VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted by

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in partial fulfilment for the award of the degree of
BACHELOR OF ENGINEERING
in
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Bull Temple Road, Bengaluru 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)
Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "Object Oriented Java Programming (23CS3PCOOJ)" carried out by **Vikas P R (1WA23CS042),** who is bonafide student of **B.M.S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

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Program 1

Implement Quadratic Equation

Code:

```
import java.util.Scanner;

public class Quadratic {
   public static void main(String[] args) {
      int a;
      int b;
      int c;
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter 'a' value: ");
      a = sc.nextInt();
      System.out.print("Enter 'b' value: ");
      b = sc.nextInt();
      System.out.print("Enter 'c' value: ");
      c = sc.nextInt();
      float disc = ((b * b) - 4 * a * c);
      System.out.println(disc);
      if (a == 0) {
         System.out.println("Not Quadratic");
      } else {
         if (disc < 0) {
            System.out.println("No real roots ");
         } else if (disc > 0) {
            double root1 = (-b + Math.sqrt(disc)) / (2 * a);
            double root2 = (-b - Math.sqrt(disc)) / (2 * a);
            System.out.println("Real roots ");
            System.out.println("Root-1: " + root1);
            System.out.println("Root-2: " + root2);
         } else {
            double root1 = (-b) / (2 * a);
            System.out.println("Real and equal");
            System.out.println("Root-1: " + root1);
            System.out.println("Root-2: " + root1);
         }
         System.out.println("Vikas P R");
         System.out.println("1WA23CS042");
      }
   }
}
```

Output :
Enter 'a' value: 1
Enter 'b' value: -3
Enter 'c' value: 2
1.0
Real roots
Root-1: 2.0
Root-2: 1.0
Vikas P R
1WA23CS042

Program 2

SGPA Calculator

Code:

```
import java.util.Scanner;

class Student {
    private String name;
    private String usn;
    private double total_credit;
    private double[] marks;
    private Scanner sc = new Scanner(System.in);

    void getInfo() {
        System.out.print("Enter Name: ");
        name = sc.nextLine();

        System.out.print("Enter USN: ");
        usn = sc.nextLine();

        System.out.print("Enter Total Credits: ");
        total_credit = sc.nextDouble();
        sc.nextLine();
    }

    double grade(double mark) {
        if (mark <= 39) {
            return 0;
        } else if (mark >= 40 && mark <= 49) {
            return 4;
        } else if (mark >= 50 && mark <= 54) {
            return 5;
        } else if (mark >= 55 && mark <= 59) {
            return 6;
        } else if (mark >= 60 && mark <= 69) {
            return 7;
```

```
        } else if (mark >= 70 && mark <= 79) {
            return 8;
        } else if (mark >= 80 && mark <= 89) {
            return 9;
        } else {
            return 10;
        }
    }

    void getMarks() {
        marks = new double[8];
        for (int i = 0; i < 8; i++) {
            System.out.println("Enter the marks for subject " + (i + 1) + ": ");
            double mark = sc.nextDouble();

            System.out.println("Enter the credit for subject " + (i + 1) + ": ");
            double credit = sc.nextDouble();

            double grade = grade(mark);
            marks[i] = grade * credit;
        }
        sc.nextLine();
    }

    void calSgpa() {
        double totalMarks = 0;
        for (int i = 0; i < 8; i++) {
            totalMarks += marks[i];
        }
        System.out.println("Name: " + name);
        System.out.println("USN: " + usn);
        System.out.println("SGPA: " + (totalMarks / total_credit));
    }
}

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

```
            Student s1 = new Student();

            s1.getInfo();
            s1.getMarks();
            s1.calSgpa();

            System.out.println("Do you want to calculate SGPA for another student?
(yes/no): ");
            String check = sc.nextLine();
            if (check.equalsIgnoreCase("yes")) {
                continue;
            } else {
                cond = false;
            }
        }
        System.out.println("Vikas P R");
        System.out.println("1WA23CS042");
        sc.close();
    }
}
```

OUTPUT:

```
Enter Name: Vikas P R
Enter USN: 1WA23CS042
Enter Total Credits: 24
Enter the marks for subject 1: 85
Enter the credit for subject 1: 3
Enter the marks for subject 2: 72
Enter the credit for subject 2: 3
Enter the marks for subject 3: 60
Enter the credit for subject 3: 4
Enter the marks for subject 4: 55
Enter the credit for subject 4: 3
Enter the marks for subject 5: 49
Enter the credit for subject 5: 3
Enter the marks for subject 6: 34
Enter the credit for subject 6: 2
Enter the marks for subject 7: 78
Enter the credit for subject 7: 4
Enter the marks for subject 8: 90
```

Enter the credit for subject 8: 2
Name: Vikas P R
USN: 1WA23CS042
SGPA: 6.71
Do you want to calculate SGPA for another student? (yes/no): no
Vikas P R
1WA23CS042

Program 3

Method overriding

Code:

```
import java.util.Scanner;

class Book {
    public String book_name;
    public String author_name;
    public int price;
    public int num_pages;

    Book(String book_name, String author_name, int price, int num_pages) {
        this.book_name = book_name;
        this.author_name = author_name;
        this.price = price;
        this.num_pages = num_pages;
    }
    @Override
    public String toString() {
        String name, author, price, numPages;
        name = "Book Name: " + this.book_name + "\n";
        author = "Author Name: " + this.author_name + "\n";
        price = "Price: " + this.price + "\n";
        numPages = "Number of Pages: " + this.num_pages + "\n";
        return name + author + price + numPages;
    }
}
public class Ride {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Number of books: ");
        int count = sc.nextInt();
        sc.nextLine();
        Book[] arr = new Book[count];
        for (int i = 0; i < count; i++) {
            System.out.print("Enter book " + (i + 1) + " name: ");
            String name = sc.nextLine();
```

```
            System.out.print("Enter author " + (i + 1) + " name: ");
            String author = sc.nextLine();
            System.out.print("Enter book " + (i + 1) + " price: ");
            int price = sc.nextInt();
            System.out.print("Enter book " + (i + 1) + " pages: ");
            int pages = sc.nextInt();
            sc.nextLine();
            arr[i] = new Book(name, author, price, pages);
            System.out.println(arr[i]);
        }

        sc.close();

        System.out.println("Vikas P R");
        System.out.println("1WA23CS042");
    }
}
```

OUTPUT:

```
Number of books: 2
Enter book 1 name: Java Programming
Enter author 1 name: John Doe
Enter book 1 price: 500
Enter book 1 pages: 300
Book Name: Java Programming
Author Name: John Doe
Price: 500
Number of Pages: 300

Enter book 2 name: Data Structures
Enter author 2 name: Jane Smith
Enter book 2 price: 400
Enter book 2 pages: 250
Book Name: Data Structures
Author Name: Jane Smith
Price: 400
Number of Pages: 250

Vikas P R
1WA23CS042
```

Program 4

Abstract Classes

Code:

```
import java.util.Scanner;

abstract class Shape {
   double dim1;
   double dim2;

   abstract void printarea();
}

class Rectangle extends Shape {
   Rectangle(double d1, double d2) {
      this.dim1 = d1;
      this.dim2 = d2;
   }

   @Override
   void printarea() {
      double area = dim1 * dim2;
      System.out.println("Area of Rectangle: " + area);
   }
}

class Triangle extends Shape {
   Triangle(double base, double height) {
      this.dim1 = base;
      this.dim2 = height;
   }

   @Override
   void printarea() {
      double area = 0.5 * dim1 * dim2;
      System.out.println("Area of Triangle: " + area);
   }
}
```

```
class Circle extends Shape {
    Circle(double radius) {
        this.dim1 = radius;
    }

    @Override
    void printarea() {
        double area = 3.14 * dim1 * dim1;
        System.out.println("Area of Circle: " + area);
    }
}

public class Area {
    public static void main(String[] args) {
        try (Scanner sc = new Scanner(System.in)) {
            System.out.println("Enter length and breadth of Rectangle:");
            double rl = sc.nextDouble();
            double rb = sc.nextDouble();
            Rectangle r1 = new Rectangle(rl, rb);
            r1.printarea();

            System.out.println("Enter base and height of Triangle:");
            double base = sc.nextDouble();
            double height = sc.nextDouble();
            Triangle t1 = new Triangle(base, height);
            t1.printarea();

            System.out.println("Enter the Radius:");
            double radius = sc.nextDouble();
            Circle c1 = new Circle(radius);
            c1.printarea();
        }

        System.out.println("Vikas P R");
        System.out.println("1WA23CS042");
    }
}
```

OUTPUT:

Enter length and breadth of Rectangle:
5 3
Area of Rectangle: 15.0
Enter base and height of Triangle:
4 6
Area of Triangle: 12.0
Enter the Radius:
7
Area of Circle: 153.86
Vikas P R
1WA23CS042

Program 5

Bank Account

Code:

```
import java.util.Scanner;

class Account {
   Scanner sc = new Scanner(System.in);

   String name = "Vikas P R";
   int money;
   String type;
   int accno;

   Account(String acctype, int accno) {
      this.type = acctype;
      this.money = 0;
      this.accno = accno;
   }

   void accdetail() {
      System.out.println("Account Holder Name: " + name);
      System.out.println("Account No: " + accno);
      System.out.println("Balance: " + money);
      System.out.println("Account Type: " + this.type);
   }

   void deposit() {
      int mon;
      System.out.println(accno);
      System.out.println(type);
      System.out.println("Enter the Amount: ");
      mon = sc.nextInt();
      money += mon;
      System.out.println("Balance: " + money);
   }

   void withdraw() {
```

```
        System.out.println(this.accno);
        System.out.println(type);
        int mon;
        System.out.println("Enter the Amount: ");
        mon = sc.nextInt();
        money -= mon;
        System.out.println("Balance: " + money);
        if ((money <= 100) && this.type.equals("current_account")) {
            System.out.println("Minimum balance is 100");
            System.out.println("Deposit money now and pay the fine of 50");
        }
    }

    void cal_intrest() {
        if (this.type.equals("saving_account")) {
            System.out.println(this.type);
            double temp = this.money;
            double intrest = (temp) * 0.5 + temp;
            System.out.println("The interest: " + intrest);
        } else {
            System.out.println("Not a saving account");
        }
    }
}

public class Sys {
    public static void main(String[] args) {
        Account c1 = new Account("saving_account", 1);
        Account c2 = new Account("current_account", 2);

        while (true) {
            Scanner sc = new Scanner(System.in);

            int choice;
            System.out.println("Enter the choice:\n1.Deposit\n2.Withdraw\n3.Compute
interest\n4.Display acc details\n5.Exit");
            choice = sc.nextInt();
            if (choice == 1) {
                c1.deposit();
                c2.deposit();
```

```
            }

            if (choice == 2) {
                c1.withdraw();
                c2.withdraw();
            }

            if (choice == 3) {
                c1.cal_intrest();
                c2.cal_intrest();
            }

            if (choice == 4) {
                c1.accdetail();
                c2.accdetail();
            }

            if (choice == 5) {
                break;
            }
        }

        System.out.println("Vikas P R");
        System.out.println("1WA23CS042");
    }
}
```

OUTPUT:

```
Enter the choice:
1.Deposit
2.Withdraw
3.Compute interest
4.Display acc details
5.Exit
1
1
saving_account
Enter the Amount:
1000
```

Balance: 1000
2
current_account
Enter the Amount:
500
Balance: 500
Enter the choice:
1.Deposit
2.Withdraw
3.Compute interest
4.Display acc details
5.Exit
3
saving_account
The interest: 1500.0
Not a saving account
Enter the choice:
1.Deposit
2.Withdraw
3.Compute interest
4.Display acc details
5.Exit
4
Account Holder Name: Vikas P R
Account No: 1
Balance: 1000
Account Type: saving_account
Account Holder Name: Vikas P R
Account No: 2
Balance: 500
Account Type: current_account
Enter the choice:
1.Deposit
2.Withdraw
3.Compute interest
4.Display acc details
5.Exit
5
Vikas P R
1WA23CS042

Program 6

Packages

Code:

```
package CIE;
import java.util.Scanner;
public class Internals extends Student {

    int[] cieMarks = new int[5];

    public void inputCIEMarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter CIE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + ": ");
            cieMarks[i] = s.nextInt();
        }
    }

    public int[] getCieMarks() {
        return cieMarks;
    }
}
```

```
package CIE;

import java.util.Scanner;

public class Student {
    protected String usn;
    protected String name;
    protected int sem;

    public void inputStudentDetails() {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter USN: ");
        usn = s.nextLine();
        System.out.print("Enter Name: ");
        name = s.nextLine();
```

```
        System.out.print("Enter Semester: ");
        sem = s.nextInt();
    }

    public void displayStudentDetails() {
        System.out.println("USN: " + usn);
        System.out.println("Name: " + name);
        System.out.println("Semester: " + sem);
    }
}

package SEE;

import CIE.Student;
import java.util.Scanner;

public class External extends Student {
    int[] seeMarks = new int[5];

    public void inputSEEMarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter SEE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + ": ");
            seeMarks[i] = s.nextInt();
        }
    }

    public int[] getSeeMarks() {
        return seeMarks;
    }
}


import CIE.Internals;
import SEE.External;
import java.util.Scanner;

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

```
Scanner sc = new Scanner(System.in);

System.out.print("Enter the number of students: ");
int numStudents = sc.nextInt();
sc.nextLine();

Internals[] cieStudents = new Internals[numStudents];
External[] seeStudents = new External[numStudents];

for (int i = 0; i < numStudents; i++) {
   System.out.println("\nEnter details for student " + (i + 1) + ":");

   cieStudents[i] = new Internals();
   cieStudents[i].inputStudentDetails();
   cieStudents[i].inputCIEMarks();

   seeStudents[i] = new External();
   seeStudents[i].inputSEEMarks();
}

System.out.println("\nFinal marks for each student:");
for (int i = 0; i < numStudents; i++) {
   System.out.println("\nDetails for student " + (i + 1) + ":");
   cieStudents[i].displayStudentDetails();

   int[] cieMarks = cieStudents[i].getCieMarks();
   int[] seeMarks = seeStudents[i].getSeeMarks();
   int[] finalMarks = new int[5];

   System.out.println("Final marks in each subject:");
   for (int j = 0; j < 5; j++) {
      finalMarks[j] = cieMarks[j] + seeMarks[j];
      System.out.println("Subject " + (j + 1) + ": " + finalMarks[j]);
   }
}

sc.close();

System.out.println("Vikas P R");
System.out.println("1WA23CS042");
```

```
    }
}
```

OUTPUT:

```
Enter the number of students: 1

Enter details for student 1:
Enter USN: 1WA23CS042
Enter Name: Vikas P R
Enter Semester: 5
Enter CIE marks for 5 subjects:
Subject 1: 85
Subject 2: 75
Subject 3: 65
Subject 4: 70
Subject 5: 80
Enter SEE marks for 5 subjects:
Subject 1: 70
Subject 2: 80
Subject 3: 60
Subject 4: 85
Subject 5: 75

Final marks for each student:

Details for student 1:
USN: 1WA23CS042
Name: Vikas P R
Semester: 5
Final marks in each subject:
Subject 1: 155
Subject 2: 155
Subject 3: 125
Subject 4: 155
Subject 5: 155

Vikas P R
1WA23CS042
```

Program 7

Exception handling

Code:

```
import java.util.Scanner;

class WrongAge extends Exception {

    public WrongAge() {
        super("Age Error");
    }

    public WrongAge(String message) {
        super(message);
    }
}

class Father {
    protected int fatherAge;

    public Father() throws WrongAge {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Father's Age: ");
        fatherAge = s.nextInt();
        if (fatherAge < 0) {
            throw new WrongAge("Age cannot be negative");
        }
    }

    public void display() {
        System.out.println("Father's Age: " + fatherAge);
    }
}

class Son extends Father {
    private int sonAge;

    public Son() throws WrongAge {
        super();
```

```
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Son's Age: ");
        sonAge = s.nextInt();
        if (sonAge < 0) {
            throw new WrongAge("Age cannot be negative");
        } else if (sonAge >= fatherAge) {
            throw new WrongAge("Son's age cannot be greater than or equal to Father's
age");
        }
    }

    @Override
    public void display() {
        super.display();
        System.out.println("Son's Age: " + sonAge);
    }
}

public class Main {
    public static void main(String[] args) {
        try {
            Son son = new Son();
            son.display();
        } catch (WrongAge e) {
            System.out.println("Exception Caught: " + e.getMessage());
        }

        System.out.println("Vikas P R");
        System.out.println("1WA23CS042");
    }
}
```

OUTPUT:

```
Enter Father's Age: 40
Enter Son's Age: 30
Father's Age: 40
Son's Age: 30

Vikas P R
1WA23CS042
```

Program 8

Threads

Code:

```
class DisplayBMS extends Thread {
    public void run() {
        while (true) {
            try {
                System.out.println("BMS College of Engineering");
                Thread.sleep(10000);  // Sleep for 10 seconds (10000 milliseconds)
            } catch (InterruptedException e) {
                System.out.println(e);
            }
        }
    }
}

class DisplayCSE extends Thread {
    public void run() {
        while (true) {
            try {
                System.out.println("CSE");
                Thread.sleep(2000);  // Sleep for 2 seconds (2000 milliseconds)
            } catch (InterruptedException e) {
                System.out.println(e);
            }
        }
    }
}

public class Main {
    public static void main(String[] args) {
        DisplayBMS bmsThread = new DisplayBMS();
        DisplayCSE cseThread = new DisplayCSE();

        // Start both threads
        bmsThread.start();
        cseThread.start();
    }
```

```
}
```

OUTPUT:

```
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
BMS College of Engineering
```

Program 9

Calculator

Code:

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

class SwingDemo {
   SwingDemo() {
      JFrame jfrm = new JFrame("Divider App");
      jfrm.setSize(275, 150);
      jfrm.setLayout(new FlowLayout());
      jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

      JLabel jlab = new JLabel("Enter the divisor and dividend:");
      JLabel jlab1 = new JLabel("USN:1BM23CS110 Name:Hemanth Kumar R");
      JTextField ajtf = new JTextField(8);
      JTextField bjtf = new JTextField(8);
      JButton button = new JButton("Calculate");
      JLabel err = new JLabel();
      JLabel alab = new JLabel();
      JLabel blab = new JLabel();
      JLabel anslab = new JLabel();

      jfrm.add(err);
      jfrm.add(jlab);
      jfrm.add(jlab1);
      jfrm.add(ajtf);
      jfrm.add(bjtf);
      jfrm.add(button);
      jfrm.add(alab);
      jfrm.add(blab);
      jfrm.add(anslab);
```

```
    ActionListener l = new ActionListener() {
       public void actionPerformed(ActionEvent evt) {
          System.out.println("Action event from a text field");
       }
    };

    ajtf.addActionListener(l);
    bjtf.addActionListener(l);

    button.addActionListener(new ActionListener() {
       public void actionPerformed(ActionEvent evt) {
          try {
             int a = Integer.parseInt(ajtf.getText());
             int b = Integer.parseInt(bjtf.getText());
             int ans = a / b;

             alab.setText("A = " + a);
             blab.setText("B = " + b);
             anslab.setText("Ans = " + ans);
             err.setText("");
          } catch (NumberFormatException e) {
             alab.setText("");
             blab.setText("");
             anslab.setText("");
             err.setText("Enter Only Integers!");
          } catch (ArithmeticException e) {
             alab.setText("");
             blab.setText("");
             anslab.setText("");
             err.setText("B should be NON zero!");
          }
       }
    });

    jfrm.setVisible(true);
  }

  public static void main(String args[]) {
    SwingUtilities.invokeLater(new Runnable() {
```

```
            public void run() {
                new SwingDemo();
            }
        });
    }
}
```