

Lab Program 1:

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 discriminant b^2-4ac is negative, display a message stating that there are no real solutions.

Code:

Q. Lab Program 1. (if) allowing two methods

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

```
import java.util.Scanner;
public class Quadratic
{
    public static void main (String args[])
    {
        Scanner input = new Scanner (System.in);
        System.out.print ("Enter the value of a: ");
        double a = input.nextDouble();
        System.out.print ("Enter the value of b: ");
        double b = input.nextDouble();
        System.out.print ("Enter the value of c: ");
        double c = input.nextDouble();
        double d = b * b - 4.0 * a * c;
        while (a == 0.0)
        {
            System.out.println ("Entered a value is incorrect enter again");
            a = input.nextDouble();
        }
        if (d > 0.0)
        {
            double r1 = (-b + Math.sqrt (d)) / (2.0 * a);
            double r2 = (-b - Math.sqrt (d)) / (2.0 * a);
            System.out.println ("The roots are " + r1 + " and " + r2);
        }
        else if (d == 0.0)
        {
            double r1 = -b / (2.0 * a);
            System.out.println ("The roots are real and equal " + r1);
        }
        else
        {
            double r1 = -b / (2.0 * a);
            double r2 = Math.sqrt (-d) / (2.0 * a);
            System.out.println ("Roots are not real.");
            System.out.println ("The roots are " + r1 + " + " + i + r2 + " and " + r1 + " - " + i + r2);
        }
    }
}
```

double r1 = (-b + Math.sqrt (d)) / (2.0 * a);
System.out.println ("The roots are distinct and the roots are " + r1 + " and " + r2);
else if (d == 0.0)
{
 double r1 = -b / (2.0 * a);
 System.out.println ("The roots are real and equal " + r1);
}
else
{
 double r1 = -b / (2.0 * a);
 double r2 = Math.sqrt (-d) / (2.0 * a);
 System.out.println ("Roots are not real.");
 System.out.println ("The roots are " + r1 + " + " + i + r2 + " and " + r1 + " - " + i + r2);
}

Output:

```
Administrator: Command Prompt
operable program or batch file.

C:\Users\BMSCECSEIL74>cd C:\Users\BMSCECSEIL74\Desktop\1BM21CS002
C:\Users\BMSCECSEIL74\Desktop\1BM21CS002>javac Quadratic.java

C:\Users\BMSCECSEIL74\Desktop\1BM21CS002>java Quadratic
Enter the value of a: 0
Enter the value of b: 3
Enter the value of c: 4
Entered a value is incorrect enter again
4
The roots are 0.0 and -0.75

C:\Users\BMSCECSEIL74\Desktop\1BM21CS002>java Quadratic
Enter the value of a: 1
Enter the value of b: 2
Enter the value of c: 16
Roots are not real.
The Roots are -1.0 + i3.872983346207417 and -1.0 - i3.872983346207417

C:\Users\BMSCECSEIL74\Desktop\1BM21CS002>java Quadratic java Quadratic
Enter the value of a: 1
Enter the value of b: 5
Enter the value of c: 2
The roots are -0.4384471871911697 and -4.561552812808831

C:\Users\BMSCECSEIL74\Desktop\1BM21CS002>java Quadratic
Enter the value of a: 1
Enter the value of b: 2
Enter the value of c: 1
The root is -1.0

C:\Users\BMSCECSEIL74\Desktop\1BM21CS002>
```

Lab Program 2:

Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

Code:

LAB Program 2.

Develop a Java program to create a class Student with members USN, Name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

```
import java.util.Scanner;
class Student {
    String name;
    String USN;
    int credits[];
    int marks[];
    double sgpa = 0;
    int cts = 0;
    int totalcred = 0;

    void acceptor (String usn, String name, int credits[], int marks[])
    {
        this.USN = usn;
        this.name = name;
        this.credits = credits;
        this.marks = marks;
    }

    Student (int credsize)
    {
        credits = new int [credsize];
        marks = new int [credsize];
    }
}
```

```
void display ()
{
    System.out.print ("USN : " + USN + "\n" + "name : "
                      + name + "\n" + "sgpa : " + sgpa);
}

void sgpacalc ()
{
    for (int i=0; i<marks.length; i++)
    {
        if (marks[i] >= 90) cts = 10;
        else if (marks[i] >= 80) cts = 9;
        else if (marks[i] >= 70) cts = 8;
        else if (marks[i] >= 60) cts = 7;
        else if (marks[i] >= 50) cts = 6;
        else if (marks[i] >= 40) cts = 5;
        else if (marks[i] >= 36) cts = 4;
        else if (marks[i] >= 0) cts = 0;
        sgpa = cts * credits[i];
        totalcred += credits[i] * 10;
    }
    sgpa = (sgpa / totalcred) * 10;
}

class lab-32
{
    public static void main (String [] args)
    {
        Scanner s = new Scanner (System.in);
        System.out.println ("Enter the number of courses");
        int n = s.nextInt ();
        int credits [] = new int [n];
        int marks [] = new int [n];
        Student s1 = new Student (n);
    }
}
```

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```
System.out.println("Enter the credits  
of the courses:");
for (int i=0; i<n; i++)
{
    credits[i] = s.nextInt();
}
System.out.println("Enter your USN, name");
String usn = s.nextLine();
String skipline = s.nextLine();
String name = s.nextLine();
System.out.println("Enter your marks in each
subject");
for (int i=0; i<n; i++)
{
    marks[i] = s.nextInt();
}
}
s1.acceptor(usn, name, credits, marks);
s1.sgpalc();
s1.display();
s.close();
```

Output:

```
ca: Command Prompt
Microsoft Windows [Version 10.0.19045.2251]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsce>cd C:\Users\bmsce\Desktop\1BM21CS017

C:\Users\bmsce\Desktop\1BM21CS017>javac Lab_2.java

C:\Users\bmsce\Desktop\1BM21CS017>java lab_2
Enter the number of courses
3
Enter the credits of the courses:
3
4
2
Enter your usn,name
1BM21CS002
Aadi
Enter your marks in each subject
enter the marks obtained in 0 course (credits= 3) :89
enter the marks obtained in 1 course (credits= 4) :97
enter the marks obtained in 2 course (credits= 2) :56

-----
usn:1BM21CS002
name:Aadi
sgpa:8.77777777777779

C:\Users\bmsce\Desktop\1BM21CS017>
```

Lab Program 3:

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

Code:

LAB PROGRAM 3.

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;

class Books
    int num_pages;
    double price;
    String name;
    String author;
    Book() {
        num_pages = 0;
        price = 0.0;
        name = "Some-book";
        author = "Some-author";
    }
    Book(int numpages, double price, String name, String author) {
        this.num_pages = numpages;
        this.price = price;
        this.name = name;
        this.author = author;
    }
}
```

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```
void get_data() {
    System.out.println("Book details is " + name + "\n" +
                        "author: " + author + "\n" +
                        "number of pages: " + num_pages + "\n" +
                        "price: " + price);
    System.out.println("\n-----\n");
}
public String toString() {
    return ("Book details is " + name + "\n" +
            "author: " + author + "\n" +
            "number of pages: " + num_pages +
            "\n" +
            "price: " + price);
}

class lab_2 {
    public static void main (String [] args) {
        Scanner s = new Scanner (System.in);
        int n = s.nextInt();
        Book b1[] = new Book[n];
        for (int i = 0; i < n; i++) {
            b1[i] = new Book();
            System.out.print ("enter the name of the book: ");
            String name = s.nextLine();
            System.out.print ("enter the author's name: ");
            String author = s.nextLine();
            System.out.print ("enter the number of pages in the book: ");
            int num_pages = s.nextInt();
            System.out.print ("enter the price of the book: ");
            double price = s.nextDouble();
        }
    }
}
```

```
System.out.println();  
b1[i].setdata(numPages, price, name,  
author);  
}  
s.close();  
}  
for (int i=0; i<n; i++)  
b1[i].getdata();  
s.close();  
}  
System.out.println("Data has been read");  
System.out.println("Original is intact");  
System.out.println("Changed");
```

S.S. (below)
Program prints user input directly
Program runs on windows
Windows 7
Baltic Sea
Latitude approx 52.5° N
S (0.0, 10.0, 0-100)
(0.0, 10.0, 0-100)
What are these?
What are these?
Information is given
Author: Andrew Thompson
Author: Andrew Thompson
Author: Andrew Thompson
Author: Andrew Thompson

Output:

```
cmd Command Prompt
Microsoft Windows [Version 10.0.19045.2251]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bmsce>cd C:\Users\bmsce\Desktop\1BM21CS017

C:\Users\bmsce\Desktop\1BM21CS017>javac Lab_3.java

C:\Users\bmsce\Desktop\1BM21CS017>java lab_2
2
enter the name of the book: enter the author's name: Ansh
enter the number of pages in the book: 345
enter the price of the book: 765

enter the name of the book: enter the author's name: Shuv
enter the number of pages in the book: 65
enter the price of the book: 654

Book details
name:
author: Ansh
number of pages: 345
price: 765.0

-----
Book details
name:
author: Shuv
number of pages: 65
price: 654.0

-----
C:\Users\bmsce\Desktop\1BM21CS017>
```

Lab Program 4:

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.

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LAB PROGRAM 4. abstract class and

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.

```
import java.util.Scanner;  
class Area {  
    public static void main(String[] args) {  
        int choice;  
        Scanner s = new Scanner(System.in);  
        System.out.println("1. Rectangle\n2. Triangle\n3. Circle");  
        choice = s.nextInt();  
        switch (choice) {  
            case 1:  
                Rectangle r1 = new Rectangle();  
                System.out.print("Enter the length and width of the  
                    Rectangle: ");  
                r1.x = s.nextInt();  
                r1.y = s.nextInt();  
                r1.printarea();  
            }  
        }  
    }  
}  
  
abstract class Shape {  
    int x, y;  
    double area;  
    abstract void printarea();  
}  
  
class Rectangle extends Shape {  
    void printarea()  
    {  
        area = x * y;  
        System.out.println("Area of the Rectangle is: " + area);  
    }  
}
```

Triangle
class Circle extends Shape {
 void printarea()
 {
 area = 0.5 * x * y;
 System.out.println("Area of the Triangle is: " + area);
 }
}

class Circle extends Shape {
 void printarea()
 {
 area = 3.1415 * x * x;
 System.out.println("Area of the Circle is: " + area);
 }
}

class Area {
 public static void main(String[] args) {
 int choice;
 Scanner s = new Scanner(System.in);
 System.out.println("1. Rectangle\n2. Triangle\n3. Circle");
 choice = s.nextInt();
 switch (choice) {
 case 1:
 Rectangle r1 = new Rectangle();
 System.out.print("Enter the length and width of the
 Rectangle: ");
 r1.x = s.nextInt();
 r1.y = s.nextInt();
 r1.printarea();
 }
 }
 }
}

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1. $y = s \cdot \text{nextInt}()$; input gsl
 1 - `printArea()`,
 break; at $y > g$ and a gsl
 so triangle stored with vertices both
 case 2: give b for a and c
 Triangle $t1 = \text{new Triangle}();$
 System.out.println("Enter the height and base of
 the triangle :");
 $t1.x = s.nextInt();$ $t1.y = s.nextInt();$
 $t1.printArea();$ \rightarrow a rectangle or
 break; last \rightarrow calculated area of triangle
 \rightarrow break; \rightarrow loop
 case 3:
 Circle $c1 = \text{new Circle}();$ \rightarrow a circle
 System.out.println("Enter the radius of the circle :");
 $c1.x = s.nextInt();$
 $c1.printArea();$ down at $t = c1$
 break; \rightarrow valid triangle \rightarrow $t = t1$
 all the valid values are stored
 default: System.out.println("Enter a valid input!");

Ques:
 1. three conditions and triangle, trapezoid
 2. \rightarrow if $t = t1$ then $t = t2$
 3. \rightarrow calculate the gsl
 triangle, trapezoid, trapezoid
 At the beginning there must be
 \rightarrow had occurred all of which
 it takes two pieces of writing from

Output:

```
Command Prompt
Microsoft Windows [Version 10.0.19045.2251]
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C:\Users\bmsce>cd C:\Users\bmsce\Desktop\cs014

C:\Users\bmsce\Desktop\cs014>javac Main.java

C:\Users\bmsce\Desktop\cs014>java Area

1:Rectangle
2:Triangle
3:Circle
1
Enter the length and width of the rectangle:
20
40
Area of the Rectangle is= 800.0

C:\Users\bmsce\Desktop\cs014>java Area

1:Rectangle
2:Triangle
3:Circle
2
Enter the height and base of the triangle:
10
20
Area of the Triangle is= 100.0

C:\Users\bmsce\Desktop\cs014>java Area

1:Rectangle
2:Triangle
3:Circle
3
Enter the radius of the Circle:
20
Area of the Circle is= 1256.600000000001

C:\Users\bmsce\Desktop\cs014>
```

Lab Program 5:

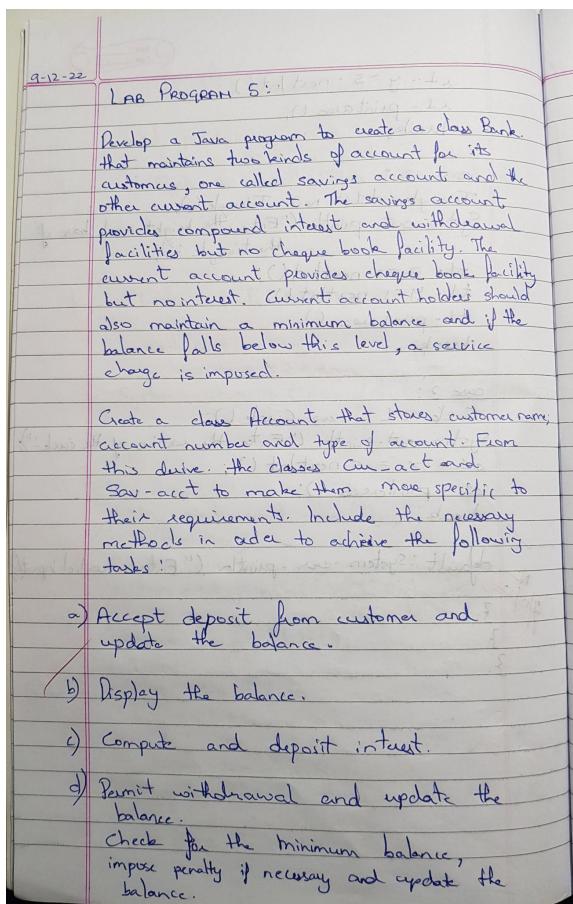
Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed.

Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

- a) Accept deposit from customer and update the balance.
- b) Display the balance.
- c) Compute and deposit interest
- d) Permit withdrawal and update the balance

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

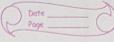
Code:



```

import java.util.Scanner;
class Account {
    String name;
    long accno;
    int type;
    long balance;
    void setA() {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter customer name:");
        name = s.nextLine();
        System.out.print("Enter account number:");
        accno = s.nextLong();
        System.out.print("Enter bank balance:");
        balance = s.nextDouble();
    }
    void display() {
        System.out.println("Customer name is :" + name);
        if (type == 1) {
            System.out.println("Customer account type is : Savings");
        } else {
            System.out.println("Customer account type is : Current");
        }
        System.out.println("Customer account number is " + accno);
        System.out.println("Current balance is :" + balance);
    }
}

```

<pre> void deposit() { System.out.print("Enter the amount to be deposited:"); Scanner s = new Scanner(System.in); double amt = s.nextDouble(); balance += amt; } class Sav-acct extends Account { double interest; Scanner s = new Scanner(System.in); Sav-acct() { type = 1; time = 5; float rate; System.out.print("Compound Interest details:"); System.out.print("Enter time in years:"); time = s.nextFloat(); System.out.println("Interest will be compounded 5 times a year"); interest = balance * (Math.pow((1+rate/10), (time))); balance += interest; } } </pre>	 <pre> void withdraw() { System.out.print("Enter the amount to be withdrawn:"); double amt = s.nextDouble(); if (balance > amt) balance -= amt; else System.out.print("Amount to be withdrawn is greater than balance!!!."); } class Curr-acct extends Account { double check_amnt; Curr-acct() { type = 2; } void cheque() { System.out.print("Enter the cheque amount:"); Scanner s = new Scanner(System.in); check_amnt = s.nextDouble(); if (check_amnt > balance - 500) System.out.println("Rs. 500 penalty imposed Is it ok to proceed? Enter y for yes and n for no"); String option = s.next(); if (option.equals("y")) balance -= check_amnt; else System.out.print("no check debited"); } } </pre>
---	---

else
 2. System.out.println ("Rupees " + check_amnt + " debited");
 balance -= check_amnt;
 3.
 void withdraws ()
 ? System.out.println ("Enter the amount to be
 withdrawn : ");
 Scanner s = new Scanner (System.in);
 double amt = s.nextDouble ();
 if (balance > amt)
 { balance -= amt; }
 else
 { System.out.println ("Amount to be withdrawn
 greater than balance!!"); }

3.
 class Bank {
 public static void main (String ss [])?
 String op1, op2;
 Scanner s = new Scanner (System.in);
 System.out.println ("1. savings or 2. current");
 int q;
 q = s.nextInt ();
 if (q == 1) {
 Sav-act s1 = new Sav-act ();
 whik (true) {
 System.out.print ("Enter the choice : ");
 1. Set the values for savings acc
 2. Display In 3. deposit In 4. interest
 In 5. withdraw In 6. exit In ");
 }

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```

op 1 = s.next();
switch (op1)
{
    case "1": s1.setA(); break;
    case "2": s1.display(); break;
    case "3": s1.deposit(); break;
    case "4": s1.cinterest(); break;
    case "5": s1.withdraw(); break;
    case "6": System.exit(0); break;
}
}

else if (q==2)
{
    curracct c1 = new curracct();
    while (true), 2
        system.out.print("Enter the choice : \n"
        1. set the values for current
        account \n 2. display \n
        3. deposit \n 4. transfer \n
        5. withdraw \n 6. exit \n");
}

op 2 = s.next();
switch (op2)
{
    case "1": c1.setA(); break;
    case "2": c1.display(); break;
}

```


Output:

1.Savings Account

```
jdt.ls-java-project\bin' 'Bank'
1. Savings or 2. Current?
1
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
1
Enter customer name: Sumukh
Enter account number: 344
Enter bank balance: 20000
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
4
Compound Interest details:
Enter time in years:
2
Enter rate of interest:
6
Interest will be compounded 5 times a year
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
2
Customer name is: Sumukh
Customer account type is: Savings
Customer account number is: 344
Current balance is: 22471.997573852605
```

```
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
3
Enter the amount to be deposited: 4000
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
2
Customer name is: Sumukh
Customer account type is: Savings
Customer account number is: 344
Current balance is: 26471.997573852605
```

```
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
5
Enter the amount to be withdrawn:
10000
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
2
Customer name is: Sumukh
Customer account type is: Savings
Customer account number is: 344
Current balance is: 16471.997573852605
Enter the choice:
1 .Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
```

2.Current Account

```
1. Savings or 2. Current?  
2  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
1  
Enter customer name: Aadi  
Enter account number: 234  
Enter bank balance: 100  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
4  
Enter the cheque amount: 1000  
Rs. 500 penalty imposed...Is it ok to proceed? Enter y for yes and n for no  
y  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
2  
Customer name is: Aadi  
Customer account type is: Current  
Customer account number is: 234  
Current balance is: -1400.0
```

```
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
2  
Customer name is: Aadi  
Customer account type is: Current  
Customer account number is: 234  
Current balance is: 100.0  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
4  
Enter the cheque amount: 1000  
Rs. 500 penalty imposed...Is it ok to proceed? Enter y for yes and n for no  
n  
no check debited  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
2  
Customer name is: Aadi  
Customer account type is: Current  
Customer account number is: 234  
Current balance is: 100.0
```

```
javac3.java:project/bin> Bank  
1. Savings or 2. Current?  
2  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
1  
Enter customer name: Aadi  
Enter account number: 234  
Enter bank balance: 8000  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
4  
Enter the cheque amount: 1000  
Rupees 1000.0 debited  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
2  
Customer name is: Aadi  
Customer account type is: Current  
Customer account number is: 234  
Current balance is: 7000.0
```

```
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
3  
Enter the amount to be deposited: 4000  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
2  
Customer name is: Aadi  
Customer account type is: Current  
Customer account number is: 234  
Current balance is: 11000.0
```

```
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
5  
Enter the amount to be withdrawn:  
6000  
Enter the choice:  
1.Set the values for current account  
2. display  
3. deposit  
4. transferCheck  
5. Withdraw  
6. exit  
2  
Customer name is: Aadi  
Customer account type is: Current  
Customer account number is: 234  
Current balance is: 5000.0
```

Lab Program 6:

Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge() when the input age<0. In Son class, implement a constructor that cases both father and son's age and throws an exception if son's age is >=father's age.

Code:

LAB Program 6

```
Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age < 0. In Son class, implement a constructor that cases both father and son's age and throws an exception if son's age is >= father's age.
```

```
import java.util.*;  
class WrongAgeException extends Exception {  
    String msg = new String();  
    WrongAgeException (String s) {  
        msg = s;  
    }  
    public String toString () {  
        return msg;  
    }  
}  
  
class Father {  
    int f-age;  
    Father () throws WrongAgeException {  
        Scanner s = new Scanner (System.in);  
        System.out.print ("Enter Father's age : ");  
        f-age = s.nextInt ();  
        if (f-age < 0) {  
            throw new WrongAgeException ("Age is less than zero");  
        }  
    }  
}
```

```
throws new WrongAgeException ("Father's age<0");  
3. I. statements. Take memory or store  
void display () {  
    int f-age;  
    System.out.println ("Father's age : "+f-age);  
}  
3. I. statements. Store memory or  
class Son extends Father {  
    int s-age;  
    Son () throws WrongAgeException {  
        Scanner s = new Scanner (System.in);  
        System.out.print ("Enter son's age : ");  
        s-age = s.nextInt ();  
        if (s-age < 0) {  
            throw new WrongAgeException ("Son's age<0");  
        }  
        else if (s-age > f-age) {  
            throw new WrongAgeException ("Son Age is > than  
                father's age!");  
        }  
    }  
    void display () {  
        System.out.print ("Father's age : "+f-age);  
        System.out.print ("Son's age : "+s-age);  
    }  
}
```


Output:

```
PS C:\Users\aadis> & 'C:\Users\aadis\AppData\Local\Programs\Eclipse Adoptium\jdk-17.0.5.8-hotspot\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:1424' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\aadis\AppData\Local\Temp\vscodesws_f298e\jdt_ws\jdt.ls-java-project\bin' 'Lab_6_java'
Enter father's age:
65
Father age: 65
Enter father's age:
65
Enter son's age:
32
Father age: 65
Son age: 32
PS C:\Users\aadis> & 'C:\Users\aadis\AppData\Local\Programs\Eclipse Adoptium\jdk-17.0.5.8-hotspot\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:1438' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\aadis\AppData\Local\Temp\vscodesws_f298e\jdt_ws\jdt.ls-java-project\bin' 'Lab_6_java'
Enter father's age:
-2
Father age < 0
PS C:\Users\aadis> & 'C:\Users\aadis\AppData\Local\Programs\Eclipse Adoptium\jdk-17.0.5.8-hotspot\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:1445' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\aadis\AppData\Local\Temp\vscodesws_f298e\jdt_ws\jdt.ls-java-project\bin' 'Lab_6_java'
Enter father's age:
34
Father age: 34
Enter father's age:
34
Enter son's age:
-2
Son age < 0
PS C:\Users\aadis> & 'C:\Users\aadis\AppData\Local\Programs\Eclipse Adoptium\jdk-17.0.5.8-hotspot\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:1452' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\aadis\AppData\Local\Temp\vscodesws_f298e\jdt_ws\jdt.ls-java-project\bin' 'Lab_6_java'
Enter father's age:
43
Father age: 43
Enter father's age:
43
Enter son's age:
45
Son age is > than father's age!
```

Lab Program 7:

Write a program which creates two threads, one thread displaying "BMS College of Engineering" once every ten seconds and another displaying "CSE" once every two seconds.

Code:

6-1-23

LAB - PROGRAM - 7

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 bms implements Runnable {
    Thread t1;
    bms () { }
    public void run () {
        try {
            for (int i = 0; i > 0; i++) {
                System.out.println ("BMS College of Engineering");
                Thread.sleep (10000);
            }
        } catch (InterruptedException e) {
            System.out.println ("BMS interrupted \n");
        }
    }
}

class cse implements Runnable {
    Thread t2;
    cse () { }
    public void run () {
        try {
            for (int i = 0; i > 0; i++) {
                System.out.println ("CSE");
                Thread.sleep (2000);
            }
        } catch (InterruptedException e) {
            System.out.println ("CSE interrupted \n");
        }
    }
}
```

try {
 for (int i = 0; i > 0; i++) {
 System.out.println ("CSE");
 Thread.sleep (2000);
 }
} catch (InterruptedException e) {
 System.out.println ("CSE interrupted \n");
}
System.out.println ("Exiting: " + t2);
}

class Lab-7.java {
 public static void main (String args) {
 bms obj1 = new bms ();
 cse obj2 = new cse ();
 obj1 .t1 .start ();
 obj2 .t2 .start ();
 }
}

Follows

Lab Program 8:

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class Internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

Code:

LAB - PROGRAM - 8

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.

Student.java file:

```
package CIE;
import java.util.*;
public class Student {
    Scanner sc = new Scanner(System.in);
    public String usn, name;
    public int sem;
    public void getData() {
        System.out.println("Enter USN, name and sem");
        usn = sc.nextLine();
        name = sc.nextLine();
        sem = sc.nextInt();
    }
}
```

Internal.java file:

```
name = sc.nextLine();
sem = sc.nextInt();
}
public void disp() {
    System.out.println("Name : " + name);
    System.out.println("USN : " + usn);
    System.out.println("SEM : " + sem);
}
}

Internal.java file.

package CIE;
import java.util.*;
public class Internal extends Student {
    Scanner sc = new Scanner(System.in);
    public int marks[5] = new int[5];
    public void getData() {
        super.getData();
        System.out.println("Enter 5 subject marks for see");
        for (int i = 0; i < 5; i++) {
            marks[i] = sc.nextInt();
        }
    }
    public void disp() {
        System.out.print("CIE marks : ");
        for (int i = 0; i < 5; i++) {
            System.out.print(marks[i] + " ");
        }
    }
}
```

```

        }
        System.out.print(marks[i] + " ");
    }
    System.out.println();
}

External.java file

package SEE;
import CIEinternal;
import java.util.*;
public class external extends internal

{
    Scanner sc = new Scanner(System.in)
    public int emarks[] = new int[5];
    public void getData()
    {
        super.getData();
        S.O.P ("Enter 5 subjects marks  
SEE");
        for (int i=0; i<5; i++)
            emarks[i] = sc.nextInt();
    }

    public void disp()
    {
        System.out.print("SEE marks:");
        for (int i=0; i<5; i++)
        {
            System.out.print(emarks[i] + " ");
        }
    }
}

```

Date _____
Page _____

```

S.O.P();
}

Exam.java file

import CIE.student;
import CIEinternal;
import SEE.external;
import java.util.*;
class exam
{
    public static void main (String args[])
    {
        Scanner sc = new Scanner (System.in);
        S.O.P ("Enter number of students");
        int n = sc.nextInt();
        int sum[] = new int [5];
        external e[] = new external [n];
        for (int i=0; i<n; i++)
        {
            e[i] = new external ();
            e[i].getData();
            S.O.P ("Final marks of student"
                    +(i+1)+": "+);
            for (int j=0; j<5; j++)
            {
                sum[i] = e[i].emarks[j]+sum[i];
            }
        }
    }
}

```

Suo·P (sum [i] + " ")

{
} S·o·P ();
{
}
}.

Output :

1
Enter Student 1 details.
Enter USN, name and SEM:

1BM24CS002

Aadishwar

3

Enter CIE marks of 5 subjects :

50

70

40

80

60

Enter SEE marks of 5 subjects:

35

60

76

45

35

Final marks of student in student in
CIE : 300.