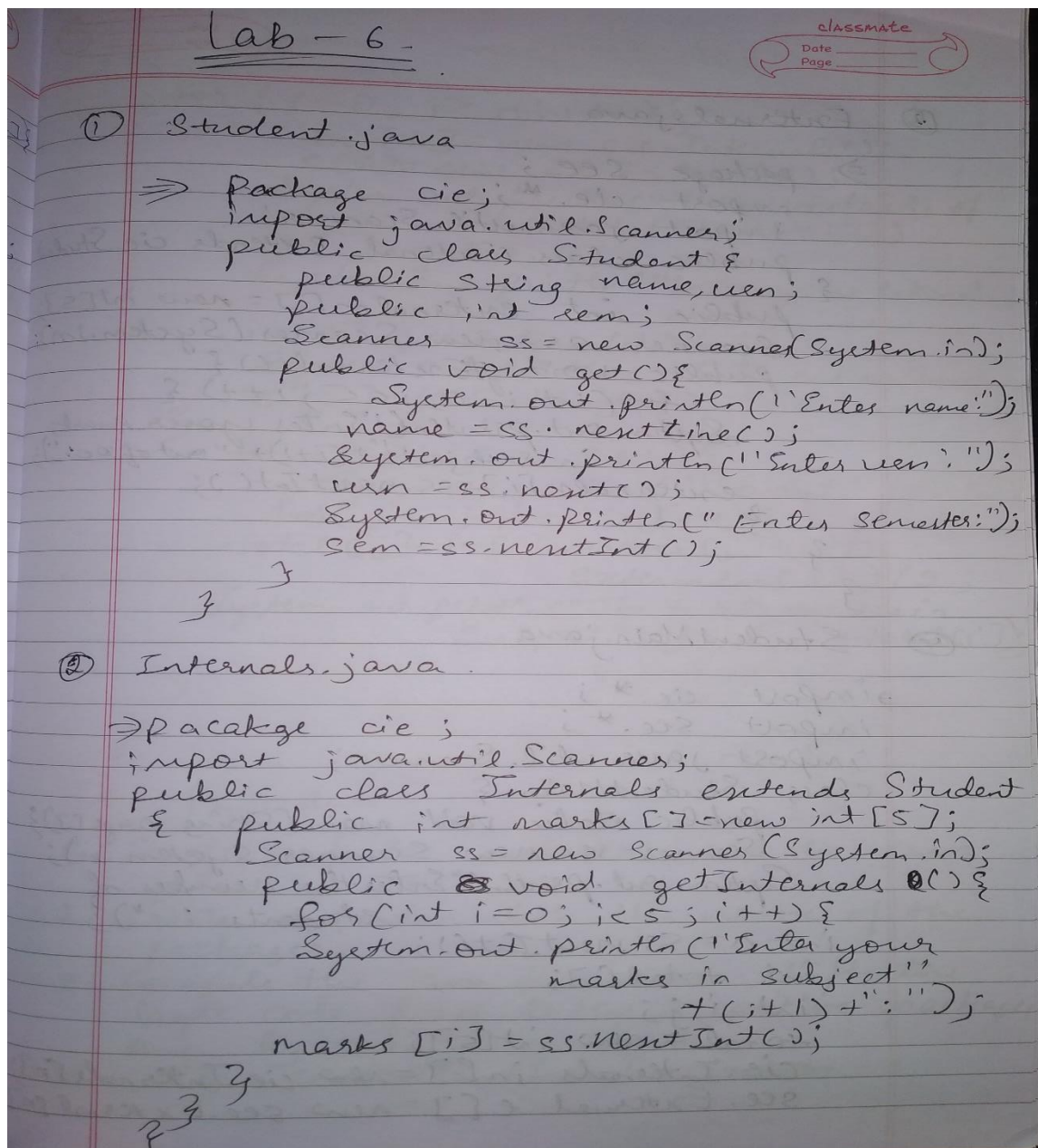


6) Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class Internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.



classmate
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② External.java

```
⇒ package see;
import cie.*;
import java.util.Scanner;
public class External extends cie.Student
{
    public int externalm[] = new int[5];
    Scanner ss = new Scanner(System.in);
    public void getExternals() {
        for(int i=0; i<5; i++) {
            System.out.println("Enter your marks  
in subject "+(i+1)+" out of 100:");
            externalm[i] = ss.nextInt();
        }
    }
}
```

④ StudentMain.java

```
import cie.*;
import see.*;
import java.util.Scanner;
class StudentMain {
    public static void main(String args[]) {
        Scanner ss = new Scanner(System.in);
        System.out.println("Enter the number of  
students : ");
        int n = ss.nextInt();
        int total[];
        int i, j;
        total = new int[5];
        cie.Internals in[] = new cie.Internals[n];
        see.External e[] = new see.External[n];
    }
}
```

is PC > OS (C:) > Program Files > Java > bin > basic > Student Pack

Name
die
see
External
Internals
Student
StudentMain.class
StudentMain

Command Prompt

```
C:\Program Files\Java\bin\basic\Student Pack>javac Student.java
C:\Program Files\Java\bin\basic\Student Pack>javac Internals.java
C:\Program Files\Java\bin\basic\Student Pack>javac External.java
C:\Program Files\Java\bin\basic\Student Pack>javac StudentMain.java
C:\Program Files\Java\bin\basic\Student Pack>java StudentMain
Enter the number of students:
2
Enter details of student 1:
Enter your name:
harshitha
Enter your usn:
1bm19cs059
Enter your semester:
3
Enter your internals marks:
Enter your marks in subject 1:
45
Enter your marks in subject 2:
47
Enter your marks in subject 3:
43
Enter your marks in subject 4:
39
Enter your marks in subject 5:
50
Enter your externals marks:
```

Command Prompt

```
C:\Program Files\Java\bin\basic\Student Pack>java StudentMain
Enter the number of students:
2
Enter details of student 1:
Enter your name:
harshitha
Enter your usn:
1bm19cs059
Enter your semester:
3
Enter your internals marks:
Enter your marks in subject 1:
45
Enter your marks in subject 2:
47
Enter your marks in subject 3:
43
Enter your marks in subject 4:
39
Enter your marks in subject 5:
50
Enter your externals marks:
Enter your marks in subject 1 out of 100:
90
Enter your marks in subject 2 out of 100:
98
Enter your marks in subject 3 out of 100:
89
Enter your marks in subject 4 out of 100:
99
Enter your marks in subject 5 out of 100:
87
Enter details of student 2:
Enter your name:
kushi
Enter your usn:
1bm19cs046
Enter your semester:
2
Enter your internals marks:
Enter your marks in subject 1:
```

Command Prompt

```
kushi
Enter your usn:
1bm19cs046
Enter your semester:
2
Enter your internals marks:
Enter your marks in subject 1:
23
Enter your marks in subject 2:
22
Enter your marks in subject 3:
36
Enter your marks in subject 4:
22
Enter your marks in subject 5:
34
Enter your externals marks:
Enter your marks in subject 1 out of 100:
87
Enter your marks in subject 2 out of 100:
67
Enter your marks in subject 3 out of 100:
65
Enter your marks in subject 4 out of 100:
56
Enter your marks in subject 5 out of 100:
88
Student 1
The total marks in subject 1:90
The total marks in subject 2:96
The total marks in subject 3:87
The total marks in subject 4:88
The total marks in subject 5:93
Student 2
The total marks in subject 1:66
The total marks in subject 2:55
The total marks in subject 3:68
The total marks in subject 4:50
The total marks in subject 5:78
```

C:\Program Files\Java\bin\basic\Student Pack>

7) Write a program to demonstrate generics with multiple object parameters.

Lab Program - 7.

Write a program to demonstrate
~~the~~ generics with multiple object
parameters.

```
import java.util.Scanner;
class Genes < A, B, C > {
    A ob1;
    B ob2;
    C ob3;
    Genes(A o1, B o2, C o3) {
        ob1 = o1;
        ob2 = o2;
        ob3 = o3;
    }
    void print() {
        System.out.println("The type of  
A is: " + ob1.getClass().getName());
        System.out.println("The type of B is: " +  
ob2.getClass().getName());
        System.out.println("The type of C is: " +  
ob3.getClass().getName());
    }
    A get1() {
        return ob1;
    }
    B get2() {
        return ob2;
    }
    C get3() {
        return ob3;
    }
}
class GenesMain {
```

```
public static void main(String args[]) {  
    Scanner ss = new Scanner(System.in);  
    System.out.println("Enter a character:");  
    char c = ss.next().charAt(0);  
    Gener < Character, Boolean, String >  
        ob = new Gener < Character, Boolean,  
            String > (c, true, "yes");  
    ob.print();  
    char x = get1();  
    System.out.println("Value: " + x);  
    boolean y = ob.get2();  
    System.out.println("Value: " + y);  
    String s = ob.get3();  
    System.out.println("Value: " + s);  
}
```

Command Prompt

C:\Program Files\Java\bin\basic>javac MPgenerics.java

C:\Program Files\Java\bin\basic>java GenerMain

Enter a character:

e

The type of A is:java.lang.Character

The type of B is:java.lang.Boolean

The type of C is:java.lang.String

value: e

value: true

value: yes

C:\Program Files\Java\bin\basic>

8) 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 Wrong Age() when the input age < 0. In Son class, implement a constructor that takes both father and son's age and throws an exception if son's age is >= father's age.

Lab Program - 8.

```
import java.util.Scanner;  
class WrongAge extends Exception {  
    private int a;  
    WrongAge(int a) {  
        a = a;  
    }  
    public String toString() {  
        return "Input Age " + a + " is wrong";  
    }  
}  
class Father {  
    int fa;  
    Father(int a) throws WrongAge {  
        fa = a;  
        if (fa < 0)
```



```
throw new WrongAge(fa); }
```

```
}
```

```
class Son extends Father {
```

```
int sa;
```

```
Son(int a, int b) throws WrongAge {
```

```
super(b);
```

```
sa = a;
```

```
if((sa > fa) || (sa <= 0)) {
```

```
throw new WrongAge(sa);
```

```
}
```

```
System.out.println("Correct age");
```

```
}
```

```
class ExceptionDemo {
```

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

```
try { Scanner ss = new Scanner(System.in);
```

```
int fa, sa;
```

```
System.out.println("Enter father's age");
```

```
fa = ss.nextInt();
```

```
System.out.println("Enter son's age");
```

```
sa = ss.nextInt();
```

```
Son s = new Son(fa, sa);
```

```
}
```

```
catch (WrongAge e) {
```

```
System.out.println("Caught Exception: " + e);
```

```
}
```

```
}
```

```
}
```

```

C:\Program Files\Java\bin\basic>javac ehhandling.java

C:\Program Files\Java\bin\basic>java ExceptionDemo
Enter father's age:
30
Enter son's age:
21
Correct age

C:\Program Files\Java\bin\basic>java ExceptionDemo
Enter father's age:
21
Enter son's age:
30
Caught Exception: Input age 30 is wrong

C:\Program Files\Java\bin\basic>java ExceptionDemo
Enter father's age:
0
Enter son's age:
45
Caught Exception: Input age 0 is wrong

C:\Program Files\Java\bin\basic>java ExceptionDemo
Enter father's age:
34
Enter son's age:
0
Caught Exception: Input age 0 is wrong

C:\Program Files\Java\bin\basic>

```

9) 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.

Lab Program 9

Write a program to create two threads, one thread displaying BMS College of Engineering once every ten seconds and other displaying CSE once every two seconds.

```

⇒ class Thread1 implements Runnable {
    String name;
    Thread t;
    int sec;
    Thread1(String threadname, int seconds) {
        name = threadname;
        sec = seconds;
        t = new Thread(this, name);
        t.start();
    }
    public void run() {
        try {
            for (int i = 5; i > 0; i--) {
                System.out.println(i + " " + name);
                Thread.sleep(sec);
            }
        } catch (InterruptedException e) {
            System.out.println(name + " Interrupted");
        }
    }
}

class MultiThreadDemo {
    public static void main(String args[]) {
        Thread1 n1 = new Thread1("BMS College of Engineering", 10000);
        Thread1 n2 = new Thread1("CSE", 2000);
    }
}

```


Command Prompt - java MultiThreadDemo

```
C:\Program Files\Java\bin\basic>javac thread1.java

C:\Program Files\Java\bin\basic>java MultiThreadDemo
CT:Thread[main,5,main]
5 BMS College of Engineering
CT:Thread[main,5,main]
5 CSE
4 CSE
3 CSE
```

Command Prompt - java MultiThreadDemo

```
C:\Program Files\Java\bin\basic>javac thread1.java

C:\Program Files\Java\bin\basic>java MultiThreadDemo
CT:Thread[main,5,main]
5 BMS College of Engineering
CT:Thread[main,5,main]
5 CSE
4 CSE
3 CSE
2 CSE
1 CSE
4 BMS College of Engineering
```

Command Prompt

```
C:\Program Files\Java\bin\basic>javac thread1.java

C:\Program Files\Java\bin\basic>java MultiThreadDemo
CT:Thread[main,5,main]
5 BMS College of Engineering
CT:Thread[main,5,main]
5 CSE
4 CSE
3 CSE
2 CSE
1 CSE
4 BMS College of Engineering
3 BMS College of Engineering
2 BMS College of Engineering
1 BMS College of Engineering

C:\Program Files\Java\bin\basic>
```

10) 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.

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Lab Program 10.

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, num1 & num2. The division of num1 & num2 is displayed in the result field when the divide button is clicked. If num1 & num2 were not an integer, the program would throw a number format exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

```

⇒ import java.awt.*;
import java.awt.event.*;
class DialogBox extends Frame implements
    ActionListener &
    IntDivisionD id;
    DialogBox(Frame parent, String title) {
        super(parent, title, true);
        id = (IntDivisionD) parent;
        setLayout(new FlowLayout());
        setSize(300, 300);
        add(new Label(id.msg));
        Button b;
        add(b = new Button("OK"));
        b.addActionListener(this);
    }
    public void actionPerformed(ActionEvent ae) {
        dispose();
    }
  }
  
```

```

public class IntDivisionD extends JFrame
    implements ActionListener
{
    TextField num1, num2, result;
    String res, msg;
    Button div;
    public IntDivisionD() {
        setLayout(new FlowLayout());
        div = new Button("Divide");
        Label numA = new Label("Number 1");
        Label numB = new Label("Number 2:");
        num1 = new TextField(5);
        num2 = new TextField(5);
        result = new TextField(10);
        add(numA);
        add(num1);
        add(div);
        add(numB);
        add(num2);
        add(res);
        add(result);
        num1.addActionListener(this);
        num2.addActionListener(this);
        div.addActionListener(this);
        result.addActionListener(this);
        addWindowListener(new WindowAdapter()
        {
            public void windowClosing(WindowEvent we)
            {
                System.exit(0);
            }
        });
    }
}

```

Label res = new Label("Result");


```

public void actionPerformed(ActionEvent ae){
    String s = ae.getActionCommand();
    if(s.equals("Divide")){
        result.setText(divide());
    }
}

```

```

String divide(){
    int n1, n2, n = 0;

```

```

    try{
        n1 = Integer.parseInt(num1.getText());
        n2 = Integer.parseInt(num2.getText());
    }

```

```

    catch (NumberFormatException nfe){
        msg = "entered numbers must be integers";
        DialogBox d = new DialogBox(this, "Dialog");
        d.setVisible(true);
    }

```

```

    n1 = Integer.parseInt(num1.getText());
    n2 = Integer.parseInt(num2.getText());
    if(n2 == 0){
        msg = "cannot divide a number by 0";
        DialogBox d = new DialogBox(this, "Dialog");
        d.setVisible(true);
        return "";
    }

```

```

    else

```

```

        n = n1/n2;
        res = Double.toString(n);
        return res;
    }

```

```

public static void main(String args[]){
    IntDivisionD intdiv = new IntDivisionD();
    intdiv.setSize(new Dimension(380, 180));
    intdiv.setTitle("Text Field Demo");
    intdiv.setVisible(true);
}
}

```

Command Prompt - java IntDivision

```
C:\Program Files\Java\bin\basic>javac IntDivision.java
C:\Program Files\Java\bin\basic>java IntDivision
```

The screenshot shows a Java Swing window titled "TextFieldDemo". It contains three text input fields: "Number 1:" with the value "10", "Number 2:" with the value "2", and "Result:" with the value "5.0". A "Divide" button is positioned between the first two input fields.

Command Prompt - java IntDivisionD

```
C:\Program Files\Java\bin\basic>javac IntDivisionD.java
C:\Program Files\Java\bin\basic>java IntDivisionD
```

The screenshot shows the "TextFieldDemo" window with "Number 1:" set to "10", "Number 2:" set to "2", and "Result:" set to "5.0". The "Divide" button is highlighted with a dashed border, indicating it is the active component.

Command Prompt - java IntDivisionD

```
C:\Program Files\Java\bin\basic>javac IntDivisionD.java
C:\Program Files\Java\bin\basic>java IntDivisionD
```

This screenshot displays two windows. On the left is a standard Java "Dialog" box with the message "cannot divide a number by 0" and an "OK" button. On the right is the "TextFieldDemo" window, where "Number 1:" is "10", "Number 2:" is "0", and "Result:" is "5.0". The "Divide" button is visible between the input fields.

Command Prompt - java IntDivisionD

```
C:\Program Files\Java\bin\basic>javac IntDivisionD.java
```

```
C:\Program Files\Java\bin\basic>java IntDivisionD
```

