

PREFACE
CERTIFICATE

This is to certify that

Mr. Deepak Mahendra Sharma with enrolment no. **190303105026** and
semester/division **5B1** has successfully completed his laboratory experiments in the Object-
Oriented Programming with Java (203105334) from the department of Computer
Science And Engineering during the academic year 2021-2022.



Date of Submission:

Staff In Charge:

Head of Department:

Name: - Deepak Mahendra Sharma
Enrolment no.: - 190303105026



INDEX

Sr. No.	Experiment Title	Page No.	Date of Performance	Date of Submission	Marks	Sign.
1	Write a program to count the number of words that start with a capital letter.	5	19/06/21	25/06/21		
1.1	Write a java program to take an array of strings as an input, and arrange strings in ascending order.	6	25/06/21	26/06/21		
2	Write a program to find the largest number in an array of numbers using command line arguments.	7	26/06/21	02/07/21		
2.1	Write a program to find factorial of number. Here, take number as command line argument.	8	02/07/21	03/07/21		
3	Write a program to demonstrate class and objects using the concept of an array object.	9	03/07/21	09/07/21		
3.1	Declare a class Box. Overload Box constructors with zero argument, one argument and three argument to initialize the members of the class. Declare a method to find volume of the box.	11	09/07/21	10/07/21		
4	Write a program to demonstrate garbage collection using System.gc() or Runtime.gc().	13	10/07/21	16/07/21		
4.1	Write a program to show the use of finalize method for garbage collection.	14	16/07/21	17/07/21		
5	Write a program to demonstrate static constants and final constants.	15	17/07/21	20/07/21		
5.1	Write a program to create a class named as Bike which consist one final method called as run(), Declare a subclass Bike & demonstrate the use of final method.	16	20/07/21	23/07/21		



6	Write a program to explain static polymorphism in java.	17	23/07/21	27/07/21		
6.1	Write a program to find volume of Box using concept of method overloading.	18	27/07/21	30/07/21		
7	Write a program to find the factorial of a number using interface.	19	30/07/21	10/08/21		
7.1	Write a program to implement multiple inheritance in java using interface.	20	10/08/21	13/08/21		
7.2	Create a package called Mathsoperation1, which must contain classes to perform addition, subtraction, create another package called Mathsoperation2, which must contain classes to perform multiplication and division operation. Create a main class and import the Mathsoperation1, Mathsoperation1 package in it to perform all the operations on the input numbers provided by the user. Finally, display the result of each operation on the console.	21	13/08/21	17/08/21		
8	Write a program to design student registration form using AWT components.	23	17/08/21	20/08/21		
8.1	Write a Java Program for Calculator Operations Using AWT Controls & appropriate layout manager.	26	20/08/21	23/08/21		
9	Write a program to demonstrate array index out of bounds exception.	36	23/08/21	27/08/21		
9.1	Create an interface Account with two methods deposit and withdraw. Create class Savings Account which implements the interface. Write a custom Exception handler for	37	27/08/21	31/08/21		



	Savings Account to handle the scenarios when withdrawn amount is larger than the balance in the account.					
10	Write a program to demonstrate class object locking using method level synchronization.	39	31/08/21	31/08/21		
10.1	Write a program that executes two threads. One thread will print the even numbers and another thread will print odd numbers from 1 to 50.	41	31/08/21	31/08/21		



PRACTICAL – 8

Aim: - Write a program to design student registration form using AWT components.

Code: -

```
import java.awt.*;

class Registration extends Frame{

    Registration() {

        Label name    = new Label("Name : ");
        Label enrollno = new Label("Enrollment No : ");
        Label email    = new Label("Email : ");
        Label gender   = new Label("Gender : ");
        Label dob      = new Label("DOB : ");
        CheckboxGroup cggender = new CheckboxGroup();
        Checkbox male   = new Checkbox("Male", false);
        Checkbox female = new Checkbox("Female", false);
        TextField tfname = new TextField();
        TextField tfenrollno = new TextField();
        TextField tfemail = new TextField();
        TextField tfdob = new TextField();
        Button submit = new Button("Submit");

        add(name);
        add(enrollno);
        add(email);
        add(gender);
        add(male);
        add(female);
        add(tfname);
        add(tfenrollno);
        add(tfemail);
```



```
add(tfdob);  
add(submit);  
add(dob);  
name.setBounds(15, 30, 100, 20);  
tfname.setBounds(120, 30, 250, 20);  
enrollno.setBounds(15, 60, 100, 25);  
tfenrollno.setBounds(120, 60, 250, 20);  
email.setBounds(15, 90, 100, 20);  
tfemail.setBounds(120, 90, 250, 20);  
dob.setBounds(15, 120, 100, 20);  
tfdob.setBounds(120, 120, 250, 20);  
gender.setBounds(15, 150, 100, 20);  
male.setBounds(120, 150, 250, 20);  
female.setBounds(120, 170, 250, 20);  
submit.setBounds(30, 250, 200, 30);  
setTitle("Registration Form");  
setSize(460,390);  
setLayout(null);  
setVisible(true);  
}  
public static void main(String[] args) {  
    new Registration();  
}  
}
```

Output: -



Registration Form

Name : Deepak Sharma

Enrollment No : 190303105026

Email : 190303105026@paruluniversity.ac.in

DOB : 01/01/2001

Gender : ☒ Male
☐ Female

Submit



PRACTICAL – 8.1

Aim: - Write a Java Program for Calculator Operations Using AWT Controls & appropriate layout manager.

Code: -

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

class MyCalc extends WindowAdapter implements ActionListener{
    Frame f;
    Label l1;
    Button b1,b2,b3,b4,b5,b6,b7,b8,b9,b0;
    Button badd,bsub,bmult,bdiv,bmod,bcalc,bclr,bpts,bneg,bback;
    double xd;
    double num1,num2,check;

    MyCalc(){
        f= new Frame("MY CALCULATOR");
        l1=new Label();
        l1.setBackground(Color.LIGHT_GRAY);
        l1.setBounds(50,50,260,60);
        b1=new Button("1");
        b1.setBounds(50,340,50,50);
        b2=new Button("2");
        b2.setBounds(120,340,50,50);
        b3=new Button("3");
        b3.setBounds(190,340,50,50);
        b4=new Button("4");
        b4.setBounds(50,270,50,50);
        b5=new Button("5");
        b5.setBounds(120,270,50,50);
```




```
b6=new Button("6");
b6.setBounds(190,270,50,50);
b7=new Button("7");
b7.setBounds(50,200,50,50);
b8=new Button("8");
b8.setBounds(120,200,50,50);
b9=new Button("9");
b9.setBounds(190,200,50,50);
b0=new Button("0");
b0.setBounds(120,410,50,50);
bneg=new Button("+/-");
bneg.setBounds(50,410,50,50);
bpts=new Button(".");
bpts.setBounds(190,410,50,50);
bback=new Button("back");
bback.setBounds(120,130,50,50);

badd=new Button("+");
badd.setBounds(260,340,50,50);
bsub=new Button("-");
bsub.setBounds(260,270,50,50);
bmult=new Button("*");
bmult.setBounds(260,200,50,50);
bdiv=new Button("/");
bdiv.setBounds(260,130,50,50);
bmod=new Button("%");
bmod.setBounds(190,130,50,50);
bcalc=new Button("=");
bcalc.setBounds(245,410,65,50);
```



```
bclr=new Button("CE");  
bclr.setBounds(50,130,65,50);  
  
b1.addActionListener(this);  
b2.addActionListener(this);  
b3.addActionListener(this);  
b4.addActionListener(this);  
b5.addActionListener(this);  
b6.addActionListener(this);  
b7.addActionListener(this);  
b8.addActionListener(this);  
b9.addActionListener(this);  
b0.addActionListener(this);  
  
bpts.addActionListener(this);  
bneg.addActionListener(this);  
bback.addActionListener(this);  
  
badd.addActionListener(this);  
bsub.addActionListener(this);  
bmult.addActionListener(this);  
bdiv.addActionListener(this);  
bmod.addActionListener(this);  
bcalc.addActionListener(this);  
bclr.addActionListener(this);  
  
f.addWindowListener(this);  
//ADDING TO FRAME  
f.add(l1);
```



```
f.add(b1); f.add(b2); f.add(b3); f.add(b4); f.add(b5); f.add(b6); f.add(b7); f.add(b8); f.add(b9); f.add(b0);
```

```
f.add(badd); f.add(bsub); f.add(bmod); f.add(bmult); f.add(bdiv); f.add(bmod); f.add(bcalc);
```

```
f.add(bclr); f.add(bpts); f.add(bneg); f.add(bback);
```

```
f.setSize(360,500);
```

```
f.setLayout(null);
```

```
f.setVisible(true);
```

```
}
```

```
//FOR CLOSING THE WINDOW
```

```
public void windowClosing(WindowEvent e) {
```

```
f.dispose();
```

```
}
```

```
public void actionPerformed(ActionEvent e) {
```

```
String z,zt;
```

```
//NUMBER BUTTON
```

```
if(e.getSource()==b1) {
```

```
zt=l1.getText();
```

```
z=zt+"1";
```

```
l1.setText(z);
```

```
}
```

```
if(e.getSource()==b2) {
```

```
zt=l1.getText();
```

```
z=zt+"2";
```

```
l1.setText(z);
```



```
}  
  
if (e.getSource () == b3) {  
    zt = l1.getText ();  
    z = zt + "3";  
    l1.setText (z);  
}  
  
if (e.getSource () == b4) {  
    zt = l1.getText ();  
    z = zt + "4";  
    l1.setText (z);  
}  
  
if (e.getSource () == b5) {  
    zt = l1.getText ();  
    z = zt + "5";  
    l1.setText (z);  
}  
  
if (e.getSource () == b6) {  
    zt = l1.getText ();  
    z = zt + "6";  
    l1.setText (z);  
}  
  
if (e.getSource () == b7) {  
    zt = l1.getText ();  
    z = zt + "7";  
    l1.setText (z);  
}  
  
if (e.getSource () == b8) {  
    zt = l1.getText ();  
    z = zt + "8";
```



```
l1.setText(z);  
}  
if(e.getSource()==b9){  
zt=l1.getText();  
z=zt+"9";  
l1.setText(z);  
}  
if(e.getSource()==b0){  
zt=l1.getText();  
z=zt+"0";  
l1.setText(z);  
}  
  
if(e.getSource()==bpts){ //ADD DECIMAL PTS  
zt=l1.getText();  
z=zt+".";  
l1.setText(z);  
}  
if(e.getSource()==bneg){ //FOR NEGATIVE  
zt=l1.getText();  
z="-"+zt;  
l1.setText(z);  
}  
  
if(e.getSource()==bback){ // FOR BACKSPACE  
zt=l1.getText();  
try{  
    z=zt.substring(0, zt.length()-1);  
}catch(StringIndexOutOfBoundsException f){return;}  
}
```



```
l1.setText(z);  
}  
  
//AIRTHMETIC BUTTON  
  
if(e.getSource()==badd) { //FOR ADDITIO  
N  
try{  
    num1=Double.parseDouble(l1.getText());  
}catch(NumberFormatException f){  
    l1.setText("Invalid Format");  
    return;  
}  
z="";  
l1.setText(z);  
check=1;  
}  
  
if(e.getSource()==bsub) { //FOR SUBTRACT  
ION  
try{  
    num1=Double.parseDouble(l1.getText());  
}catch(NumberFormatException f){  
    l1.setText("Invalid Format");  
    return;  
}  
z="";  
l1.setText(z);  
check=2;  
}  
  
if(e.getSource()==bmult) { //FOR MULTIPLI  
CATION  
try{
```



```
num1=Double.parseDouble(l1.getText());
} catch (NumberFormatException f) {
    l1.setText("Invalid Format");
    return;
}

z="";
l1.setText(z);
check=3;
}

if(e.getSource()==bdiv) {                                //FOR DIVISION
try{
    num1=Double.parseDouble(l1.getText());
    } catch (NumberFormatException f) {
        l1.setText("Invalid Format");
        return;
    }
    z="";
    l1.setText(z);
    check=4;
}

if(e.getSource()==bmod) {                                //FOR MOD/REMAIN
DER
try{
    num1=Double.parseDouble(l1.getText());
    } catch (NumberFormatException f) {
        l1.setText("Invalid Format");
        return;
    }
    z="";
```



```
l1.setText(z);  
check=5;  
}  
  
//RESULT BUTTON  
if(e.getSource()==bcalc){  
try{  
    num2=Double.parseDouble(l1.getText());  
}catch(Exception f){  
    l1.setText("ENTER NUMBER FIRST ");  
    return;  
}  
if(check==1)  
    xd =num1+num2;  
if(check==2)  
    xd =num1-num2;  
if(check==3)  
    xd =num1*num2;  
if(check==4)  
    xd =num1/num2;  
if(check==5)  
    xd =num1%num2;  
l1.setText(String.valueOf(xd));  
} //FOR CLEARING THE LABEL and Memory  
if(e.getSource()==bclr){  
    num1=0;  
    num2=0;  
    check=0;  
    xd=0;  
    z="";
```




```
l1.setText(z);  
  
}  
  
//MAIN METHOD where objects of MyCalc is instantaiated  
public static void main(String args[]){  
    new MyCalc();  
}  
}
```

Output: -





PRACTICAL – 9

Aim: - Write a program to demonstrate array index out of bounds exception.

Code: -

```
public class fact {  
    public static void main(String[] a) {  
        int number;  
        number = Integer.parseInt(a[0]);  
        int n = 1;  
        for (int i = 1; i <= number; i++) {  
            n = n * i;  
        }  
        System.out.println("The factorial of " + number + " is  
" + n);  
    }  
}
```

Output: -

```
PS D:\5th Semester\OOPJ\Lab> javac fact.java  
PS D:\5th Semester\OOPJ\Lab> java fact  
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Index 0 out of bounds for length 0  
at fact.main(fact.java:5)
```



PRACTICAL – 9.1

Aim: - Create an interface Account with two methods deposit and withdraw. Create class Savings Account which implements the interface. Write a custom Exception handler for Savings Account to handle the scenarios when withdrawn amount is larger than the balance in the account.

Code: -

```
interface Account {  
    void deposit(int amount);  
    void withdraw(int amount) throws InsufficientFundsException;  
}  
  
class SavingAccount implements Account {  
    int Balance = 3000;  
    public void deposit(int amount) {  
        Balance = Balance + amount;  
        System.out.println("Balance after deposit is : " + Balance);  
    }  
    public void withdraw(int amount) throws InsufficientFundsException {  
        if (amount > Balance) {  
            throw new InsufficientFundsException("Insufficient Funds");  
        } else {  
            Balance = Balance - amount;  
            System.out.println("Balance after deposit is : " + Balance);  
        }  
    }  
}  
  
class InsufficientFundsException extends Exception {
```



```
public InsufficientFundsException(String msg) {  
    super(msg);  
}  
  
}  
  
public class practical_9_1 {  
    public static void main(String[] args) throws Insufficient  
FundsException {  
        SavingAccount sA = new SavingAccount();  
        sA.deposit(5000);  
        sA.withdraw(3000);  
        sA.withdraw(6000);  
    }  
}
```

Output: -

```
Balance after deposit is : 8000  
Balance after deposit is : 5000  
Exception in thread "main" InsufficientFundsException: Insufficient Funds  
    at SavingAccount.withdraw(practical_9_1.java:13)  
    at practical_9_1.main(practical_9_1.java:30)
```



PRACTICAL – 10

Aim: - Write a program to demonstrate class object locking using method level Synchronization.

Code: -

```
public class practical_10 implements Runnable{
    public void run(){
        Lock();
    }
    public void Lock() {
        System.out.println(Thread.currentThread().getName());
        synchronized(this) {
            System.out.println("in block " + Thread.currentThread().getName());
            System.out.println("in block " + Thread.currentThread().getName() + " end");
        }
    }
    public static void main(String[] args) {
        practical_10 p = new practical_10();
        Thread t1 = new Thread(p);
        Thread t2 = new Thread(p);
        practical_10 p1 = new practical_10();
        Thread t3 = new Thread(p1);
        t1.setName("t1");
        t2.setName("t2");
        t3.setName("t3");
        t1.start();
        t2.start();
        t3.start();
    }
}
```



Parul™
University

}

}

Output: -

```
t1
t2
t3
in block t1
in block t3
in block t1 end
in block t3 end
in block t2
in block t2 end
```



PRACTICAL – 10.1

Aim: - Write a program that executes two threads. One thread will print the even numbers and another thread will print odd numbers from 1 to 50.

Code: -

```
public class practical_10_1 {  
    int counter = 1;  
    static int N;  
  
    public void odd(){  
        synchronized (this){  
            while (counter < N){  
                while (counter % 2 == 0) {  
                    try {  
                        wait();  
                    } catch (InterruptedException e) {  
                        e.printStackTrace();  
                    }  
                }  
                System.out.println(counter + " " + "odd");  
                counter++;  
                notify();  
            }  
        }  
    }  
  
    public void even(){  
        synchronized (this){  
            while (counter < N){  
                while (counter % 2 == 1) {  
                    try {
```



```
        wait();
    } catch (InterruptedException e) {
        e.printStackTrace();
    }
}
System.out.println(counter + " " + "even");
counter++;
notify();
}
}

public static void main(String[] args) {

    practical_10_1 oE = new practical_10_1();
    N = 50;
    Thread t1 = new Thread(new Runnable() {
        @Override
        public void run() {
            oE.odd();
        }
    });
    Thread t2 = new Thread(new Runnable() {
        @Override
        public void run() {
            oE.even();
        }
    });
    t1.start();
    t2.start();
}
```




}

}

Output: -

```
1 odd
2 even
3 odd
4 even
5 odd
6 even
7 odd
8 even
9 odd
10 even
11 odd
12 even
13 odd
14 even
15 odd
16 even
17 odd
18 even
19 odd
20 even
21 odd
22 even
23 odd
39 odd
40 even
41 odd
42 even
43 odd
44 even
45 odd
46 even
47 odd
48 even
49 odd
50 even
```