(6) Create a package CIE which has two classes - Students 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 Internal which is derived class of Student. This class has an array that stores the SEE marks scored in 5 courses of the current semester of the student. Import the 2 packages in a file that declares the final marks of n students in all five courses.

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Lab - 6 :-

Internals.java

```
package cie;
  import java.util.*;

public class internals extends student
  {
    public int a[] = new int [5];

    public void read()
    {
      Super.read
      Scanner sc = new Scanner (System.in);
      System.out.println("Enter CIE marks
                          for all 5 courses");
      for (int i=0; i<5; i++)
      {
        System.out.println("Enter marks
                            of course "
                            +(i+1)+":");
        a[i] = sc.nextInt();
      }
    }
    public void display ()
    {
      System.out.println("USN:"+usn);
      System.out.println("Name:"+name);
      System.out.println("Semester :"+sem);
```

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```
}
}
```

Student.java :-

```
package cie;
~~import~~ import java.util.*;
public class student
{
public String usn;
public String name;
public int ~~String~~ sem;

public void read()
{
Scanner sc = new Scanner(System.in);
System.out.println("Enter usn : ");
usn = sc.next();
System.out.println("Enter name : ");
name = sc.next();
System.out.println("Enter semester : ");
sem = sc.nextInt();
}

}
```

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External.java :-

```
package see;
import java.util.*;

public class external extends cie-student
{
public int b[] = new int [5];
 public int mar[];
public void read()
 {
    Scanner sc = new Scanner (System.in);
    for (int i=0; i<5; i++)
     {
    System.out.println("Enter SEE marks
                    of course "+(i+1)+" :");
     b[i] = sc.nextInt();
     }
 }
}
```

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Student_end.java

```
import java.util.*;
import cie.*;
import see.*;

public class student_end
{
public static void main(String[] args)
{
    int n;
    Scanner sc = new Scanner(System.in);
    n = sc.nextInt();
    internals inter[] = new internals[n];
    external exter[] = new external[n];
    internals ob1 = new internals();
    external ob2 = new external();
    ob2.mar = new int[n];

    for(int i=0; i<n; i++)
    {
    System.out.println("Enter the
      details of the student" +(i+1));
    inter[i] = new internals();
     inter[i].read();
     exter[i] = new externals();
     exter[i].read();
     }
```

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```
System.out.println();

for(int i = 0; i < n; i++)
{
  System.out.println("Student -> " + (i+1));
System.out.println("USN of the student
                    is " + inter[i].usn);
System.out.println("Name of the student is "
                    + inter[i].name);
System.out.println("semester of student is "
                    + inter[i].sem);
for( int j=0; j<5; j++)
{
  final = inter[i].a[j] + ((exter[i].b[j])/2);
  System.out.println("Final Marks of student "
                    +(i+1) + " in course "
                    +(j+1) + "\t" + finalmar);
  }
  System.out.println();
  }
 }
}
```

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Internals.java

```
package cie;

import java.util.*;


public class internals extends student

{

        public int a[]=new int[5];


        public void read()

        {

                super.read();

          Scanner sc=new Scanner(System.in);

          System.out.println("Enter CIE marks for all 5 courses");

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

          {

                System.out.println("Enter marks of course " + (i+1)+":");

                a[i]=sc.nextInt();

          }

        }

        public void display()

        {

                System.out.println("USN : " + usn);

                System.out.println("Name : " + name);

                System.out.println("Semester : " + sem);

        }
```

```
}
```

Student.java

```
package cie;

import java.util.*;

public class student

{

        public String usn;

        public String name;

        public int sem;


        public void read()

        {

                Scanner sc=new Scanner(System.in);

                System.out.println("Enter usn:");

                usn=sc.next();

                System.out.println("Enter name:");

                name=sc.next();

                System.out.println("Enter semester:");

                sem=sc.nextInt();

        }

}
```

External.java

```
package see;

import java.util.*;
```

```
public class external extends cie.student
{
	public int b[]=new int[5];
	public int mar[];
	public void read()
	{
		Scanner sc=new Scanner(System.in);
		for(int i=0;i<5;i++)
		{
			System.out.println("Enter SEE marks of course " + (i+1)+ ":" );
			b[i]=sc.nextInt();
		}
	}
}
```

Student_end.java

```
import java.util.*;
import cie.*;
import see.*;



public class student_end
{
	public static void main(String[] args)
	{
		int n;
```

```
        Scanner sc=new Scanner(System.in);
        int finalmar;
        System.out.println("Enter the Number of students ");
        n=sc.nextInt();
        internals inter[]=new internals[n];
        external exter[]=new external[n];
        internals ob1=new internals();
        external ob2=new external();
        ob2.mar=new int[n];

        for(int i=0;i<n;i++)
        {
            System.out.println("Enter the details of the student " + (i+1));
            inter[i]=new internals();
            inter[i].read();
            exter[i]=new external();
            exter[i].read();
        }
System.out.println();
        for(int i=0;i<n;i++)
        {
            System.out.println("Student-->" + (i+1));
            System.out.println("USN of the student is " + inter[i].usn);
          System.out.println("Name of the stuednt is " + inter[i].name);
          System.out.println("Semester of the student is " + inter[i].sem);
```

```
                    for(int j=0;j<5;j++)
                    {
                      finalmar=inter[i].a[j]+((exter[i].b[j])/2);
                      System.out.println("Final Marks of student " + (i+1) + " in course " + (j+1)
+"\t"+ finalmar);


                    }
                    System.out.println();
            }


        }


}
```

```
PS D:\Prg data\Java\OOJ Lab\lab9> javac student_end.java
PS D:\Prg data\Java\OOJ Lab\lab9> java student_end
Enter the Number of students
2
Enter the details of the student 1
Enter usn:
1BM19ET033
Enter name:
Piyush
Enter semester:
3
Enter CIE marks for all 5 courses
Enter marks of course 1:
44
Enter marks of course 2:
41
Enter marks of course 3:
47
Enter marks of course 4:
50
Enter marks of course 5:
39
Enter SEE marks of course 1:
90
Enter SEE marks of course 2:
92
Enter SEE marks of course 3:
74
Enter SEE marks of course 4:
100
Enter SEE marks of course 5:
80
Enter the details of the student 2
Enter usn:
1BM19CS123
Enter name:
Rishav
Enter semester:
3
Enter CIE marks for all 5 courses
Enter marks of course 1:
45
Enter marks of course 2:
47
Enter marks of course 3:
```

```
Rishav
Enter semester:
3
Enter CIE marks for all 5 courses
Enter marks of course 1:
45
Enter marks of course 2:
47
Enter marks of course 3:
38
Enter marks of course 4:
41
Enter marks of course 5:
50
Enter SEE marks of course 1:
90
Enter SEE marks of course 2:
92
Enter SEE marks of course 3:
66
Enter SEE marks of course 4:
78
Enter SEE marks of course 5:
83

Student-->1
USN of the student is 1BM19ET033
Name of the stuednt is Piyush
Semester of the student is 3
Final Marks of student 1 in course 1    89
Final Marks of student 1 in course 2    87
Final Marks of student 1 in course 3    84
Final Marks of student 1 in course 4    100
Final Marks of student 1 in course 5    79

Student-->2
USN of the student is 1BM19CS123
Name of the stuednt is Rishav
Semester of the student is 3
Final Marks of student 2 in course 1    90
Final Marks of student 2 in course 2    93
Final Marks of student 2 in course 3    71
Final Marks of student 2 in course 4    80
Final Marks of student 2 in course 5    91
```

Lab - 7 : generics

(Q) Write a program to demonstrate generics with multiple object parameter

```
class myGen <A, B>
{
A obj1;
B obj2;
myGen(A obj1, B obj2){
        this.obj1 = obj1;
        this.obj2 = obj2;
}
public void print() {
        System.out.println(this.obj1);
        System.out.println(this.obj2);
}
}
public class test {
    public static void main(String args[]){
        myGen<String, Integer> myObj = new myGen
                                        <String, Integer>
                                        ("Test", 25);
        myGen<Character, Double> myObj2 = new
                                        myGen<Character,
                                        Double>
                                        ('X', 420.00)

        myObj.print();
        myObj2.print();
    }
}
```

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```java
class myGen<A,B>{
    A obj1;
    B obj2;
    myGen(A obj1, B obj2){
        this.obj1 = obj1;
        this.obj2 = obj2;
    }

    public void print(){
        System.out.println(this.obj1);
        System.out.println(this.obj2);
    }
}

public class test{
    public static void main(String[] args) {
        myGen<String,Integer> myObj = new myGen<String, Integer>("Test", 25);
        myGen<Character,Double> myObj2 = new myGen<Character, Double>('X',420.00)
;
        myObj.print();
        myObj2.print();
    }
}
```

Output:

```
PS D:\Prg data\Java\OOJ Lab\Sample> cd "d:\Prg data\C
Test
25
X
420.0
PS D:\Prg data\C&C++\Stack implementation>
```

(8) Write a program to create two threads, one thread displaying "BMS College of engineering" once every ten and another displaying "CSE" once every two seconds.

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Lab 8 :-

```
Class NewThread implements Runnable {
    thread t;
    NewThread() {
        t = new Thread (this, "Demo");
        t.start();
    }
public void run() {
    try {
        while (true) {
            System.out.println("CSE");
            Thread.sleep (2000);
        }
    }
    catch (InterruptedException e) {
        System.out.println("Child Interrupted");
    }
    }
}
Class JThreads {
    public static void main (String args[]) {
        new NewThread();
        try {
            for (int i=5; i>0; i--)
            {
            System.out.println("BMSCE");
            Thread.sleep (5000);
            }
```

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```
catch (InterruptedException e) {
    System.out.println("Main thread interrupted");
}
System.out.println("exiting main");
System.exit(0);
    }
}
```

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```java
class NewThread implements Runnable{
    Thread t;
    NewThread(){
        t=new Thread(this,"Demo Thread");
        t.start();
    }
    public void run(){
        try{
            while (true){
                System.out.println("CSE");
                Thread.sleep(2000);
            }
        }
        catch (InterruptedException e){
            System.out.println("Child interrupted");
        }
    }
}
class JThreads{
    public static void main(String args[]){
        new NewThread();
        try{
            for (int i=5;i>0;i--){
                System.out.println("BMSCE");
                Thread.sleep(5000);
            }
        }
        catch(InterruptedException e){
            System.out.println("Main thread interrupted");
        }
        System.out.println("exiting main");
        System.exit(0);
    }
}
```

Output:

```
PS D:\Prg data\Java\OOJ Lab\Sample> cd "d:\Prg data\Java\OOJ Lab\Sampl
e\" ; if ($?) { javac JThreads.java } ; if ($?) { java JThreads }
BMSCE
CSE
CSE
CSE
BMSCE
CSE
CSE
BMSCE
CSE
CSE
CSE
BMSCE
CSE
CSE
BMSCE
CSE
CSE
CSE
exiting main
PS D:\Prg data\Java\OOJ Lab\Sample>
```

(9) Write a program the 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.

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Lab 7 - Exception Handling :-

```
import java.util.*;
class WrongAge extends Exception {
    private String detail;
     WrongAge(String s) {
     detail = s;
     }
  public String toString() {
      return("Invalid Age exception : " + detail);
      }
  }
class Father {
    int age;
     Father(int a) {
       age = a;
      }
  }
class Son extends Father {
     int age1;
     Son(int a, int b) {
       super(a);
       age1 = b;
     }
  }
~~public static void main~~
public class prog8 {
   public static void main(String args[]) {
```

```
Scanner in = new Scanner (System.in);
System.out.println("Enter Father's & Son's age");
int m = in.nextInt();
int n = in.nextInt();
try {
  if (m<0)
    throw new WrongAge("Negative");
  else if (n>=m)
    throw new WrongAge("Illogical");
  else
  {
  Son ob = new Son (m,n);
  System.out.println("Father's Age:"
                  + ob.age + "\nSon's Age:"
                  + ob.age1);

    }
    }
  catch (WrongAge e){
   System.out.println(e);
    }
  }
}
```

```java
import java.util.*;
class WrongAge extends Exception{
    private String detail;
    WrongAge(String s){
        detail=s;
    }
    public String toString(){
        return ("Inavlid Age exception : "+detail);
    }
}
class Father{
    int age;
    Father(int a){
        age=a;
    }
}
class Son extends Father{
    int age1;
    Son(int a,int b){
        super(a);
        age1=b;
    }
}

public class Prog8 {
    public static void main(String args[]){
        Scanner in = new Scanner(System.in);
        System.out.println("Enter Father's and Son's age");
        int m=in.nextInt();
        int n=in.nextInt();
        try{
        if(m<0)
        throw new WrongAge("Negative");
        else if(n>=m)
        throw new WrongAge("Illogical");
        else{
        Son ob=new Son(m,n);
        System.out.println("Father's Age: "+ob.age+"\nSon's Age: "+ ob.age1);
        }
        }
        catch (WrongAge e){
        System.out.println(e);
    }
}
}
```

Output:

```
PS D:\Prg data\Java\OOJ Lab\Sample> cd "d:\Prg da
Enter Father's and Son's age
10 20
Inavlid Age exception : Illogical
PS D:\Prg data\Java\OOJ Lab\Sample> cd "d:\Prg da
Enter Father's and Son's age
-5 10
Inavlid Age exception : Negative
PS D:\Prg data\Java\OOJ Lab\Sample> cd "d:\Prg da
Enter Father's and Son's age
40 20
Father's Age: 40
Son's Age: 20
PS D:\Prg data\Java\OOJ Lab\Sample>
```

Lab - 11 - AWT

```
import java.awt.*;
import java.awt.event.*;
class Division1 extends Frame implements
                ActionListener {
  Frame f;
  TextField tf1;
  TextField tf2;
  TextField tf3;
  Button b;
  Dialog d1;
  Division1() {
      setSize(300,300);
      setVisible(true);
      setLayout(null);

      addWindowListener(new WindowAdapter()
      addWindowListener(new WindowAdapter() {
          public void windowClosing(WindowEvent
                                    ew) {
              dispose();
          }
      });

tf1 = new TextField("Number 1");
tf1.setBounds(10,30,200,30);
add(tf1);
```

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```
tf2 = new TextField("Number 2");
tf2.setBounds(10, 70, 200, 30);
add(tf2);

b = new Button("/");
b.setBounds(10, 110, 200, 30);
b.addActionListener(this);
add(b);

tf3 = new TextField("Output");
tf3.setBounds(10, 150, 200, 30);
add(tf3);
}
public void actionPerformed(ActionEvent e){
    try {
        String num1 = tf1.getText();
        int nu1 = Integer.parseInt
                                (num1);
        String num2 = tf2.getText();
        int nu2 = Integer.parseInt(num2);
        int result = nu1/nu2;
        tf3.setText(Integer.toString(result));
    }
    catch (NumberFormatException e2){
        d1 = new Dialog(f, "error", true);
        Label l = new Label(" "+e1);
        d1.add(l);
```

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```
d1.setSize(300,50);
d1.setVisible(true);
}
}
}
public class App {
    public static void main(String args[]) {
        Division1 d = new Division1();
    }
}
```

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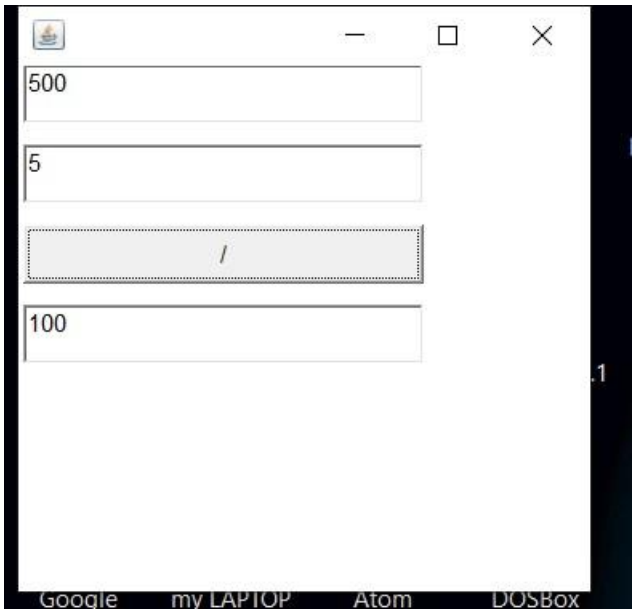
```java
import java.awt.*;
import java.awt.event.*;
class Division1 extends Frame implements ActionListener{
    Frame f;
    TextField tf1;
    TextField tf2;
    TextField tf3;
    Button b;
    Dialog d1;
    Division1(){
        setSize(300,300);
        setVisible(true);
        setLayout(null);
        //to colse window
        addWindowListener(new WindowAdapter(){
            public void windowClosing(WindowEvent aew){
                dispose();
            }
        });
        //textfield1 initialization
        tf1 = new TextField("Number1");
        tf1.setBounds(10,30,200,30);
        add(tf1);
        //textfield2 initialization
        tf2 = new TextField("Number2");
        tf2.setBounds(10,70,200,30);
        add(tf2);
        //division button creation
        b = new Button("/");
        b.setBounds(10, 110, 200, 30);
        b.addActionListener(this);
        add(b);
        //textfield3 initialization
        tf3 = new TextField("Output");
        tf3.setBounds(10,150,200,30);
        add(tf3);
    }
    public void actionPerformed(ActionEvent e){
        try{
            String num1=tf1.getText();
            int nu1=Integer.parseInt(num1);
            String num2=tf2.getText();
            int nu2=Integer.parseInt(num2);
            int result = nu1/nu2;
            tf3.setText(Integer.toString(result));
        }
        catch(NumberFormatException e2){
            d1 = new Dialog(f,"error",true);
```

```
            Label l = new Label(""+e2);
            d1.add(l);
            d1.setSize(300,50);
            d1.setVisible(true);


        }
        catch(ArithmeticException e1){
            d1 = new Dialog(f,"error",true);
            Label l = new Label(""+e1);
            d1.add(l);
            d1.setSize(300,50);
            d1.setVisible(true);

        }
    }
}
public class App {
    public static void main(String[] args) {
        Division1 d = new Division1();
    }

}
```