VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT on

OBJECT ORIENTED JAVA PROGRAMMING

Submitted by

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

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B. M. S. College of Engineering,

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(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 **SANKETH GM(1BM21CS188),** 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 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of Object Oriented Java Programming Lab**- (21CS3PCOOJ)** work prescribed for the said degree.

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Index Sheet

Course Outcome

CO1	Apply the knowledge of Java concepts to find the solution for a given problem.	
CO2	Analyse the given Java application for correctness/functionalities.	
CO3	Develop Java programs / applications for a given requirement.	
CO4	Conduct practical experiments for demonstrating features of Java.	

LAB PROGRAM 1: QUADRATIC EQUATIONS

<u>CODE:</u>

```java
import java.util.Scanner; import
  java.lang.Math;
  public class Trial
  {
    public static void main(String[] args)
      {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the coefficients: ");
        float a = s.nextFloat(); float b = s.nextFloat();
        float c = s.nextFloat(); double r1,r2; float d =
        (b*b)-(4.0f*a*c); if(d>0)
        {
          r1=(-b+Math.sqrt(d))/(2*a); r2=(-b-
          Math.sqrt(d))/(2*a);
          System.out.println("Roots are Real");
          System.out.println("Root 1: "+r1+" Root 2: "+r2);
        }
        else if(d==0)
        {
          r1=(-b)/(2*a);
System.out.println("Roots are Equal");    System.out.println("Root is:
"+r1);
        }


else
        {
          double    e    =(-b)/(2.0f*a);    double    f
          =(Math.sqrt(-d))/(2*a);
          System.out.println("Roots          are
```

```java
			imaginary");
			System.out.println("Root 1: "+e+"i+"+f);
			System.out.println("Root 2: "+e+"i-"+f);
		}
	}
}
```

8) write a java program for Quadratic equation for displaying various ~~state~~ roots of the equation.

```java
import java.util.*;
import java.lang.Math;

class Main {
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("enter the values 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 eqn");
        }

        else if (d == 0) {
            System.out.println("Roots are equal");
            r1 = r2 = -b/(2*a);
            System.out.println("Root 1 and 2 are" + r1);
        }

        else if (d > 0) {
            System.out.println("Roots are real & distinct");
            r1 = (-b + Math.sqrt(d))/(2*a);
            r2 = (-b + Math.sqrt(d))/(2*a);
            System.out.println("Root 1 is" + r1);
            System.out.println("Root 2 is " + r2);
        }
    }
}
```

```java
else {
    System.out.println("Roots are imaginary");
    r1 = (-b/2*a);
    r2 = (Math.sqrt(-d))/(2*a);

    System.out.println("Root 1 is " + r1 + " + i" +
    System.out.println(" Root2 is " + r1 + "-i"
}
}
}
```

output:

Enter values of a,b,c

1

2

4

The roots are equal

$r_1 = r_2 = -2$

LAB PROGRAM 2: SGPA CALCULATION

<u>CODE</u>

import   java.util.Scanner;

 class Student

 {

        String USN; String name;

```java
int[] credits = new int[20];

int[] marks = new int[20];

void input(int n)

{

Scanner s = new Scanner(System.in);

System.out.print("Enter Student USN: ");

USN = s.nextLine();

System.out.print("Enter Student Name: "); name

= s.nextLine();

for(int i=0;i<n;i++)

{

System.out.print("Enter the Subject "+(i+1)+" marks and credits
respectively: ");  marks[i] =

s.nextInt(); credits[i]

= s.nextInt();

}

}

float calculate(int n)

{

int sum_of_credits = 0; float

result=0.0f;

for(int i=0;i<n;i++)
```

```c
        {
            sum_of_credits+=credits[i];

              if(calculate_grade_point(marks[i])==-1)

                    return -1.0f;

            else

            {

                    result = result +(float)
        (calculate_grade_point(marks[i])*credits[i]);

            }

        }

        return (result/sum_of_credits);
 }
        int calculate_grade_point(int marks)

        {
if(marks>=
90) return
10; else if
((marks>=
80)&&(ma
rks<90))
        return 9;

        else if ((marks>=70)&&(marks<80))

        return 8;

        else if ((marks>=60)&&(marks<70))

        return 7;
```

```java
        else if ((marks>=50)&&(marks<60))

        return 6;

        else if ((marks>=40)&&(marks<50))

        return 5;

        return -1;

        }


        void display(int n,float result)

        {

        System.out.println("\n");

        System.out.println("Student Details"); System.out.println();

        System.out.println("Student USN: "+USN);

        System.out.println("Student          Name:          "+name);

        System.out.println("Student Marks and Credits");

        for(int i=0;i<n;i++)

        {

        System.out.println("Subject 1 -->\tMarks: "+marks[i]+" Credits:
"+credits[i]);

        }

        System.out.println("SGPA: "+result);

        }

}
```

```java
public class Lab_02_SGPA
{

        public static void main(String[] args)

        {

        Scanner s = new Scanner(System.in);

        Student s1 = new Student();

        System.out.print("Enter the number of subjects: ");

        int n = s.nextInt();

        s1.input(n);

        float result = s1.calculate(n);  if(result
        == -1.0f)

        {

        System.out.println();

         System.out.println("The Student has failed in a subject. SGPA cannot
    be calculated!");

        System.exit(0);

        }
s1.display(n,result);

        }

    }
```

```
import java.util.*;
class Student {
        String usn;
        String name;
        int[] credits = new int[30];
        int[] marks = new int[30];

void input (int subjects) {

        Scanner sc = new Scanner( System.in);
     System.out.println("Enter the usn : ");
        this.usn = sc. nextline();
     System.out.println(" Enter the name of student");
     this.name = sc. nextline();

     System.out.println (" Enter the credits : ");
 for( int i=0 ;   i< subjects ; i++) {
        this. credits [i] = sc.nextInt();
     }

 System.out.println (" Enter the marks: ");
 for(int i=0 ;    i < subjects ; i++) {
        this. marks[i] = sc.nextInt();
     }
     }
}
```

```
float calcu...
    float    sum-of-credits = 0;
    float    SGPA;
    float    res = 0;
    for ( int i=0;  i < subjects ; i++) {
        sum-of-credits += credits[i];
    }

    for ( int i=0 ;  i < subjects ; i++) {
        res += (float) ( getcredits (marks[i]) *
                                credits [i]);
    }

    SGPA = (res) / (sum-of-credits);

    return SGPA;

}


int getcredits (int marks) {
    if (marks >= 90) {
        return 10;
    }
    else if (marks >= 80) {
        return 9;
    }
    else if ( marks >= 70) {
        return 8;
    }
    else if ( marks >= 60) {
        return 7;
    }
```

```java
        }
    else if (marks >= 40) {
        return 5;
    }
    else {
        return -1; }
    }

    void display (float result) {
        System.out.println("Student details \t");
        System.out.println("USN : . " + this.usn);
        System.out.println(" Name: " + this.name);

        System.out.println("The SenPA of Student is:"
                            + result);

    }
}

class Main {
    public static void main (String[] args) {
        Scanner sc = new Scanner(System.in);

        Student s1 = new student();
        System.out.println("Enter the no. of Sub ");
        int subjects = s.nextInt();

        s1.input(subjects);
        float result = s1.calculate(subjects);
        s1.display(result);
    }
}
```

output:

Enter the no. of subs: 3.
Enter   usn :   IBM21CS188
Enter   name: Santeeth G M
Enter   marks: 99   98   95
Enter   credits: 4   3   3

Student details
_____   _____

USN :   IBM21CS188
Name: Santeeth G M
The SGPA of student is 10.00

```
C:\Users\bmsce>javac BookDetails.java

C:\Users\bmsce>java BookDetails
Enter the number of Books
1
Enter the Title of  the Books
jesus
Enter the Author of  the Books
inshallah
Enter the Price of  the Books
200
Enter the Number of pages of  the Books
100
Title     Author            Price    Pages

jesus    inshallah         200.0    100
```

LAB PROGRAM 3: IMPLEMENTING ARRAY OF OBJECTS

CODE

```java
import   java.util.*; import
java.io.*;

class Book
{
String    title,author; float
price;
int num_pages;
Book()
{
title = "Default Value"; author
    =    "Default Value"; price
= 0.0f; num_pages = 0;
```

```java
    }

void setTitle(String title)
    { this.title=title;

    }

void setAuthor(String author)
    {

    this.author=author;

    }

void setPrice(float price)
    {

    this.price=price;

    }

void setPages(int num_pages)
    {

    this.num_pages = num_pages;

    }

 public String toString()
    {

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

    }
```

```java
    }

public class BookDetails
 {
  public static void main(String args[])
  {
   String   t, a;
   float p; int
   np,n;
   Scanner   s   =   new   Scanner(System.in);
   System.out.print("Enter the number of Books: ");
   n = s.nextInt(); Book[] b = new Book[n]; for(int
   i=0;i<n;i++)
   {
   System.out.println();
   System.out.print("Enter the book name: "); t
   = s.next();
   System.out.print("Enter the author name: "); a
   = s.next();
   System.out.print("Enter the book price: "); p
   = s.nextFloat();
   System.out.print("Enter the number of pages: "); np
   = s.nextInt();
```

```java
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\t Author \t\t Price \t\t Pages\n"); for(int

i=0; i<n;i++)

{

System.out.println(b[i]);

}

}

}
```

```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;
    }
}
```

```java
        return title + "\t" +
        price + "\t" + numpages + "\n";
    }
}

class BookDetails {
    public static void main (String args[]){
        String t, a;
        double p;
        int np, n;
        Scanner sc = new Scanner (System.in);
        System.out.println ("Enter no. 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 author ");
            a = sc.next();
            Sop (" Enter price");
            p = sc.nextDouble();
            Sop (" Enter no. of pages");
            np = sc.nextInt();
            b[i] = new book();
            b[i].setTitle(t);
            b[i].setAuthor(a);
            b[i].setPrice(p)        b[i].setpages(n
}
```

```
sop ("Title \t Author \t price \pages \n");
    for (int i=0; i<n; i++) {
        sop (b[i]);
    }
}
```

output:

Enter the no. of books : 2

Enter the title : The Alchemist
Enter Author : Paulo caelho.
Enter price : 100
Enter pages : 800

Enter the title ! We Dream of space.
Enter the author : Erin
Enter price : 800
Enter pages : 400

Title	Author	price	pages
The Alchemist	Paulo Caelho	100	800
We dream of Space	Erin	300	400.

```
C:\Users\bmscecse\Desktop>java SGPA
Enter the number of subjects: 5
Enter Student USN: 1BM21CS180
Enter Student Name: ABCXYZ
Enter the Subject 1 marks and credits respectively: 99 4
Enter the Subject 2 marks and credits respectively: 91 3
Enter the Subject 3 marks and credits respectively: 92 2
Enter the Subject 4 marks and credits respectively: 81 1
Enter the Subject 5 marks and credits respectively: 78 1


Student Details

Student USN: 1BM21CS180
Student Name: ABCXYZ
Student Marks and Credits
Subject 1 -->    Marks: 99 Credits: 4
Subject 1 -->    Marks: 91 Credits: 3
Subject 1 -->    Marks: 92 Credits: 2
Subject 1 -->    Marks: 81 Credits: 1
Subject 1 -->    Marks: 78 Credits: 1
SGPA: 9.727273
```

LAB PROGRAM 4: CALCULATING AREA OF SHAPES (ABSTRACT CLASS)

CODE

```java
import          java.util.Scanner;

public class Shape1
{

        public static void main(String args[])

        {

        int choice;

        Scanner s = new Scanner(System.in); do
```

```java
    {
        System.out.println("1. Calculate Area of Rectangle\n2. Calculate Area of Triangle\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: Triangle t =

                new Triangle();

                        t.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);

    }

}
```

```java
abstract class Shape
{

        int a,b;

        abstract void printArea();

}



class Rectangle extends 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;

        System.out.println("\nArea of Rectangle: "+area+"\n");

        }

}


class Triangle extends Shape
{


        void printArea()
```

```java
        {
        float area;

        Scanner s = new Scanner(System.in);

        System.out.println("Enter the base and height of triangle: ");

        a = s.nextInt(); b = s.nextInt();  area = 0.5f*a*b;

        System.out.println("\nArea of triangle: "+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");
        }
}
```

program-4 [shape]

```java
import java.util.*;
abstract class shape
{
    int a,b;
    abstract void printArea();
}
class Rectangle extends shape
{
    void printArea()
    {
        int area;
        Scanner sc= new Scanner(System.in);
        System.out.println(" Enter the length &
        breadth of rectangle : ");
        a = s.nextInt();
        b = s.nextInt();
        area = a*b;
        System.out.println(" \n Area of Rectangle:
                + area + " \n" );
    }
}

class Square extends shape
{
    Void print Area()
    {
        int area;
        Scanner sc = new Scanner (System.in);
```

```java
                                    square : ");
int     a = sc.nextInt();
        area = a * a;
System.out.println (" \n Area of square :" +
                                area + "\n");
        }
    }

class Circle extends shape
{
    void printArea()
    {
        double area;
        Scanner sc = new Scanner (System.in);
        System.out.println (" Enter the radius of
        circle : ");
        int a = sc.nextInt();
        area = Math.PI * a;
        System.out.println (" Area of Circle : "
           + area + "\n");
    }
}

public class LAB_04
{
    public static void main (String [] args)
    {
        int choice;
        Scanner sc = new Scanner (System.in);

    do
    {
        System.out.println (" 1. Calculate Area
    of Rectangle\n 2. Calculate Area of square \n
    3. Calculate area of circle \n 4) Exit \n \n
```

```java
Enter the choice : ");
        int choice = Sc. 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 (" \n IInvalid
           choice ( \n");
        }

} while (true);

}
```

O/P
1. Calculate area of Rectangle
2. Calculate area of square
3. Calculate area of circle.
4. Exit.

Enter choice: 1
Enter length & breadth of Rectangle:
3   4.
Area of Rectangle: 12

1. Calculate area of Rectangle
2. Calculate Area of Square
3. Calculate Area of circle.
4. Exit.

Enter choice: 2.
Enter side length of Square:
5

Area of Square: 25

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

Enter choice: 3.
Enter radius of circle:
10

Area of circle: 314.159265

O/P
16/12/22

```
C:\Users\student\Desktop>java AreaOfShapes
Menu
 1.Area of Rectangle
 2.Area of Traingle
 3.Area of Circle
Enter your choice : 1
Enter length and breadth for area of rectangle :
30 2
Area of Rectangle is 60.0

C:\Users\student\Desktop>java AreaOfShapes
Menu
 1.Area of Rectangle
 2.Area of Traingle
 3.Area of Circle
Enter your choice : 2
Enter bredth and height for area  of traingle :
15 35
Area of Triangle is 262.5

C:\Users\student\Desktop>java AreaOfShapes
Menu
 1.Area of Rectangle
 2.Area of Traingle
 3.Area of Circle
Enter your choice : 3
Enter radius for area of circle :
20
Area of Circle is 1257.1428
```

LAB PROGRAM 5: BANK PROGRAM

CODE

import java.util.Scanner; class
Account

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

```java
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)
        {
            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()
```

```java
    {
        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 boolean check_Bal_part_2()
    {
        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); return
            false;
        }
        return true;
    }
```

```java
    public void withdraw()
    {
        System.out.print("\nEnter Amount to withdraw:
        "); withdraw = s.nextFloat();
        if(check_Bal_part_2())
        {
            bal-=withdraw;
            System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance:
"+bal);
        }
    }


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


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();
```

```java
        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;  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"
```

```java
                        + "\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;
        }
    }
    }
```

program 5:-

```java
import java.util.Scanner;
class Account
{
    String customer-name;
    long acc-no;
    float bal;
    Scanner s = new Scanner(System.in);

    public void input()
    {
        System.out.print("\n Enter customer name:");
        customer-name = s.nextLine();
        sop("Enter account num: ");
        acc-no = s.nextlong();
        sop("Enter string amount (Minimum = 500)");
        bal = s.nextFloat();

        if(bal < 5000f){
            sop("Account balance can't be less than"+
                "5000.0");
            System.end(0);
        }
    }

    public void display() {
        Sop("\n Customer Name : "+ customer-nam);
        Sop("Account Number : "+ acc-no);
        Sop("Amount : "+ bal);
    }
}
```

```java
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;
    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);
    }
}
```

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

class current extends Account {
    float deposit, withdraw, penalty;
    public void deposit() {
        Sop(" \n Enter ammount ". ");
        deposit = S. new Float ();
        bal + = deposit;
        Sop(" Balance " + bal);
    }

    public void check_bal() {
        if (bal < 5000) {
            penalty = (0.1 * bal);
        }
    }

System.out.println(" \n 1. Deposit \n 2. Withdraw
    3. check balance \n Issue cheque book \n 5)
Account Details \n 6) Exit );

n = S. nextInt();


Switch(n) {

Case 1: c. deposit();
        break;

Case 2:  c. withdraw ();
        break;

Case 3:   c. check_bal ()
        break;
```

```java
case 4:    c.cheque-book();
            break;

case 5:    c.display();
            break;

case 6: System.out.println("\n Exiting !!");
        System.exit(0);
        break;

default:    System.out.println("\n Invalid Input");
}

}while(true);

default: System.out.println("\n Invalid choice");
            break;
        }

    }
}.
```

```
Exiting Transaction!

C:\Users\student\Desktop>java Bank.java

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

Enter the Customer Name: rashtri km

Enter the Account Number: 123456789

Enter the Starting Amount (Minimum Amount = 5000): 6000

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

Enter your choice: 1

Enter Amount to be deposited: 6000
Balance: 12000.0

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

Enter your choice: 2

Enter Amount to withdraw: 5000

Amount Withdrawn: 5000.0
Balance: 7000.0

1. Deposit
2. Withdrawal
3. Check Balance
4. Issue Cheque Book
5. Show Account Details
```

```
Insufficient Balance!!
Balance: 4500.0

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

Enter your choice: 4

Interest Credited: 270.0
Balance :4770.0

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

Enter your choice: 5

Customer Name: Rashtri km
Account Number: 12345678
Amount: 4770.0

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\student\Desktop>java Bank.java

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

Enter the Customer Name: rashtri km
```

```
Enter the amount to be deposited: 1000

Balance: 6500.0

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

Enter your choice: 2000

Invalid Operation

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: 2000

Amount Withdrawn: 2000.0
Balance: 4500.0

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

Enter your choice: 3

Insufficient Balance!!
Balance: 4500.0

1. Deposit
2. Withdrawal
```

```
C:\Users\student\Desktop>java Bank.java

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

Enter the Customer Name: Rashtri km

Enter the Account Number: 12345678

Enter the Starting Amount (Minimum Amount = 5000): 5500

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

Enter your choice: 1000

Invalid Operation

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

Enter your choice: 1

Enter the amount to be deposited: 1000

Balance: 6500.0

1. Deposit
2. Withdrawal
3. Check Balance
```

LAB PROGRAM 7: AGE EVALUATION - EXCEPTION HANDLING

CODE

```java
import java.util.Scanner;

public class Age
  {

        public static void main(String[] args) throws WrongAge,InvalidAge

        {

        new Son();

        }

  }


  class WrongAge extends Exception

  {

        public String getMessage()

        {

        return "Age Cannot Be Negative";

        }

  }

  class InvalidAge extends Exception

  {
```

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

    if(son>f)   throw   new
    InvalidAge();
    }
    catch(InvalidAge e3)
    {
```

```java
            System.out.println(e3.getMessage());

            System.exit(0);

        }


        System.out.println("Ages are appropriate");

    }

}
```

```java
    int son;
    son() throws WrongAge, InvalidAge {
        super();
        System.out.println("Enter Son's Age : ");
        Son = S.nextInt();

        try {
            if(son < 0) {
                throw new WrongAge();
            }
        }
        catch(WrongAge e2) {
            System.out.println(e2.getMessage());
        }
        try {
            if(son > 4) {
                throw new InvalidAge();
            }
        }
        catch(InvalidAge e3) {
            System.out.println("e3.getMessage());
        }
    }
}

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

O/P

Enter father's age: 56
Enter son's age: 69.

Son's Age can't be more than father's!

Enter father's Age: 23
Enter Son's Age: -10
Age cannot Be negative.

```
C:\Users\bmscecse\Desktop>javac Age.java

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: 40
Enter the Son's Age: 20
Ages are appropriate

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: 30
Enter the Son's Age: 50
Son's Age cannot be greater than Father's!

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: -1
Age Cannot Be Negative

C:\Users\bmscecse\Desktop>java Age.java
Enter the Father's Age: 50
Enter the Son's Age: -1
Age Cannot Be Negative
```

LAB PROGRAM 8: MULTI-THREADING

CODE

```java
class MyThread extends Thread
{
      long time;
      private volatile boolean running = true;
      MyThread(){
      System.out.println("Default");
}
MyThread(String name, long time)
{
      super(name); this.time
      = time;
}
public void pause()
{
      running = false;
}
public void run()
{ try
      {
            while(running)
            {
```

```java
                System.out.println(this.getName());

                Thread.sleep(time*1000);

            }

        }

        catch(InterruptedException ie)

        {

            System.out.println("Exception caught in method");

        }



    }
}


class ThreadRunner
{

    public static void main(String [] args)

    {

        MyThread mt1 = new MyThread("BMS",

        10); MyThread mt2 = new

        MyThread("CSE", 2); mt1.start();

        mt2.start();

        Try

        {

            Thread.sleep(20*1000);

            mt1.pause(); mt2.pause();

        }

        catch(InterruptedException ie)

        {
```

```java
            System.out.println("Exception caught in main");
        }
    }
}
```

```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
            } i++;
        }
    }
}
```

```
public class Thread {

    public static void main (String[] args).

    {   Thread t1 = new Thread-1();
        Thread t2 = new Thread-2();
        t1.start();
        t2.start();

    }
}
```

o/p
___

CSE
CSE
CSE
CSE

BMSCE

CSE
CSE
LSE
CSE

BMSCE

CSE
CSE
CSE
CSE

BMSCE

```
Microsoft Windows [Version 10.0.22621.1105]
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C:\Users\Acer\Desktop\Notes (2nd Year)\java practice
programs\OOJ Lab Programs\Threads>javac Threads.java

C:\Users\Acer\Desktop\Notes (2nd Year)\java practice
programs\OOJ Lab Programs\Threads>java Multithreading

CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
Exiting Thread 2
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
Exiting Thread 1
```

Lab program 6: Patient

```java
import java.util.*;

class Patient {
    Scanner sc = new (System.in);
    int pat_id[] = new int[30];
    String pat_name[] = new String[30];
    int pat_age[] = new int[30];
    String doc[] = new String[30];

    void input(int np) {
        for(int i=1; i<=np; i++) {
            System.out.println("Enter the details of "+i
                patients");
            System.out.println(" Enter patient id :");
            this.pat_id[i]= sc.nextInt();
            Syso("Enter name :");
            this.pat_name[i]= sc.next();
            Syso(" Enter age :");
            this.pat_age[i] = sc.nextInt();
            Syso(" Enter doctor name");
            this.doc[i]= sc.next();
        }
    }

    void display(int np) {
        for(int i=1; i<=np; i++) {
            Syso(" Details of patient"+i);
```

```java
            Syso(" patient name:" + this. pat_name[i]);
            Syso(" patient age : "+ this. pat_age [i]);
            syso(" treated doctor name :" + this. doc[i]);
            Syso( " ");

        }

    }

}

class Main1 {
    public static void Main ( String[] args) {
        Scanner sc = new Scanner ( System. in);
        patient p = new Patient ();

        Syso(" Enter no. of patients : ");
        int np = sc. nextInt ();
            p. input (np);
            p. display (np);

    }

}
```

O/P:
    Enter details of 1 patients.
    Enter patient id : 12
    Enter patient name : San
    Enter patient age : 19
    Enter doctor name : Sauk.