

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT on

Object Oriented Java Programming

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
(Autonomous Institution under VTU)
BENGALURU-560019
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B. M. S. College of Engineering,
Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)
Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “**Object Oriented Java Programming**” carried out by **SAMRITH SANJOO.S(1BM21CS185)**, 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 Data structures Lab - **(21CS3PCOOJ)** work prescribed for the said degree.

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,

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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.

PROGRAM 1

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

QUADRATIC EQUATION.

```
Java.util.Scanner;  
  
public  
class QuadraticEquation {  
    public static void main (String[] strings) {  
        Scanner sc = new Scanner (System.in)  
        System.out.println (" Enter the Value of a");  
        int a = sc.nextInt();  
        System.out.println (" Enter the Value of b");  
        System.out.println (" Enter the Value of b");  
        int b = sc.nextInt();  
        System.out.println (" Enter the Value of c");  
        int c = sc.nextInt();  
  
        double d = b*b - 4*a*c;  
  
        if (d > 0) {  
            double r1 = (-b + Math.pow(d, 0.5)) / (2.0*a);  
            double r2 = (-b - Math.pow(d, 0.5)) / (2.0*a);  
            System.out.println (" The roots are " + r1 + " and " + r2);  
        }  
  
        else if (d == 0.0) {  
            double r1 = -b / (2.0*a);  
            System.out.println (" The root is " + r1);  
        }  
  
        else {  
            System.out.println (" Roots are not Real");  
        }  
    }  
}
```

OUTPUT:

```
Command Prompt
Microsoft Windows [Version 10.0.19044.2364]
(c) Microsoft Corporation. All rights reserved.

C:\Users\samri> cd C:\Users\samri\Desktop\java lab

C:\Users\samri\Desktop\java lab> javac sample.java
sample.java:3: error: class quadratic equations is public, should be declared in a file named quadratic equations.java
public class quadratic equations {
      ^
1 error

C:\Users\samri\Desktop\java lab> javac sample.java

C:\Users\samri\Desktop\java lab> java quadratic equations
Enter the value of a
34
Enter the value of b
56
Enter the value of c
5
The roots are -0.09473460627271374 and -1.552324217256698

C:\Users\samri\Desktop\java lab>
```

PROGRAM 2

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

WEEK-2

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

```
import java.util.Scanner
```

```
public class Student {  
    public static void main(String args[]) {  
        Scanner sc = new Scanner(System.in);  
        int credit[] = new int[50];  
        int mark[] = new int[5];  
        int vsn;  
        String name;  
        int totalCredit = 0;  
        double Sgpa = 0;
```

```
        System.out.println("Enter the details of the Student\n");  
        System.out.println("Enter the Vsn details of the Student\n");  
        vsn = sc.nextInt();
```

```
        for (int i = 0; i < 5; i++) {
```

```
            System.out.println("Enter the Marks of the " + (i+1) + "  
            st Subject\n");
```

```
            mark[i] = sc.nextInt();
```


$Sgpa = Sgpa + (\text{total (credit / e)});$

```
System.out.println("The Name of the Student : "+ name);  
System.out.println("The USN of the Student : "+ usn);  
System.out.println("The SGPA of the Student : "+ sgpa);  
}  
}
```

Output:

The Enter the details of the Student

Enter the usn of the Student

185

Enter the Name of the Student

Samrith

Enter the Marks of 1st Subject

90

Enter the Marks of the 2nd Subject

98

Enter the Marks of the 3rd Subject

92

Enter the Marks of the 4th Subject

99

Marks of the 5th Subject

The Name of the Student : Samrith
The USN of the Student : 34
The ~~total~~ SGPA of the Student : 9.0

0/p_{2u}
2/12/22

OUTPUT:

Week - 3

```
class Book {
```

```
    String title, author;
```

```
    double price;
```

```
    int numpages;
```

```
    Book() {
```

```
        title = "Default";
```

```
        author = "Default";
```

```
        price = 0.0;
```

```
        numpages = 0;
```

```
    }
```

```
    void setTitle (String t) {
```

```
        this.title = t; }
```

```
    void setAuthor (String s) {
```

```
        this.author = s; }
```

```
    void setPrice (double p) {
```

```
        this.price = p; }
```

```
    void setPages (int pa) {
```

```
        this.numpages = pa; }
```

```
    public String toString () { return title + " | " + author + " | " +  
        price + " | " + numpages + " | " + "\n"; }
```

```

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

        System.out.println ("Enter the no of Books\n");
        int n = sc.nextInt();

        Book book[] = new Book[n];

        for (int i=0; i < n; i++) {
            System.out.println ("Enter the details of the n+3(i+1) + "th Book\n");
            System.out.println ("Enter the Title of the Book\n");
            String t = sc.next();

            System.out.println ("Enter the Author of the Book\n");
            String s = sc.next();

            System.out.println ("Enter the price of the Book\n");
            double p = sc.nextDouble();

            System.out.println ("Enter the pages of the Book\n");
            int pa = sc.nextInt();

            book[i] = new Book();
            book[i].setTitle(t);
            book[i].setAuthor(s);
            book[i].setPrice(p);
            book[i].setPages(pa);
        }
    }
}

```

OUTPUT:

```
Command Prompt
at java.base/java.util.Scanner.next(Scanner.java:1598)
at java.base/java.util.Scanner.nextDouble(Scanner.java:2569)
at Bookdetails.main(sample.java:59)

C:\Users\samri\Desktop\java lab>java Bookdetails
Enter the no of Books
2
Enter the Details of the1th Book
Enter the Title of the Book
CodedTriangles
Enter the Author of the Book
Sreedharpriyan
Enter the Price of the Book
345
Enter the Pages of the Book
190
Enter the Details of the2th Book
Enter the Title of the Book
Annakaranina
Enter the Author of the Book
LeoToslttoy
Enter the Price of the Book
567
Enter the Pages of the Book
45
Title Author Price Numberofpages
CodedTriangles Sreedharpriyan 345.0 190
Annakaranina LeoToslttoy 567.0 45

C:\Users\samri\Desktop\java lab>
```

PROGRAM 4

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape.

WEEK-4

Area of shapes

```
abstract class Shape {
```

```
    int a;
```

```
    int b;
```

```
    abstract void printArea();
```

```
}
```

```
class Rectangle extends Shape {
```

```
    public void printArea() {
```

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

```
        System.out.println("Enter the Value of length");
```

```
        a = sc.nextInt();
```

```
        System.out.println("Enter the Value of breadth");
```

```
        b = sc.nextInt();
```

```
        int c = a * b;
```

```
        System.out.println("The area of the Rectangle is: " + c);
```

```
    }
```

```
class Triangle extends Shape {
```

```
    public void printArea() {
```

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

```
        System.out.println("Enter the Value of length");
```

```
        a = sc.nextInt();
```

```
        System.out.println("Enter the Value of breadth");
```

```
        b = sc.nextInt();
```

```
        double c = (a * b) * 0.5; System.out.println("The area of Triangle is: " + c);
```



```
class Circle extends Shape {
```

```
    public void printArea() {
```

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

```
        System.out.println("Enter the Value of Radius");
```

```
        a = sc.nextInt();
```

```
        double c = (3.14 * a * a);
```

```
        System.out.println("The area of the Circle is: " + c);
```

```
    }
```

```
}
```

```
class Area {
```

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

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

```
        Triangle t = new Triangle();
```

```
        Rectangle r = new Rectangle();
```

```
        Circle c = new Circle();
```

```
        System.out.println("Choose to Calculate area");
```

```
        System.out.println("1. Rectangle");
```

```
        System.out.println("2. Triangle");
```

```
        System.out.println("3. Circle");
```

```
        System.out.println("Enter Your Choice");
```

```
        int choice = sc.nextInt();
```

```
        if (choice == 1) {
```

```
            t.printArea();
```

```
        }
```

```
        else if (choice == 2) {
```

```
            r.printArea();
```

```
        } else if (choice == 3) { c.printArea(); }
```

dx 1
Sy

3

3

3

Output 2

Choos

1. Rec

2. T

3. C

Enter

1

Enter

23

Enter

4

The

```
else {
    System.out.println("Wrong Choice");
}
```

Output 2

Choose to Calculate Area (in method) area? area? area?

1. Rectangle
2. Triangle
3. Circle

Enter Your Choice

1

Enter the Value of length

23

Enter the value of height

45

The area of the Triangle is: 517.5

~~9/12/20~~

OUTPUT:

```
Command Prompt
Annakaranina LeoTosltoy 567.0 45

C:\Users\samri\Desktop\java lab>javac sample.java

C:\Users\samri\Desktop\java lab>java Area
choose to calculate area
1.Rectangle
2.Triangle
3.Circle
Enter Your Choice
2
Enter the value of length
54
Enter the value of breath
4
The area of the Rectangle is :216

C:\Users\samri\Desktop\java lab>java Area
choose to calculate area
1.Rectangle
2.Triangle
3.Circle
Enter Your Choice
1
Enter the value of length
34
Enter the value of height
56
The area of the Triangle is :952.0

C:\Users\samri\Desktop\java lab>java Area
choose to calculate area
1.Rectangle
2.Triangle
3.Circle
Enter Your Choice
3
Enter the value of Radius
56
The area of the Circle is :9847.04

C:\Users\samri\Desktop\java lab>
```

PROGRAM 5

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the

following tasks: a) Accept deposit from customer and update the balance.
b) Display the balance. c) Compute and deposit interest d) Permit withdrawal and update the balance Check for the minimum balance, impose penalty if necessary and update the balance.

Bank problem

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

```
class Account {
```

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

```
    String name;
```

```
    int acc-no;
```

```
    double acc-no;
```

```
    double bal, si;
```

```
    int noofdeposits=0;
```

```
    int noofwithdraws=0;
```

```
    void creation() {
```

```
        System.out.println("Enter your name");
```

```
        name = sc.next();
```

```
        System.out.println("Enter the initial Amount");
```

```
        bal = sc.nextFloat();
```

```
    }
```

```
    void deposit() {
```

```
        float amount;
```

```
        noofdeposits++;
```

```
        System.out.println("Enter the amount to be deposited");
```

```
        amount = sc.nextFloat();
```

```
        bal = bal + amount;
```

```
        System.out.println("Current balance: " + bal);
```


class CurrentAccount extends Account {

public void ChequeBook () {

bal = bal - 50;

System.out.println("50rs has been Deducted from the balance
for the Cheque Book Entry");

System.out.println("No of Deposits : " + noOfDeposits);

System.out.println("No of Withdrawal : " + noOfWithdrawals);

System.out.println("Balance : " + bal);

}

public void withdrawal () {

float amt;

System.out.println("Enter the amount to be withdrawn");

amt = sc.nextFloat();

if (amt > bal)

System.out.println("Balance insufficient");

else {

bal = bal - amt;

if (bal < 1000)

System.out.println("50rs is taken as Service fee");

}

System.out.println("Withdrawn : " + amt);

System.out.println("Current balance : " + bal);

}

}

}

class SavingsAccount extends Account {

public void withdraw() {

float amt;

System.out.println("Enter the amount to be withdrawn");

amt = sc.nextFloat();

if (amt > bal)

System.out.println("Balance insufficient");

else

bal = bal - amt;

System.out.println("Withdrawn: " + amt);

System.out.println("Current balance: " + bal);

}

public void interest() {

System.out.println("Enter the rate of interest");

double r = 0.06;

System.out.println("Enter the number of times interest applied
applied per time period");

int n = sc.nextInt();

System.out.println("Enter the time elapsed");

int t = sc.nextInt();

$S_1 = \text{bal} * (1 + (r/n))$

System.out.println("Compound interest is " + (Math.pow(S1, n)))

}

}

Output:

1. Savings account

2. Current account

Enter your Name

Samith.

Enter the Initial Amount

6000.

Name : Samith

Balance : 6000.0

Enter the amount to be deposited

100

Current balance : 6100.0

Enter the rate of Interest

Enter the Number of times Interest applied per

time period

1.

Enter the time elapsed.

2

Compound interest is 4.18091567

Enter the amount to be withdrawn

500

Current balance : 5600.0.

OUTPUT:


```
Command Prompt
Compound interest is 1.945779834454954E72
Enter the amount to be withdrawn
56
Withdrawn : 56.0
Current balance : 4011.0

C:\Users\samri\Desktop\java lab>javac sample.java
sample.java:2: error: class Exception is public, should be declared in a file named Exception.java
public class Exception {
      ^
1 error

C:\Users\samri\Desktop\java lab>javac sample.java

C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
23
Enter the 2nd value
7
The first value is 23
The Second value is 7
Result of division is 3.0
Finished the Execution

C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
1a
Enter the 2nd value
5
NumberFormatException: Invalid input string
Finished the Execution

C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
56
Enter the 2nd value
0
The first value is 56
The Second value is 0
We failed ot divide.Reason is..
java.lang.ArithmeticException: / by zero
Finished the Execution

C:\Users\samri\Desktop\java lab>
```

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.

Exception

```
import java.util.Scanner;
```

```
public class Exception2
```

```
{  
    public static void main (System.in) {
```

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

```
        System.out.println ("Enter the 1st Value");
```

```
        String s1 = sc.next();
```

```
        System.out.println ("Enter the 2nd Value");
```

```
        String s2 = sc.next();
```

```
        try {
```

```
            int a = Integer.parseInt (s1);
```

```
            int b = Integer.parseInt (s2);
```

```
            System.out.println ("The First Value is " + a);
```

```
            System.out.println ("The Second Value is " + b);
```

```
        } catch (
```

```
            java.lang.Exception e) {
```

```
                System.out.println ("Result of division is " + c);
```

```
            }
```

```
        } catch (java.lang.Exception e) {
```

```
            System.out.println ("We failed the division. Reason is ...");
```

```
            System.out.println (e);
```

```
        }
```

```
    } catch (NumberFormatException e) {
```

```
        System.out.println ("NumberFormatException: Invalid input  
String");
```

```
    }
```

```
    System.out.println ("Finished the Execution");
```

```
}
```


Output :

Enter the 1st Value
45

Enter the 2nd Value
6

The First Value is 45

The Second Value is 6

Result of division is 7

Enter the 1st Value

19

Enter the 2nd Value

55

Number Format Exception: Invalid input string.

Finished the Execution.

Enter the 1st Value

23

Enter the 2nd Value

0

The First Value is 23

The Second Value is 0

We failed the Division. Reason is...

java.lang.ArithmeticException: / by zero.

Finished the Execution.

o/p seen
6/1/23

OUTPUT:

```
Command Prompt
Compound interest is 1.945779834454954E72
Enter the amount to be withdrawn
56
Withdrawn : 56.0
Current balance : 4011.0

C:\Users\samri\Desktop\java lab>javac sample.java
sample.java:2: error: class Exception is public, should be declared in a file named Exception.java
public class Exception {
      ^
1 error

C:\Users\samri\Desktop\java lab>javac sample.java

C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
23
Enter the 2nd value
7
The first value is 23
The Second value is 7
Result of division is 3.0
Finished the Execution

C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
1a
Enter the 2nd value
5
NumberFormatException: Invalid input string
Finished the Execution

C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
56
Enter the 2nd value
0
The first value is 56
The Second value is 0
We failed ot divide.Reason is..
java.lang.ArithmeticException: / by zero
Finished the Execution

C:\Users\samri\Desktop\java lab>
```

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<0. In Son class, implement a constructor that cases both father and son’s age and throws an exception if son’s age is >=father’s age.

WRONG AGE EXCEPTION

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

```
import java.lang.Exception;
```

```
class WrongAge extends Exception {
```

```
    public String toString() {
```

```
        return "Wrong age! Please enter the Right age";
```

```
    }
```

```
class Father {
```

```
    int age;
```

```
    Father (int age) {
```

```
        age = age;
```

```
        System.out.println("Father age: " + age);
```

```
    }
```

```
class Son extends Father {
```

```
    int age;
```

```
    Son (int age, int ages) {
```

```
        super (age);
```

```
        age = ages;
```

```
        System.out.println("Son's age: " + age);
```

```
    }
```

```
}
```

```
class Exception1 {
```

```
    public static void main (String args[]) throws WrongAge {
```

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

```
        System.out.println("Enter the Father's Age");
```

```
        int agef = sc.nextInt();
```

```
        System.out.println("Enter the Son's Age");
```

```
        int ages = sc.nextInt();
```

```

class Exception2 {
    public static void main (String args[]) throws WrongAge {
        Scanner sc = new Scanner (System.in);
        System.out.println ("Enter the Father's Age");
        int agef = sc.nextInt();
        System.out.println ("Enter the Son's Age");
        int ages = sc.nextInt();

        if (agef < 0 || ages > agef) {
            try {
                throw new WrongAge();
            }
            else {
                Son s = new Son (agef, ages);
            }
        }
    }
}

```

Output:

Enter the Father's Age
45
Enter the Son's Age
12

Father age: 45

Son's age: 12

Father age: 45

Son's age: 12

Enter the Father's Age

0

Enter the Son's Age

23

Age! please Enter the Right Age

class
String
Thread
Sample

public

for

if (

}

if (

}

3 Cat

3

Sys

3

5

```
Command Prompt
Exception1.java:21: error: constructor Object in class Object cannot be applied to given types;
super(agef);
^
  required: no arguments
  found:    int
  reason: actual and formal argument lists differ in length
1 error

C:\Users\samri\Desktop\java lab>javac Exception1.java
Exception1.java:21: error: constructor Object in class Object cannot be applied to given types;
super(agef);
^
  required: no arguments
  found:    int
  reason: actual and formal argument lists differ in length
1 error

C:\Users\samri\Desktop\java lab>javac Exception1.java

C:\Users\samri\Desktop\java lab>java Exception1
Enter the Father's Age
45
Enter the Son's Age
12
Father age:45
Son's age:12

C:\Users\samri\Desktop\java lab>java Exception1
Enter the Father's Age
0
Enter the Son's Age
23
Exception in thread "main" Wrong age! Please enter the Right age
    at Exception1.main(Exception1.java:39)

C:\Users\samri\Desktop\java lab>java Exception1
Enter the Father's Age
6
Enter the Son's Age
78
Exception in thread "main" Wrong age! Please enter the Right age
    at Exception1.main(Exception1.java:39)

C:\Users\samri\Desktop\java lab>
```

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

Multi Threading

class SampleThread implements Runnable {

String message, name;

Thread t;

SampleThread (String msg, String name) {

t = new Thread (this, name);

message = msg;

t.start();

}

public void run() {

try {

for (int i=5; i>0; i--) {

if (t.getName().equals("Thread 1")) {

System.out.println(message);

Thread.sleep(10000);

}

if (t.getName().equals("Thread 2")) {

System.out.println(message);

Thread.sleep(2000);

}

}

} catch (InterruptedException) {

System.out.println("Thread was interrupted");

}

System.out.println("Exiting thread " + t.getName());

```

class DisplayThread {
    public static void main (String [] args) {
        SampleThread s1 = new SampleThread ("BMS COLLEGE OF ENGINEERING", "Thread1");
        SampleThread s2 = new SampleThread ("CSE", "Thread2");
    }
}

```

Output:

BMS COLLEGE OF ENGINEERING

CSE

CSE

CSE

CSE

CSE

Exiting thread: Thread2.

BMS COLLEGE OF ENGINEERING

BMS COLLEGE OF ENGINEERING

BMS COLLEGE OF ENGINEERING

Exiting thread: Thread1.

OUTPUT:

```
Command Prompt
C:\Users\Admin\Desktop\18M21CS185>javac displaythreads.java
C:\Users\Admin\Desktop\18M21CS185>java DisplayThread
BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
CSE
CSE
BMS COLLEGE OF ENGINEERING
Exiting thread:Thread2
BMS COLLEGE OF ENGINEERING
BMS COLLEGE OF ENGINEERING
BMS COLLEGE OF ENGINEERING
Exiting thread:Thread1
C:\Users\Admin\Desktop\18M21CS185>
```

Enter command number:

Activate Windows
Go to Settings to activate Windows.