VISVESVARAYA TECHNOLOGICAL UNIVERSITY
"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

OBJECT ORIENTED JAVA PROGRAMMING (21CS3PCOOJ)

Submitted by

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

B.M.S. COLLEGE OF ENGINEERING
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B. M. S. College of Engineering,

Department of Computer Science and Engineering

<u>CERTIFICATE</u>

This is to certify that the Lab work entitled "Object Oriented Java Programming (21CS3PCDOOJ)" carried out by **Sannidhi M (1BM21CS189),** 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 during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of Object Oriented Java Programming (21CS3PCOOJ) work prescribed for the said degree.

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PROGRAM 1

Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions.

CODE

```java
import java.util.*;

import java.lang.Math;

class prog1{

    public static void main (String[] args)

    {

        Scanner sc = new Scanner (System.in);

        System.out.println("Enter the values of a,b,c");

        float a = sc.nextFloat();

        float b = sc.nextFloat();

        float c = sc.nextFloat();

        float d = b*b-4*a*c;

        double r1, r2;

        if (a==0) {

            System.out.println("Not a quadratic equation");

            }

        else if (d==0){

            System.out.println("Roots are equal.");

            r1 = r2 = -b/(2*a);

            System.out.println ("Root 1 and Root 2 are:  "+r1);

        }

        else if (d>0){

            System.out.println ("Roots are real and distinct.");

            r1 = (-b + Math.sqrt(d))/(2*a);

            r2 = (-b - Math.sqrt(d))/(2*a);

            System.out.println ("Root 1: "+r1);

            System.out.println ("Root 2: " +r2);
```

```java
        }
    else {

        System.out.println ("Roots are imaginary");

        r1 = (-b/2*a);

        r2 = (Math.sqrt(-d))/(2*a);

        System.out.println ("Root 1: " +r1 + "+i" +r2);

        System.out.println ("Root 2: " +r1 + "-i" +r2);

        }

    }

}
```
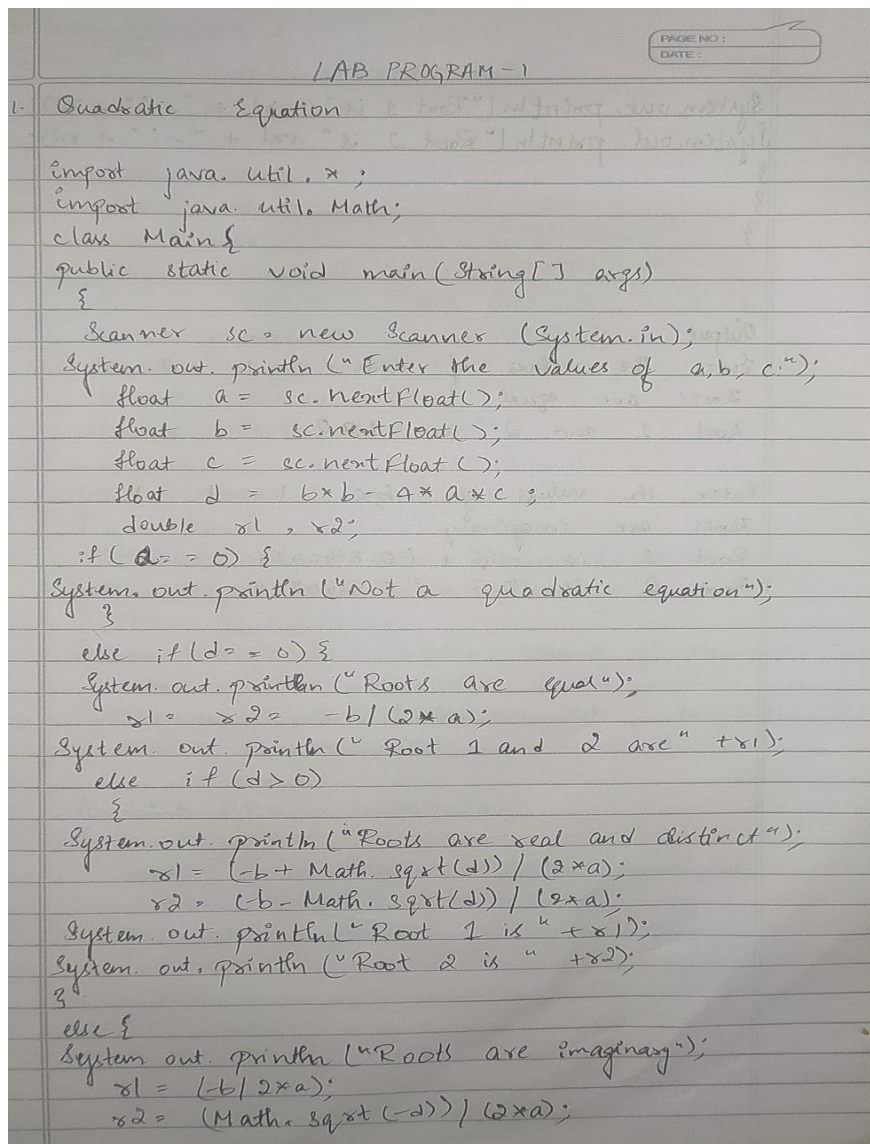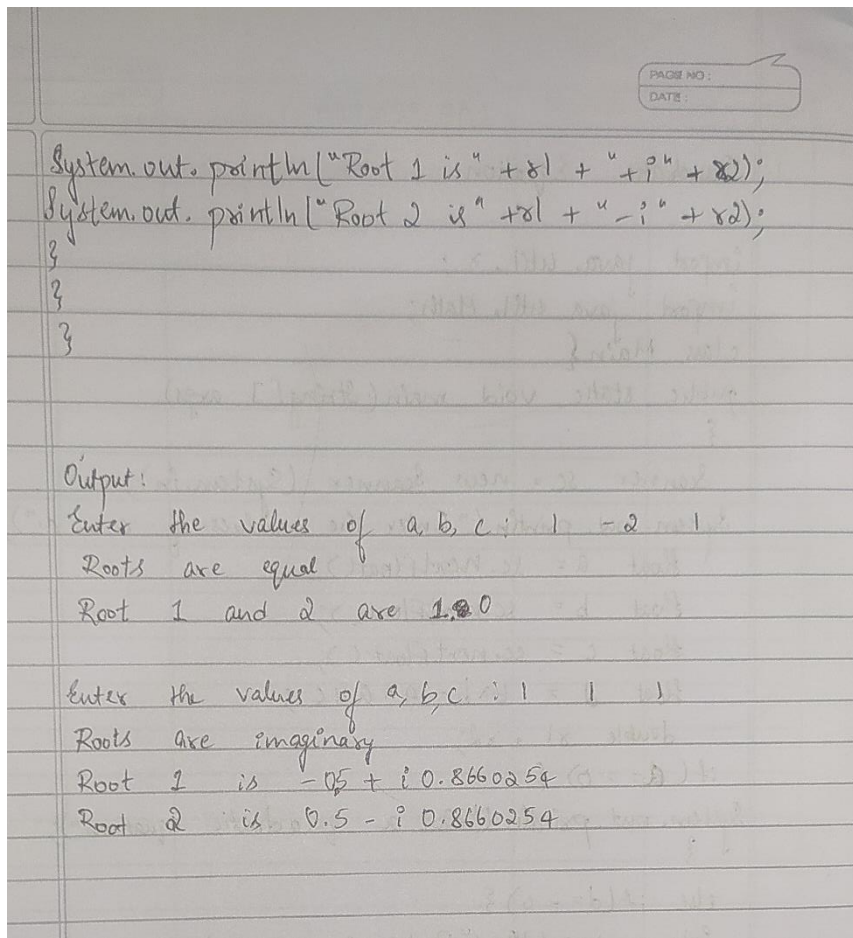
OBSERVATION

System.out.println("Root 1 is " + r1 + " +i " + x2));
System.out.println("Root 2 is " + r1 + " -i " + x2));
}
}
}

Output:
Enter the values of a, b, c : 1 -2 1
Roots are equal
Root 1 and 2 are 1.0

Enter the values of a, b, c : 1 1 1
Roots are imaginary
Root 1 is -05 + i 0.8660254
Root 2 is 0.5 - i 0.8660254

OUTPUT

```
C:\Users\Admin>cd Document
The system cannot find the path specified.

C:\Users\Admin>cd Documents

C:\Users\Admin\Documents>javac Main.java

C:\Users\Admin\Documents>java Main
Enter the values of a,b,c
1 3 4
Roots are imaginary
Root 1: -1.5+i1.3228756555322954
Root 2: -1.5-i1.3228756555322954

C:\Users\Admin\Documents>java Main
Enter the values of a,b,c
1 2 1
Roots are equal.
Root 1 and Root 2 are:  -1.0

C:\Users\Admin\Documents>java Main
Enter the values of a,b,c
1 -5 6
Roots are real and distinct.
Root 1: 3.0
Root 2: 2.0

C:\Users\Admin\Documents>
```

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

```java
import java.util.*;

class  Student{
    String USN;
    String name;
    int sub;
    int[] marks = new int[10];
    int[] credits = new int[10];
    int gradepoints[] = new int[10];
    double nume =0;
    double denom=0;
    double SGPA;
    void accept()
    {
        Scanner sc = new Scanner (System.in);
        System.out.println ("Enter USN of student: ");
        USN = sc.nextLine();
        System.out.println("Enter Name of the student: ");
        name = sc.nextLine();
        System.out.println("Enter number of subjects:");
        sub = sc.nextInt();
        for(int i=0; i<sub; i++)
        {
            System.out.println("Enter subject "+(i+1)+" marks: ");
            marks[i] = sc.nextInt();
            System.out.println("Enter subject "+(i+1)+" credits: ");
            credits[i] = sc.nextInt();
```

```java
        denom += credits[i];
      }
   }
  void calculate()
  {
    for(int i=0;i<sub;i++)
    {
      if(marks[i]>=90)
      gradepoints[i]=10;
      else if (marks[i]>= 80 && marks[i]<90)
      gradepoints[i]=9;
      else if (marks[i]>= 70 && marks[i]<80)
      gradepoints[i]=8;
      else if (marks[i]>= 60 && marks[i]<70)
      gradepoints[i]=7;
      else if (marks[i]>= 50 && marks[i]<60)
      gradepoints[i]=6;
      else if (marks[i]>= 40 && marks[i]<50)
      gradepoints[i]=5;
      else
      gradepoints[i]=0;
    nume += credits[i]*gradepoints[i]; }
SGPA = nume/denom;
  }
  void display()
  {
    System.out.println("The student details are:");
    System.out.println("Name:"+name);
    System.out.println("USN: "+USN);
    System.out.println("SGPA:"+SGPA);
  }
```

```
}
class prog2{
    public static void main (String args[]) {
        Student s = new Student();
        s.accept();
        s.calculate();
        s.display();
    }
}
```

OBSERVATION

LAB PROGRAM - 2.

Class Student, Calculate SGPA.

```
import java.util.*;
class Student {
    String USN;
    String name;
    int sub;
    int[] marks = new int[10];
    int[] credits = new int[10];
    int[] gradepoints = new int[10];
    double nume = 0;
    double denom = 0;
    double SGPA;

    void accept()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter USN of student: ");
        USN = sc.nextline();
        System.out.println("Enter Name of student: ");
        name = sc.nextline();
        System.out.println("Enter number of subjects: ");
        sub = sc.nextInt();

        for(int i=0; i<sub; i++)
        {
            Sop("Enter subject" + (i+1) + "marks:");
            marks[i] = sc.nextInt();
            Sop("Enter subject" + (i+1) + "credits: ");
            credits[i] = sc.nextInt();
            denom += credits[i];
        }
    }
}
```

```
void calculate()
{
  for(int i=0; i< sub; i++)
  {
    if(marks[i] >= 90)
        gradepoint[i] = 10;
  else if(marks[i] >= 80 && marks[i] < 90)
      gradepoints[i] = 9;
  else if(marks[i] >= 70 && marks[i] < 80)
      gradepoints[i] = 8;
  else if(marks[i] >= 60 && marks[i] < 70)
      gradepoints[i] = 7;
  else if(marks[i] >= 50 && marks[i] < 60)
      gradepoints[i] = 6;
  else if(marks[i] >= 40 && marks[i] < 50)
      gradepoints[i] = 5;
  else
          gradepoints[i] = 0;

    num += credit[i] * gradepoints[i];
    SGPA = num/denom;
  }
}

void display()
{
    Sop(" The student details are ");
    Sop(" Name : " + name);
    Sop(" USN : " + USN);
    Sop(" SGPA : " + SGPA);
  }
}
```

```
class Main
{
    p s vm (String args[])  {
        Student s = new Student();
        s. accept();
        s. calculate();
        s. display ();
    }
}
```

O/p.
Enter USN of Student:
21CS188
Enter Name of Student?
Ramya
Enter Number of Subjects:
3
Enter Subject 1 marks: 90
Enter Subject 1 Credits: 3
Enter Subject 2 marks: 89
Enter Subject 2 Credits: 3
Enter Subject 3 marks: 83
Enter Subject 3 Credits: 3
The Student details are:
Name: Ramya
USN: 21CS188
SGPA: 9.333

OUTPUT

```
Microsoft Windows [Version 10.0.22000.1219]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Sannidhi>cd C:\Users\Sannidhi\OneDrive\Desktop\JAVA

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>javac prog2.java

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>java prog2
Enter USN of student:
1BM21CS145
Enter Name of the student:
Swara
Enter number of subjects:
4
Enter subject 1 marks:
89
Enter subject 1 credits:
3
Enter subject 2 marks:
98
Enter subject 2 credits:
3
Enter subject 3 marks:
86
Enter subject 3 credits:
3
Enter subject 4 marks:
90
Enter subject 4 credits:
3
The student details are:
Name:Swara
USN: 1BM21CS145
SGPA:9.5

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>_
```

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

```java
import java.io.*;

import java.util.*;

class Book {

        String title, author;

        double price;

        int numPages;

         Book() {

                title="Default";

                author="Default";

                price=0.0;

                numPages=0;

        }

void setTitle(String t) {

        title=t; }

void setAuthor(String a) {

      author=a;}

void setPrice(double p) {

       price=p;}

void setPages(int np) {

    numPages=np;}

public String toString() {

        return title+"\t"+author+"\t"+price+"\t"+numPages+"\n";

        }

}
```

```java
class prog3 {
public static void main(String args[]) {
                String t, a;
                double p;
                int np,n;
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter the number of Books");
                n = sc.nextInt();
                Book b[]= new Book[n];
                for(int i=0; i<n;i++) {
                        System.out.println("Enter the Title of  the Books");
                        t= sc.next();
                        System.out.println("Enter the Author of  the Books");
                        a= sc.next();
                        System.out.println("Enter the Price of  the Books");

                        p= sc.nextDouble();
                        System.out.println("Enter the Number of pages of  the Books");
                        np= sc.nextInt();
                        b[i] = new Book();
                        b[i].setTitle(t);
                        b[i].setAuthor(a);
                        b[i].setPrice(p);
                        b[i].setPages(np);
                }
        System.out.println("Title \t Author \t Price \t Pages\n");
                for(int i=0; i<n;i++) {
                        System.out.println(b[i]);
                }
        }
}
```

OBSERVATION

```
class BookDetails {
public static voidmain (String args[]) {
    String t, a;
    double p;
    int np, n;
    Scanner sc = new Scanner (System.in);
    System.out.println ("Enter the number of Books");
    n = sc.nextInt();
    book b[] = new book[n];
    for (int i = 0; i < n; i++) {
        System.out.println ("Enter the Title of the Books");
        t = sc.next();
        Sop ("Enter the Author of the Book");
        a = sc.next();
        Sop ("Enter the Price of the Book");
        p = sc.nextDouble();
        Sop ("Enter the Number of Pages of the Book");
        np = sc.nextInt();

        b[i] = new book();
        b[i].setTitle(t);
        b[i].setAuthor(a);
        b[i].setPrice(p);
        b[i].setPages(np);
    }
    Sop ("Title \t Author \t Price \ Pages \n");
    for (int i=0; i<n; i++) {
        Sop(b[i]);
    }
}
}
```

```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Student\Desktop\CS178>javac Details.java

C:\Users\Student\Desktop\CS178>java Details
Enter the no of books:
2
Enter the title of the book:
abc
Enter the author of the book:
pqr
Enter the price of the book:
120
Enter the no of pages of the book:
300
Enter the title of the book:
lmn
Enter the author of the book:
def
Enter the price of the book:
200
Enter the no of pages of the book:
450
Title    Author   Price    Pages

abc       pqr     120.0    300

lmn       def     200.0    450
```

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.

CODE

```java
import java.util.Scanner;

abstract class Shape
{
    int a,b;
    abstract void printArea();
}

class Rectangle extends Shape
{
    void printArea()
    {
        int area;
```

```java
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the length and breadth of rectangle: ");
        a = s.nextInt();
        b = s.nextInt();
        area = a*b;
        System.out.println("\nArea of Rectangle: "+area+"\n");
    }
}
class Square extends Shape
{
    void printArea()
    {
        int area;
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the side of square: ");
        a = s.nextInt();
        area = a*a;
        System.out.println("\nArea of square: "+area+"\n");
    }
}
class Circle extends Shape{
  void printArea()
    {
        double area;
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the radius of circle: ");
        a = s.nextInt();
        area = Math.PI*a;
        System.out.println("Area of Circle: "+area+"\n");
    }
}
```

```java
public class prog4
{
    public static void main(String[] args)
    {
        int choice;
        Scanner s = new Scanner(System.in);
        do
        {
            System.out.println("1. Calculate Area of Rectangle\n2. Calculate Area of Square\n3. Calculate Area of " +
                "Circle\n4. Exit the Program\n\nEnter the choice: ");
            choice = s.nextInt();
            switch(choice)
            {
                case 1: Rectangle r = new Rectangle();
                    r.printArea();
                    break;
                case 2: Square sq = new Square();
                    sq.printArea();
                    break;
                case 3: Circle c = new Circle();
                    c.printArea();
                    break;
                case 4: System.out.println("Exiting the program!");
                    System.exit(0);
                    break;
                default: System.out.println("\nInvalid Choice!\n");
            }
        }while(true);
    }
}
```

OBSERVATION

```
LAB  PROGRAM  4.    (Area)


import. java.util. Scanner;
abstract  class  Shape
{
  int a,b;
abstract void printArea();
}
class  Rectangle  entends  Shape
{
void  printArea()
{
  int area;
Scanner  s = new  Scanner( System.in);
System.out.println(" Enter the  length and  breadth of
       rectangle");
      a= S.nextInt();
      b= s.nextInt();
      area = a * b;
  Sop (" \n Area of Rectangle: "+ area + "\n");
  }
}
class  Square  entends  Shape
{
void  printArea()
{
int area;
Scanner  s = new  Scanner (System.in);
Sop (" Enter the  side of  square:");
  a = s.nextInt();
  area = a * a;
  Sop ("\n Area of  Square: " + area + "\n");
  }
}
```

```java
class Circle extends Shape
{

    void printArea()
    {

        double area;
        Scanner s = new Scanner (System.in);
        Sop("Enter the radius of circle:");
        a = nextInt();
        area = Math.PI * a * a;
        Sop("Area of circle: " + area + "\n");
    }

}


public class area
{

    psvm (String[] args)
    {

        int choice;
        Scanner s = new Scanner (System.in);
        do
        {
            Sop(" 1. Calculate Area of Rectangle \n  2. Calculate Area
            of Square \n  3. Calculate Area of Circle \n  4. Exit the
            Program \n");
            Sop("\n Enter the choice:");
            choice = s.nextInt();
            switch (choice)
            {

                case 1: Rectangle r = new Rectangle();
                        r.printArea();
                        break;
                case 2: Square sq = new Square();
                        sq.printArea();
                        break;
```

```java
Case 3: Circle c = new Circle();
        c.printArea();
        break;
Case 4: Sopl(" Exiting the program!");
        System.exit(0);
        break;
default: Sop("\n Invalid Choice! \n");
        }
    } while (true);
    }
}
```

Output:
1. Calculate Area of Rectangle
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program.

Enter the choice:
1
Enter the length and breadth of rectangle:
5   6
Area of Rectangle: 30

1. Calculate Area of Rectangle
2 Calculate Area of Square
3. Calculate Area of Circle
4 Exit the Program.

Enter the choice:
4
Exiting the program!

OUTPUT

```
C:\Windows\System32\cmd.exe
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program

Enter the choice:
1
Enter the length and breadth of rectangle:
45
89

Area of Rectangle: 4005

1. Calculate Area of Rectangle
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program

Enter the choice:
3
Enter the radius of circle:
6
Area of Circle: 18.84955592153876

1. Calculate Area of Rectangle
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program

Enter the choice:
4
Exiting the program!

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>_
```

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 customer_name;
    long acc_no;
    float bal;
    Scanner s = new Scanner(System.in);
```

```java
  public void input()
    {
        System.out.print("\nEnter the Customer Name: ");
        customer_name = s.nextLine();
        System.out.print("\nEnter the Account Number: ");
        acc_no = s.nextLong();
        System.out.print("\nEnter the Starting Amount (Minimum Amount = 5000): ");
        bal = s.nextFloat();
        if(bal<5000f){
            System.out.println("\nAccount Balance cannot be less than 5000.0 \n");
            System.exit(0);
        }
    }
    public void display() {
        System.out.println("\nCustomer Name: "+customer_name);
        System.out.println("Account Number: "+acc_no);
        System.out.println("Amount: "+bal);
    }
}
class Savings extends Account
{
    Scanner s = new Scanner(System.in);
    float deposit,withdraw,interest;
    public void deposit()
    {
        System.out.print("\nEnter the amount to be deposited: ");
        deposit = s.nextFloat();
        bal+=deposit;
        System.out.println("\nBalance: "+bal);
    }
    public void withdraw()
    {
        System.out.print("\nEnter the amount to be withdrawn: ");
        withdraw = s.nextFloat();
        if( bal<5000 || bal<withdraw )
        {
            System.out.println("\nInsufficient Balance");
        }
        else
        {
            bal-=withdraw;
            System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance: "+bal);
        }
    }
    public void check_Bal(){
        if(bal<5000)
        {
```

```java
            System.out.println("\nInsufficient Balance!!\nBalance: "+bal);
        }
        else
        {
            System.out.println("\nBalance: "+bal);
        }
    }
    public void interest()
    {
        interest=(bal*6)/100;
        bal+=interest;
        System.out.println("\nInterest Credited: "+interest+"\nBalance :"+bal) ;
    }
}

class Current extends Account
{
    float deposit, withdraw, penalty;

    public void deposit()
    {
        System.out.print("\nEnter Amount to be deposited: ");
        deposit = s.nextFloat();
        bal += deposit;
        System.out.println("Balance: " + bal);
    }

    public void check_Bal()
    {
        if (bal < 5000)
        {
            penalty = (0.1f * bal);
            System.out.println("\nInitial Account Balance: "+bal);
            bal = bal-penalty;
            System.out.println("\nLow balance!\nPenalty Amount: " + penalty + "\nAccount
balance: " + bal);
        }
        else
        {
            System.out.println("\n Balance: " + bal);
        }
    }

    public void withdraw()
    {
        System.out.print("\nEnter Amount to withdraw: ");
        withdraw = s.nextFloat();
```

```java
        if(bal<5000)
        {
            check_Bal();
        }
        else if(bal<withdraw)
        {
            System.out.println("\nInsufficient Balance!!\nBalance: "+bal);

        }
        else
        {
            bal-=withdraw;
            System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance: "+bal);
        }
    }

    public void chequebook()
    {
        System.out.println("\nCheque Book has been Issued!");
    }
}

public class prog5
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        String ch;
        int n;
        Current c = new Current();
        Savings sa = new Savings();
        System.out.print("\nEnter the Account Type (S for Savings , C for Current) : ");
        ch = s.next();

        switch(ch.toLowerCase())
        {
            case "s" : sa.input();
                    do
                    {
                        System.out.print("\n1. Deposit \n2. Withdrawal \n3. Check Balance \n4.
Check Interest\n5. Show Account Details \n6. Exit Transaction\n\nEnter your choice: ");
                        n = s.nextInt();
                        switch(n)
                        { case 1 : sa.deposit();
                                break;
                            case 2 : sa.withdraw();
                                break;
```

```java
                case 3 : sa.check_Bal();
                        break;
                case 4 : sa.interest();
                        break;
                case 5 : sa.display();
                        break;
                case 6 : System.out.println("\nExiting Transaction!");
                        System.exit(0);
                        break;
                default : System.out.println("\nInvalid Operation");
             }
          }while(true);
    case "c" : c.input();
            do {
    System.out.print("\n1. Deposit \n2. Withdrawal \n3. Check Balance \n4. Issue Cheque
Book "\n5. Show Account Details \n6. Exit Transaction\n\nEnter your choice: ");
                n = s.nextInt();
                switch (n) {
                  case 1:
                     c.deposit();
                     break;
                  case 2:
                     c.withdraw();
                     break;
                  case 3:
                     c.check_Bal();
                     break;
                  case 4:
                     c.chequebook();
                     break;
                  case 5:
                     c.display();
                     break;
                  case 6:
                     System.out.println("\nExiting Transaction!");
                     System.exit(0);
                     break;
                  default:
                     System.out.println("\nInvalid Operation");
              }
           }while(true);
    default : System.out.println("\nInvalid Choice");
            break;
       }
    }
}
```

OBSERVATION

```
LAB - 5.
import java.util.Scanner;

class Account {
  String customer_name;
  long acc_no;
  float bal;
  Scanner s = new Scanner(System.in);
  public void input() {
    Sop(" Enter customer name: ");
    customer_name = s.nextLine();
    Sop(" Enter account number: ");
    acc_no = s.nextLong();
    Sop(" Enter starting amount (Minimum=500): ");
    bal = s.nextFloat();
    if (bal < 5000f) {
      Sop("Account balance can't be less than " + 5000.0f);
      System.exit(0);
    }
  }

  public void display() {
    Sop("\n Customer Name: " + customer_name);
    Sop(" Account Number: " + acc_no);
    Sop(" Amount: " + bal);
  }
}

class Savings extends Account {
  Scanner s = new Scanner(System.in);
  float deposit, withdraw, interest;
  public void deposit() {
    Sop("\n Enter amount to be deposited");
    deposit = s.nextFloat();
    bal += deposit;
```

```java
        Sop("\n Balance : " +bal);
    }

    public void withdraw() {
        Sop("\n Enter Amount to be withdrawn");
        withdraw = s.nextFloat();
        if(bal < 5000 || bal < withdraw {
            Sop("\n insufficient balance");
        }

        else {
            bal - = withdraw;
            Sop("\n Amount Withdrawn : " +withdraw +
            "\n Balance" +bal);
        }
    }

    public void check Bal() {
        if(bal < 5000) {
            Sop("\n insufficient balance!! \n Balance : "+bal)
        }

        else {
            Sop("\n Balance : " +bal);
        }
    }

    public void interest() {
        interest = (bal *6) /100;
        bal + = interest;
        Sop(" Interest credited : " +interest +
        "\n Balance : " +bal);
    }
}


class Current extends Account {
    float deposit, withdraw, penality;
    public void deposit() {
```

```java
Sop ("\n Enter Amount : ");
deposit = s. new Float();
bal + = deposit;
Sop ("Balance " + bal);
}

public void check_Bal () {
    if (bal < 5000) {
    penalty = 10.0f * bal);
    Sop ("\n Initial Balance : " + bal);
    bal - = penalty;
    Sop ("\n Penalty : " + penalty + "\n Account Balance"
    + bal);
    }

else {
    System. out. println ("\n Balance : " + bal);
    }
}

public void withdraw () {
    Sop ("\n Enter amount : ");
    withdraw = S. next Float();
    if (bal < 5000) {
        check_Bal ();
    }

    else if (bal < withdraw)
    { Sop ("\n insufficient Balance " + bal);
    }
}
public void chequebook ()
{
Sop ("\n Cheque Book has been Issued ");
}
}
```

```java
public class Bank
{
    public static void main (String [] args)
    {
        Scanner s = new Scanner (system.in);
        String ch;
        int n;
        Current c = new Current();
        Savings sa = new Savings();
        Sop("\nEnter the Account Type (S for Savings,
                        C for Current):");
        ch = s.next();
        Switch (ch.toLowerCase())
        {
        Case 's' : sa.input();
                do
                {
                    System.out.println("\n1. Deposit \n 2. Withdraw
    \n 3. Check Balance \n 4. Check Interest" \n 5. Show
    Account Details \n 6. Exit Transaction \n\n Enter
    your choice:");
                    n = s.nextInt();
                    switch (n)
                    {
                    Case 1; sa deposit();
                            break;
                    case 2: sa. withdraw();
                            break;
                    Case 3: sa. check_Bal();
                            break;
                    Case 4: sa. Interest();
                            break;
                    Case 5: sa. display();
```

```
                    break;
    Case 6: System.out.println("\n Exiting Transaction!");
                System.exit (0);
                break;
    default: Sop("\n Invalid Operation");
    }

} while (true);


Case "c": c.input();
        do {
        Sop ("\n 1. Deposit \n 2. Withdrawal \n 3. check
Balance \n 4. Issue Cheque Book" + "\n. Show
Account Details \n 6. Exit Transaction \n \n
Enter your choice: ");
            n = s.nextInt();
        switch (n) {
            Case 1:    c. deposit ();
                    break;
            Case 2: c. withdraw();
                    break;
            Case 3: c. check_Bal();
                    break;
            Case 4: c. chequebook ();
                    break;
            Case 5: c. display ();
                    break;
            Case 6: Sop(" Exiting Transaction!");
                    System. exit(0);
                    break;
            default: Sop ("\n Invalid operation ");
        }
    } while (true);
    default : Sop (" Invalid Choice");
            break;
    }
}
```

OUTPUT

```
Select C:\Windows\System32\cmd.exe - java prog5

Enter the Account Type (S for Savings , C for Current) : S

Enter the Customer Name: suresh

Enter the Account Number: 12378956

Enter the Starting Amount (Minimum Amount = 5000): 40000

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 2

Enter the amount to be withdrawn: 20000

Amount Withdrawn: 20000.0
Balance: 20000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 4

Interest Credited: 1200.0
Balance :21200.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
```

```
C:\Windows\System32\cmd.exe
Amount Withdrawn: 20000.0
Balance: 20000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 4

Interest Credited: 1200.0
Balance :21200.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 5

Customer Name: suresh
Account Number: 12378956
Amount: 21200.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction

Enter your choice: 6

Exiting Transaction!

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>
```

PROGRAM 6

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.

CODE

```java
import java.util.InputMismatchException;
import java.util.Scanner;
interface Z
{
    public int calc(int a,int b);
}

class Y implements Z
{
    public int calc(int a, int b)
    {
        int c = a/b;
        return c;
    }
}
public class prog6
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        Y o = new Y();
        int num1,num2;
        try
        {
            System.out.println("Enter the two numbers: ");
            num1 = s.nextInt();
            num2 = s.nextInt();
            int c = o.calc(num1,num2);
            System.out.println("Quotient: "+c);
        }
        catch(ArithmeticException | InputMismatchException e1)
        {
            System.out.println("Exception: "+e1);
        }
    }
}
```

OBSERVATION

```
LAB PROGRAM-6

import java.util. InputMismatchException;
import java.util. Scanner;

interface Z
{
    public int calc (int a, int b);
}

class Y implements Z
{
    public int calc (int a, int b);
    {
        int c = a/b;
        return c;
    }
}


public class prog6
{
    public static void main (String [ ] args)
    {
        Scanner s = new Scanner (System.in);
        Y p = new Y();
        int num1, num2;
        try
        {
        Sop ("Enter two numbers: ");
            num1 = s.nextInt();
            num2 = s.nextInt();
            int c = p.calc (num1, num2);
            Sop ("Quotient: " +c);
        }
```

```
catch (Arithmetic Exception | InputMismatchException e1)
{
    Sop (" Exception : "+e1);
}
}
}
```

Output.
Enter the two numbers:
4-5
0

Exception : java.lang.ArithmeticException: / by zero.

Enter the two numbers:
90.78
Exception: java.util.InputMismatchException.

OUTPUT

PROGRAM 7

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=father's age.

CODE

```java
import java.util.Scanner;

class WrongAge extends Exception
{
   public String getMessage()
   {
      return "Age Cannot Be Negative";
   }
}
class InvalidAge extends Exception
{
   public String getMessage()
   {
      return "Son's Age cannot be greater than Father's!";
   }
}
class Father
{
   Scanner s = new Scanner(System.in);
   int f;
   Father() throws WrongAge
   {
      System.out.print("Enter the Father's Age: ");
      f = s.nextInt();
      try
      {
      if(f<0)
         throw new WrongAge();
      }
      catch(WrongAge e1)
      {
         System.out.println(e1.getMessage());
         System.exit(0);
      }
   }
```

```java
}
class Son extends Father
{
   int son;
   Son() throws WrongAge,InvalidAge
   {
      super();
      System.out.print("Enter the Son's Age: ");
      son = s.nextInt();
      try
      {
      if(son<0)
         throw new WrongAge();
      }
      catch(WrongAge e2)
      {
         System.out.println(e2.getMessage());
      }
      try
      {
      if(son>f)
         throw new InvalidAge();
      }
      catch(InvalidAge e3)
      {
         System.out.println(e3.getMessage());
      }
   }
}

public class prog7
{
   public static void main(String[] args) throws WrongAge,InvalidAge
   {
      new Son();
   }
}
```

OBSERVATION

```java
LAB PROGRAM-1
import java.util. Scanner;
class WrongAge extends Exception
{
    public String getMessage()
    {
        return "Age Cannot Be Negative";
    }
}
Class InvalidAge extends Exception
{
    public String getMessage()
    {
        return "Son's Age Cannot be greater than Father";
    }
}


class Father
{
Scanner S= new Scanner(System.in);
int f;
father() throws WrongAge
{
    Sop("Enter the Father's Age:");
    f = S.nextInt();
    try
    {
        if(f<0)
            throw new WrongAge();
    }
    catch(WrongAge e1)
    {
        Sop(" e1. getMessage());
```

```java
            System.exit(0);
        }
    }
}

class Son extends Father
{
    int son;
    Son() throws WrongAge, InvalidAge
    {
        super();
        Sop("Enter Son's Age:");
        son = snextInt();
        try
        {
            if (son < 0)
                throw new WrongAge();
        }
        catch (WrongAge e2)
        {
            Sop(" e2.getMessage());
        }
        try
        {
            if(son > f)
                throw new InvalidAge();
        }
        catch (InvalidAge e3)
        {
            Sop(" e3.getMessage());
        }
    }
public class prog7
{
```

```
psvm( String [] args) throws WrongAge, InvalidAge
{
    new Son();
}
}
```

Output:
Enter Father's Age: 45
Enter Son's Age: 63
Son's Age cannot be greater than Father's!

Enter Father's Age: 34
Enter Son's Age: -24
Age Cannot Be Negative.

OUTPUT

```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>javac prog7.java

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>java prog7
Enter the Father's Age: 47
Enter the Son's Age: 78
Son's Age cannot be greater than Father's!

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>java   prog7
Enter the Father's Age: -67
Age Cannot Be Negative

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>java prog7
Enter the Father's Age: 56
Enter the Son's Age: -23
Age Cannot Be Negative

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>_
```

PROGRAM 8

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

```java
class Thread_1 extends Thread
{
   public void run()
   {
     int i = 0;
     while(i<100)
     {
        try
        {
          Thread.sleep(10000);
          System.out.println("BMSCE");
        }
        catch(Exception e)
        {
          System.out.println("Exception: "+e);
        }
        i++;
     }
   }
}

class Thread_2 extends Thread
{
   public void run()
   {
     int i = 0;
     while(i<100)
     {
        try
        {
          Thread.sleep(2000);
          System.out.println("CSE");
        }
        catch(Exception e)
        {
          System.out.println("Exception "+e);
        }
        i++;
     }
   }
}

public class prog8
{
   public static void main(String[] args)
   {
```

```
    Thread t1 = new Thread_1();
    Thread t2 = new Thread_2();
    t1.start();
    t2.start();
  }
}
```

OBSERVATION

```
LAB  PROGRAM- 8
cto import java.util.*;
class  Thread-1  extends  Thread
{
    public  void  run ()
    {
        int i = 0;
        while (i <100)
        {
        try
        {
          Thread. sleep(10000);
          System.out.println (" BMSCE");
        }
        Catch (Exception e)
        {
          System. out.println (" Exception : "+e);
        }
        i++;
        }
    }
}

class  Thread_2  extends  Thread
{
    public  void  run()
    {
        int i = 0;
        while (i < 100)
        {
        try
        { Thread. sleep(2000);
          System. out. println (" CSE").
        }
```

```
                catch (Exception e)
            {
                System.out.println(" Exception " +e);
            }
            i++;
        }
    }
}
public class prog8
{
    public static void main (String[] args)
    {
        Thread  t1 = new Thread_1();
        Thread  t2 = new Thread_2();
        t1. start();
        t2. start();
    }
}
```

Output
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE

OUTPUT

```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>javac prog8.java

C:\Users\Sannidhi\OneDrive\Desktop\JAVA>java prog8
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
```