

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT

on

COURSE TITLE

Submitted by

NITHIN SN (1BM21CS121)

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

October-2022 to Feb-2023

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 ” carried out by **NITHIN SN(1BM21CS121)**, 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 a **Course Title - (Course code)** work prescribed for the said degree.

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Sl No.	Date	Experiment Title	Page No.
1.	17/11/2022	Develop a Java program that prints all real solutions to the quadratic equation $ax^2+bx+c = 0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.	5
2.	24/11/2022	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.	8
3.	01/12/2022	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 <code>toString()</code> method that could display the complete details of the book. Develop a Java program to create n book objects.	11
4.	08/12/2022	Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named <code>printArea()</code> . 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 <code>printArea()</code> that prints the area of the given shape.	14
5.	29/12/2022	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-	17

		<p>acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:</p> <ul style="list-style-type: none"> 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. 	
6.	12/01/2023	<p>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.</p>	23
7.	05/01/2023	<p>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.</p>	27
8.	12/01/2023	<p>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</p>	31

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

```
Scanner sc = new Scanner (System.in);
int a = sc.nextInt();
float f = sc.nextFloat();
double d = sc.nextDouble();
```

Lab - 2

```
import java.util.Scanner;
import java.math.*;
```

```
class quad {
```

```
    public static void main (String args[]) {
        Scanner sc = new Scanner (System.in);
        float a, b, c, r1, r2;
```

```
        System.out.println ("enter value of a");
```

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

```
        System.out.println ("enter value of b");
```

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

```
        System.out.println ("enter value of c");
```

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

```
        float dis = (b * b) - (4 * a * c);
```

```
        if (d > 0) {
```

```
            System.out.println ("roots are real");
```

```
r1 = (-b + math.sqrt (dis)) / (2 * a);
```

```
r2 = (-b - math.sqrt (dis)) / (2 * a));
```

```
        System.out.println ("roots are r1 = " + r1 + " and r2 = " + r2);
```

```
else if (d==0){  
    System.out.println ("roots are equal");  
    r1 = (-b/(2*a));  
    System.out.println ("roots are r1 = " + r1);  
}  
else  
{  
    System.out.println ("roots are imaginary");  
    r1 = (-b + Math.sqrt(Math.abs(dis)))/(2*a);  
    r2 = (-b - Math.sqrt(Math.abs(dis)))/(2*a);  
  
    System.out.println ("r1 = " + r1 + " and r2 = " + r2);  
}  
}  
}
```

Output

Enter value of a

1

Enter value of b

2

Enter value of c

1

roots are real and equal

roots are r1 = -1.0

SAMPLE OUTPUTS:

- Roots are Real and Equal

```
C:\Users\BMSCECSE\Desktop\1BM21CS229>java quadratic
Enter a
2
Enter b
4
Enter c
2
Roots are real and equal and each root is equal to-1.0
```

- Roots are real and distinct

```
C:\Users\BMSCECSE\Desktop\1BM21CS229>java quadratic
Enter a
1
Enter b
0
Enter c
-1
Roots are real and distinct
Roots are
r1=1.0and1.0
```

- Roots are imaginary and distinct

```
C:\Users\BMSCECSE\Desktop\1BM21CS229>java quadratic
Enter a
1
Enter b
2
Enter c
3
Roots are imaginary and distinct.
Roots are
r1=-1.0+i1.4142135623730951
r2=-1.0-i1.4142135623730951
```

- Invalid Outputs

```
Enter a
2
Enter b
4
Enter c
2
Roots are real and equal and each root is equal to-1.0
```

float calculate SGPA {

 float SGPA;

 int sum_of_credits = 0;

 int numerator = 0;

 for (int i = 0; i < credits.length; i++) {

 if (marks[i] >= 90) {

 gradePoint[i] = 10;

 }

 else if (marks[i] < 90 && marks[i] >= 80)

 gradePoints[i] = 9;

 }

 else if (marks[i] < 80 && marks[i] >= 70) {

 gradePoints[i] = 8;

 }

 else if (marks[i] < 70 && marks[i] >= 60) {

 gradePoints[i] = 7;

 }

 else if (marks[i] < 60 && marks[i] >= 50) {

 gradePoint[i] = 6;

 }

 else if (marks[i] < 50 && marks[i] >= 40) {

 gradePoint[i] = 5;

 }

 else {

 gradePoint[i] = 0;

 }

 sum_of_credits += credits[i];

 numerator += (credit[i] * gradePoint[i]);

Sgpa ob = New Sgpa();

ob. enter marks();

float result = ob. calculateSgpa();
System.out.println ("The SGPA of student is
+ result);

5
6

OutPut:-

Enter each subjects marks & credit

enter the subject 1's marks
ao

enter the subject 1's credit
4

enter the subject 2's marks
68

enter the subject 2's credit
3

Sgpa
9/12/2022

SAMPLE OUTPUT:

```
Enter name and usn of student
asdf
123
Enter the number of courses
4
Credit of subject 1 : 4
Marks of subject 1 : 98
Credit of subject 2 : 3
Marks of subject 2 : 87
Credit of subject 3 : 2
Marks of subject 3 : 76
Credit of subject 4 : 2
Marks of subject 4 : 56
USN of the student 123
Name of the student asdf
SGPA is 8.636363636363637
```

```
for (i=0; i<3; i++) {
```

System.out.println ("Enter name, author, Price &
number of pages for book " + (i+1))

name = sc.next();

author = sc.next();

Price = sc.nextDouble();

NP = sc.nextInt();

books[i] = new Book (name.toString(), author,
(String) null, Price, NP);

3

```
for (i=0; i<3; i++) {
```

System.out.println ("The details of book " + (i+1)
+ " are: ");

Enter name, author, Price & number of Page for

600/-

Bhutan

Katraj

2000

100

Sb
1/1/2022

SAMPLE OUTPUT:

```
cmd Command Prompt
4 errors
C:\Users\Admin\Desktop>javac Bookvck.java
C:\Users\Admin\Desktop>java Bookvck
Enter the no. of book objects
2
Enter book name
ABC
Enter author name
ABCG
Enter price
123
Enter No. of pages
345
Enter book name
ASDF
Enter author name
ASDFG
Enter price
3467
Enter No. of pages
234
ABC ABCG 123 345
ASDF ASDFG 3467 234
C:\Users\Admin\Desktop>
```

Program - 4

```
import java.util.*;  
abstract class Shape  
{
```

```
    int a, b;
```

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

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

```
}
```

```
class Rectangle extends Shape  
{
```

```
    void PrintArea()
```

```
{
```

```
System.out.println ("Area of rectangle");
```

```
System.out.println ("Enter length & breadth");
```

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

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

```
double area = a * b;
```

```
System.out.println ("Area of rectangle = " + " " + area);
```

```
}
```

```
class Triangle extends Shape  
{
```

```
void printArea()
```

```
{
```

```
System.out.println ("Area of triangle");
```

```
System.out.println ("Enter Base and height");
```

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

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

```
double area = (a * b) / 2;
```

~~System.out.println ("Area of triangle = " + " " + area);~~

```
}
```

class circle extends shape

{ void PrintArea()

System.out.println ("Area of circle");

System.out.println ("Enter Radius");

a = sc.nextInt();

double Area = 3.14 * a * a;

System.out.println ("Area of circle = " + " + Area);

}

Public class AbstractShape

{ Public static void main (String args[])

Rectangle rec = new Rectangle ();

rec. Print area ();

Triangle tri = new triangle ();

tri. Print Area ();

Circle cir = new Circle ();

cir. Print Area ();

}

Output:-

Area of rectangle
Enter length and breadth

5

2

Run
16/12/22

Area of rectangle = 10

Area of triangle

Enter Base and height

SAMPLE OUTPUT:

```
Rectangle area=2.0
Triangle area=1.0
Circle area=78.55
```

Public void check_bal()

{
if (bal < 5000)

{

System.out.println ("In insufficient Balance!!"
"\n Balance :" + bal);

}

else

{

System.out.println ("In sufficient Balance!!"
"\n Balance :" + bal);

}

else

{

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

}

{

{

interest = (bal * 6) / 100;

bal += interest;

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

}

{

~~class current extends account~~

{

float deposit, withdraw, Penalty;

{

Public void deposit ()

{

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

Enter Account type (S for Savings, C for current) : S

Enter Customer Name : nit
Enter Account number : 23

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 withdrawal : 10000

Amount withdrawal : 10000.0

Balance : 30000.0

enter your choice : 4

interest credited : 1800.

Balance : 31800.

Solved 2022

Sample Output :

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

C:\Users\Admin>cd C:\Users\Admin\Desktop\1BM21CS229

C:\Users\Admin\Desktop\1BM21CS229>set path=C:\Program Files\Java\jdk-19\bin

C:\Users\Admin\Desktop\1BM21CS229>javac classbank.java

C:\Users\Admin\Desktop\1BM21CS229>java bank
enter your name, account number, account type(savings/current), balance
tanisha
45084840
savings
3500
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
1
enter the value to deposit
650
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
2
Balance is: 4150.0
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
3
enter the time period
2
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
2
Balance is: 4575.375
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
4
enter the value to withdraw
575
withdrawal successful
new balance: 4000.375
```

```
new balance: 4000.375
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
5
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
4
enter the value to withdraw
678
balance higher than minimum balance
withdrawal successful
new balance: 7926.0
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
5
balance higher than minimum balance
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
4
enter the value to withdraw
7892
balance higher than minimum balance
withdrawal successful
new balance: 34.0
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
5
balance lesser than minimum balance, penalty imposed
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
6
exited

C:\Users\Admin\Desktop\1BM21CS229>
```

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

```
Scanner sc = new Scanner (System.in);
int a = sc.nextInt();
float f = sc.nextFloat();
double d = sc.nextDouble();
```

Lab - 2

```
import java.util.Scanner;
import java.math.*;
```

```
class quad {
```

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

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

```
        float a, b, c, r1, r2;
```

```
        System.out.println ("enter value of a");
```

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

```
        System.out.println ("enter value of b");
```

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

```
        System.out.println ("enter value of c");
```

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

```
        float dis = (b * b) - (4 * a * c);
```

```
        if (d > 0) {
```

```
            System.out.println ("roots are real");
```

```
r1 = (-b + math.sqrt (dis)) / (2 * a);
```

```
r2 = (-b - math.sqrt (dis)) / (2 * a));
```

```
        System.out.println ("roots are r1 = " + r1 + " and r2 = " + r2);
```

else if ($d == 0$) {

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

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

System.out.println ("roots are $r1 = " + r1$ ");

3

else

{

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

$$r1 = (-b + \text{math.sqrt}(\text{math.abs}(d))) / (2 * a);$$

$$r2 = (-b - \text{math.sqrt}(\text{math.abs}(d))) / (2 * a);$$

System.out.println ("roots are $r1 = " + r1 + "$ and $r2 = " + r2$ ");

4

5

Output

Enter value of a

1

Enter value of b

2

Enter value of c

1

Roots are real and equal

Roots are $r1 = -1.0$

```
C:\Users\BMSCECSE\Desktop\1BM21CS229>java quadratic
Enter a
2
Enter b
4
Enter c
2
Roots are real and equal and each root is equal to -1.0
```

Roots are real and distinct

```
:\\Users\\BMSCECSE\\Desktop\\1BM21CS229>java quadratic
Enter a
Enter b
Enter c
1
Roots are real and distinct
Roots are
r1=1.0 and r2=1.0
```

Roots are imaginary and distinct

```
\\Users\\BMSCECSE\\Desktop\\1BM21CS229>java quadratic
Enter a
Enter b
Enter c
Roots are imaginary and distinct.
Roots are
-1.0+1.414213562373095i
-1.0-1.414213562373095i
```

Valid Outputs

```
C:\Users\BMSCECSE\Desktop\1BM21CS229>java quadratic
Enter a
2
Enter b
4
Enter c
2
Roots are real and equal and each root is equal to -1.0
```

Roots are real and distinct

```
C:\Users\BMSCECSE\Desktop\1BM21CS229>java quadratic
Enter a
1
Enter b
0
Enter c
-1
Roots are real and distinct
Roots are
r1=1.0 and r2=-1.0
```

Roots are imaginary and distinct

```
C:\Users\BMSCECSE\Desktop\1BM21CS229>java quadratic
Enter a
1
Enter b
2
Enter c
3
Roots are imaginary and distinct.
Roots are
r1=-1.0+i1.4142135623730951
r2=-1.0-i1.4142135623730951
```

3

Output

Enter value of a
1

Enter value of b
2

Enter value of c
1

Roots are real and equal

Roots are $\lambda = -1.0$

public static void main (String args[]){

Scanner sc = new Scanner (System.in);

float a, b, c, r1, r2;

System.out.println ("enter value of a");

a = sc.nextFloat();

System.out.println ("enter value of b");

b = sc.nextFloat();

System.out.println ("enter value of c");

c = sc.nextFloat();

float dis = (b * b) - (4 * a * c);

if (d > 0) {

System.out.println ("roots are real");

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

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

```
new balance: 4000.375
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
5

1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
4
enter the value to withdraw
678
balance higher than minimum balance
withdrawal successful
new balance: 7926.0
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
5
balance higher than minimum balance
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
4
enter the value to withdraw
7892
balance higher than minimum balance
withdrawal successful
new balance: 34.0
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
5
balance lesser than minimum balance, penalty imposed
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw using cheque
5.check for minimum balance
6.exit
6
exited
```

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

C:\Users\Admin>cd C:\Users\Admin\Desktop\1BM21CS229

C:\Users\Admin\Desktop\1BM21CS229>set path=C:\Program Files\Java\jdk-19\bin

C:\Users\Admin\Desktop\1BM21CS229>javac classbank.java

C:\Users\Admin\Desktop\1BM21CS229>java bank
enter your name, account number, account type(savings/current), balance
tanisha
45084840
savings
3500
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
1
enter the value to deposit
650
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
2
Balance is: 4150.0
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
3
enter the time period
2
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
2
Balance is: 4575.375
1.deposit
2.display balance
3.compute and deposit interest
4.withdraw
5.check for minimum balance
6.exit
4
enter the value to withdraw
575
withdrawal successful
new balance: 4000.375
```

Public void check_bal()

{
if (bal < 5000)
{

System.out.println ("In insufficient Balance!!"
"n Balance :" + bal);

}
else

{
System.out.println ("In sufficient Balance!!"
"n Balance :" + bal);

}
else

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

}
}

Public void interest()

{
interest = (bal * 6) / 100;
bal += interest;

System.out.println ("In interest credited " + interest)
"n Balance :" + bal);

}
}

~~class current extends account~~

{
float deposit, withdraw, Penalty;

Public void deposit ()

{

Rectangle area=2.0

Triangle area=1.0

Circle area=78.55