two second.
	1 T T 1 T-2-10-15
	Class Two Thread Togethor ? Static class Treatends Thread ?
	State Class 11 Ections 110
	Public void runc ) {
	try &
	while (True) ?
100	System.out. printen ("BMSCE");
	Thread - Sleep (10008);
	3
	2 3
	catch (Interrupted Exception e) 3.
	Catch (Interrupted Exception e) 3°  System.out.printen ("Thread (Interrupted")  3
	3
	Colorado a la contra de la contra del la contra della con
	Static class To ordends Thread ?
	@ override
	public void run () {
	try {
	while (Txue) {
	System. out. printen ("CSE");
	Thread. sleep (2000);
	2
	Catal Catal and a se
	Catch (Interrupted Exceptione )?
	System out printer ("Thraad2 interrupted")
	3
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Myead	public chasic void main (String [Jargs] ?
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once	To b = new To ();
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```
PROGRAM 9:
import javax.swing.*;
import java.awt.event.*;
class Division implements ActionListener {
  static JLabel label1, label2, resultLabel;
  static JTextField textField1, textField2;
  public static void main(String[] args) {
    JFrame frame = new JFrame("Division of Numbers");
    frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    frame.setSize(400, 200);
    label1 = new JLabel("Enter the first number: ");
    label2 = new JLabel("Enter the second number: ");
    resultLabel = new JLabel("Result will appear here.");
    textField1 = new JTextField(10);
    textField2 = new JTextField(10);
    JButton submit = new JButton("Submit");
    Division division = new Division();
    submit.addActionListener(division);
    JPanel panel = new JPanel();
    panel.add(label1);
    panel.add(textField1);
    panel.add(label2);
    panel.add(textField2);
    panel.add(submit);
    panel.add(resultLabel);
    frame.add(panel);
    frame.setVisible(true);
  }
  public void actionPerformed(ActionEvent e) {
    try {
       int num1 = Integer.parseInt(textField1.getText());
       int num2 = Integer.parseInt(textField2.getText());
       if (num2 == 0) {
         resultLabel.setText("Error: Division by zero!");
       } else {
         int result = num1 / num2;
         resultLabel.setText("The result of the division is: " + result);
     } catch (NumberFormatException ex) {
       resultLabel.setText("Error: Please enter valid numbers.");
```

Lab program - 9 import jaya, util. \*, publik static void main (Stoling [7 arloge) Scanner Sq = new Scanner (System . in System out printer / L" Enter num 1:" Write a program that creates a user interface loperform integer divisions The user enters has numbers in the text fields, num I and num?. The division of num I and num? is displayed in the result field when the divide button is clicked of num! or num? were not an integer. The program would throw a Number formal Exception of num 2 were zero, the program would throw an Arithmetic exception. Display the the exception in mersage dialog box

impart javax civing \*; impost java, and eventy class division implements actionly tener of Static Table 13; Static Fortfield ti, to; public static void main (string : Jargs) {

J Frame frame = new J Frame ("dividon of two

frame. set Default Close Operation numbers")); trame set Default close Operation ( J Frame ' ExTI on alose"): frame. set Size (400, 400); Thatel 1 = new Tlabel ("enter the first number"); Tlabel 12 = new Tlabel ("enter the second number"); 12 = new Tlabel (1111); JPanel p = new JPanel(); ti = new Treat Field (10); to = new Flext Field (10); Talton submit = new JButton ("Submit"). Division to = new Division (); submit add Action Listener (te); p.addtli); P.add (ti); p. add (li) P. add (tz); p. add (13); p. add (cubmit); Frame add (p); trame. set Visible (true);

1	- 10 18:
	public void action Erformed (Action Evente) ?
	String 3 = e. agraction ( command ());
	if (Os. equals ("Submit") }
11	dist num 1= Tysteger purse Int ft of Teast (1)
	int num! = Integer . purse Int ( t = get Text());
	num 1 /= num 2;
	String ans "The answer of the division is"+ mun!
	13 setText (ans);
1200	3
	catch (Exception +) +
1.00	I Frame frame = new JFrame ("error occured),
-	frame, setsize (300,100);
-	Ilabel 1: new Tabel ( + to Chring ());
	trame add (k);
	13 trame suttinible (true);
	3
	3
	3
	019
	division of two numbers - 17x
	enter the first number [12]
	enter the second number [3]
	The answer of the division is 4
	answer of the division is 4
	The state of the s

Golivition of two number -171x( enter the first number [12] enter the second number [0] Submit get Teat(); num 1; error occured java lang. Arithmetic Exception/by zero; secured"), Program

```
PROGRAM 10:
class SharedResource {
  synchronized void method1(SharedResource other) {
     System.out.println(Thread.currentThread().getName() + " is executing method1");
     try { Thread.sleep(100); } catch (InterruptedException e) {}
     System.out.println(Thread.currentThread().getName() + " is trying to call method2 on other
resource");
     other.method2(this);
  synchronized void method2(SharedResource other) {
     System.out.println(Thread.currentThread().getName() + " is executing method2");
     try { Thread.sleep(100); } catch (InterruptedException e) { }
     System.out.println(Thread.currentThread().getName() + " is trying to call method1 on other
resource");
     other.method1(this);
  }
}
class DeadlockDemo {
  public static void main(String[] args) {
     SharedResource res1 = new SharedResource();
     SharedResource res2 = new SharedResource();
     Thread t1 = \text{new Thread}(() -> \text{res1.method1}(\text{res2}), "Thread-1");
     Thread t2 = \text{new Thread}(() -> \text{res2.method1(res1)}, "Thread-2");
    t1.start();
     t2.start();
  }
}
```

1	(1-1 mys dam -10
M	Labgragram -10
M	class Shared Resource &
	and the mized void method the resolute office of
	Sychem out printer (Thread current thread).
5	Sychemout. Println (Intead austent Inread).  get Name () + " is executing nethod!")?
4	try & Thread eleep (100); 3
7/1-	cata (Interrupte d'Execution e) ? }
	Syclem out printer (Thread coursent Thread () get Name ()+
74	"is trying to call method 2 oh other resource");
	Other method 2 (this);
	Synchronized void method 2 (Shared Rosource other) {
	Synchronized voia moderna throats act Name () +
-	Syplem out. Println (Thread current Thread(). get Name()+
	"is executing method ?"";
	dry &Thread. sleep (100 ); it
	Catch (Interrupted Execution e) { }
<u> </u>	System out printen (Thread current Thread 1) get Vane ()  +" is trying to call method I on other resource);
	It is kying to call method I on other resource
	other method (this);
	3
	3
	class Deadlock Demo &
	public static yord man (string 1 Jourgs)
	Chare Aresource rest = new shared Kesource
	GaredResource yes2 = new SharedResource O;
	Thread ti= new thread (C) - rest method (res),
At a second	le Taroad-1");
	Thread to = new Thread (() -> res2, mellod (Yes)),
	"Thread ?" );
-	t1, slort(); t2. slort();
	3

Thread-1 is executing method1
Thread-2 is executing method1
Thread-1 is trying to call method2 on other resource
Thread-2 is trying to call method2 on other resource