

**VISVESVARAYA TECHNOLOGICAL
UNIVERSITY**
“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT
on
Object Oriented Java Programming
(23CS3PCOOJ)

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
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**B.M.S. College of Engineering,
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Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “Object Oriented Java Programming (23CS3PCOOJ)” carried out by **Rudra Singh(1BF24CS257)**, who is bonafide student of **B.M.S. College of Engineering**. It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object-Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

Dr. Seema Patil Associate Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE
--	--

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Github Link:

<https://github.com/RudRaS1ngh/Java>

Program 1

Implement Quadratic Equation

Code:

```
import java.util.Scanner;

class quadratic{

    public static void main(String args[]){

        int a,b,c;

        double d,r1,r2;

        Scanner scnr=new Scanner(System.in);

        System.out.println("Enter the value of 'a' (in ax^2 + bx +c=0):");

        a=scnr.nextInt();

        if(a==0){

            System.out.println("Not a quadratic equation.");

        }

        else{

            System.out.println("Enter the value of 'b' (in ax^2 + bx +c=0):");

            b=scnr.nextInt();

            System.out.println("Enter the value of 'c' (in ax^2 + bx +c=0):");

            c=scnr.nextInt();

            d=(b*b)-4*a*c;

            if(d==0){

                System.out.println("Roots are real and equal.");

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

                System.out.println("Value of both roots:");

            }

        }

    }

}
```

```
        System.out.println(r1);

    }

    else if(d>0){

        System.out.println("Roots are real and unequal.");
        r1=(-b)-Math.sqrt(d)/(double)(2*a);
        r2=(-b)+Math.sqrt(d)/(double)(2*a);
        System.out.println("Value of root1:");
        System.out.println(r1);
        System.out.println("Value of root2:");
        System.out.println(r2);

    }

    else{

        System.out.println("Roots are imaginary.");
        r1=(-b)/(2*a);
        r2=Math.sqrt(-d)/2*a;
        System.out.println("Value of root1:");
        System.out.println(r1);
        System.out.println("Value of root2:");
        System.out.println(r2);

    }

}

}

}
```

Output:

```
● Enter the value of 'a' (in ax^2 + bx +c=0):
1
Enter the value of 'b' (in ax^2 + bx +c=0):
2
Enter the value of 'c' (in ax^2 + bx +c=0):
1
Roots are real and equal.
Value of both roots:
-1.0
PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257> cd 'c:\Users\Admin\Desktop\Rudra Singh 1BF24CS257'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetail
lsInExceptionMessages' '-cp' 'C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\9c7fb83aab1159ad099aad915c84d01c\redhat.java\jdt_ws\Rudra Singh 1BF24CS257_3027e896\
● bin' 'quadratic'
workspaceStorage\x5c9c7fb83aab1159ad099aad915c84d01c\x5credhat.java\x5cjdt_ws\x5cRudra Singh 1BF24CS257_3027e896\x5cbin' 'quadratic' ;7d61b326-c9b2-4bd3-a993-41091085e87dEnt
3
Enter the value of 'b' (in ax^2 + bx +c=0):
1
Enter the value of 'c' (in ax^2 + bx +c=0):
4
Roots are imaginary.
Value of root1:
0.0
Value of root2:
10.283481900601565
PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257> cd 'c:\Users\Admin\Desktop\Rudra Singh 1BF24CS257'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetail
lsInExceptionMessages' '-cp' 'C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\9c7fb83aab1159ad099aad915c84d01c\redhat.java\jdt_ws\Rudra Singh 1BF24CS257_3027e896\
bin' 'quadratic'
Enter the value of 'a' (in ax^2 + bx +c=0):
1
Enter the value of 'b' (in ax^2 + bx +c=0):
7
Enter the value of 'c' (in ax^2 + bx +c=0):
3
Roots are real and unequal.
Value of root1:
-6.541381265149109
Value of root2:
-0.45861873485089033
● PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257> cd 'c:\Users\Admin\Desktop\Rudra Singh 1BF24CS257'; & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetail
lsInExceptionMessages' '-cp' 'C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\9c7fb83aab1159ad099aad915c84d01c\redhat.java\jdt_ws\Rudra Singh 1BF24CS257_3027e896\
bin' 'quadratic'
Enter the value of 'a' (in ax^2 + bx +c=0):
0
Not a quadratic equation.
○ PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257>
```

Program 2

Calculating SGPA of a student

Code:

```
import java.util.Scanner;

class Student{

    int i;

    int subjectmarks[] = new int[10];

    int credits[] = new int[10];

    int grade[] = new int[10];

    String name;

    String usn;

    Scanner scnr = new Scanner(System.in);

    Student(String n, String u){

        name = n;

        usn = u;

    }

    void getmarks(){

        for(i=0; i<7; i++){

            int a;

            int j = i+1;

            System.out.println("Enter marks for subject "+j+":");

            a = scnr.nextInt();

            subjectmarks[i] = a;

            System.out.println("Enter credits for subject "+j+":");

            credits[i] = scnr.nextInt();

        }

    }

}
```

```

    }

    for(i=0;i<7;i++){
        grade[i]=(subjectmarks[i]/10)+1;

    }

}

int effectivescore(){

    int efscore=0;

    for(i=0;i<7;i++){

        efscore+=grade[i]*credits[i];

    }

    return efscore;

}

int totalcredits(){

    int creds=0;

    for(i=0;i<7;i++){

        creds+=credits[i];

    }

    return creds;

}

double sgpa(){

    double sg_pa=(double)effectivescore()/(double)totalcredits();

    return sg_pa;

}

```

```
}
```

```
class Stud{  
    public static void main(String args[]){  
        Student s1[]=new Student[5];  
  
        int i;  
  
        String nm;  
  
        String us;  
  
        int j=0;  
  
        int a;  
  
        for(i=0;i<2;i++){  
  
            Scanner scnr1=new Scanner(System.in);  
  
            int k;  
  
            k=i+1;  
  
            System.out.println("");  
  
            System.out.println("Enter name of student"+k+":");  
  
            nm=scnr1.nextLine();  
  
            System.out.println("Enter USN of student:");  
  
            us=scnr1.nextLine();  
  
            s1[i]=new Student(nm,us);  
  
            s1[i].getmarks();  
  
            j++;  
        }  
    }
```

```
for(i=0;i<j;i++){  
    System.out.println("Name:"+s1[i].name);  
    System.out.println("USN:"+s1[i].usn);  
    System.out.println("Effective Score:"+s1[i].effectivescore());  
    System.out.println("Total Credits:"+s1[i].totalcredits());  
    System.out.println("SGPA:"+s1[i].sgpa());  
    System.out.println("");  
}  
}  
}
```

```
● PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257> & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' 'Code\User\workspaceStorage\9c7fb83aab1159ad099aad915c84d01c\redhat.java\jdt_ws\Rudra Singh 1BF24CS257_3027e896\bin' 'Stud'
ws\x5cRudra Singh 1BF24CS257_3027e896\x5cbn' 'Stud' ;4eb0244b-c694-4d2c-93d0-6d6ff79d775f
Enter name of student1:
A
Enter USN of student:
A01
Enter marks for subject 1:
90
Enter credits for subject 1:
4
Enter marks for subject 2:
91
Enter credits for subject 2:
4
Enter marks for subject 3:
92
Enter credits for subject 3:
3
Enter marks for subject 4:
87
Enter credits for subject 4:
3
Enter marks for subject 5:
91
Enter credits for subject 5:
2
Enter marks for subject 6:
94
Enter credits for subject 6:
1
Enter marks for subject 7:
91
Enter credits for subject 7:
1

Enter name of student2:
B
Enter USN of student:
B01
Enter marks for subject 1:
80
Enter credits for subject 1:
4
Enter marks for subject 2:
83
Enter credits for subject 2:
4
Enter marks for subject 3:
92
Enter credits for subject 3:
3
Enter marks for subject 4:
86
Enter credits for subject 4:
```

```
PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257> & 'C:\Program Files\Java\jdk-21\bin\java
\Code\User\workspaceStorage\9c7fb83aab1159ad099aad915c84d01c\redhat.java\jdt_ws\Rudra Sin
ws\x5cRudra Singh 1BF24CS257_3027e896\x5cbin' 'Stud' ;4eb0244b-c694-4d2c-93d0-6d6ff79d775
Enter credits for subject 6:
1
Enter marks for subject 7:
91
Enter credits for subject 7:
1

Enter name of student2:
B
Enter USN of student:
B01
Enter marks for subject 1:
80
Enter credits for subject 1:
4
Enter marks for subject 2:
83
Enter credits for subject 2:
4
Enter marks for subject 3:
92
Enter credits for subject 3:
3
Enter marks for subject 4:
86
Enter credits for subject 4:
3
Enter marks for subject 5:
88
Enter credits for subject 5:
2
Enter marks for subject 6:
91
Enter credits for subject 6:
1
Enter marks for subject 7:
95
Enter credits for subject 7:
1
Name:A
USN:A01
Effective Score:167
Total Credits:17
SGPA:9.823529411764707

Name:B
USN:B01
Effective Score:157
Total Credits:17
SGPA:9.235294117647058
```

Program 3

Using the `toString()` method

Code:

```
import java.util.Scanner;

class Book{

    String name;

    String author;

    int price;

    int numpages;

    Book(String name, String author, int price, int numpages){

        this.name=name;

        this.author=author;

        this.price=price;

        this.numpages=numpages;

    }

    public String toString(){

        String name;

        String author;

        String price;

        String numpages;

        name="Book name:"+this.name+"\n";

        author="Author:"+this.author+"\n";

        price="Price:"+this.price+"\n";

        numpages="Number of pages:"+this.numpages+"\n";

        return name+author+price+numpages;
    }
}
```

```
    }

}

class Book_show{

    public static void main(String args[]){

        int n;

        int i;

        int k;

        String name;

        String author;

        int price;

        int numpages;

        Scanner scnr=new Scanner(System.in);

        System.out.println("Enter number of books:");

        n=scnr.nextInt();

        scnr.nextLine();

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

        Book bks[]=new Book[n];

        for(i=0;i<n;i++){

            k=i+1;

            System.out.println("");

            System.out.println("Enter name of book"+k+":");

            name=scnr.nextLine();

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

            author=scnr.nextLine();

```

```
System.out.println("Enter price of book:");
price=scnr.nextInt();

System.out.println("Enter number of pages:");
numpages=scnr.nextInt();

scnr.nextLine();

bks[i]=new Book(name,author,price,numpages);

}

for(i=0;i<n;i++){

    k=i+1;

    System.out.println("");

    System.out.println("Entry for book"+k+":");

    System.out.println(bks[i]);

}

}

}
```

Output:

```
PS C:\Users\LENOVO\Desktop\web design using html> & 'C:\Program Fi
NOVO\AppData\Roaming\Code\User\workspaceStorage\9bb571d81bf630c0389
Enter number of books:
3
Enter data:

Enter name of book1:
B1
Enter name of author:
A
Enter price of book:
1000
Enter number of pages:
300

Enter name of book2:
Ba2
Enter name of author:
B
Enter price of book:
2000
Enter number of pages:
300

Enter name of book3:
Bfc1
Enter name of author:
C
Enter price of book:
1500
Enter number of pages:
500

Entry for book1:
Book name:B1
Author:A
Price:1000
Number of pages:300

Entry for book2:
```

Entry for book1:

Book name:B1

Author:A

Price:1000

Number of pages:300

Entry for book2:

Book name:Ba2

Author:B

Price:2000

Number of pages:300

Entry for book3:

Book name:Bfc1

Author:C

Price:1500

Number of pages:500

Program 4

Using Abstract Classes

Code:

```
import java.util.Scanner;

class InputScanner{

    int l,b;

}

abstract class Shape extends InputScanner{

    abstract void printArea();

}

class Rectangle extends Shape{

    void printArea(){

        Scanner scnr=new Scanner(System.in);

        System.out.print("Enter length of rectangle:");

        l=scnr.nextInt();

        System.out.print("Enter width of rectangle:");

        b=scnr.nextInt();

        scnr.nextLine();

        double a=l*b;

        System.out.println("Area of rectangle:"+a);

        System.out.println("");

    }

}
```

```
class Triangle extends Shape{  
    void printArea(){  
        Scanner scnr=new Scanner(System.in);  
        System.out.print("Enter height of triangle:");  
        l=scnr.nextInt();  
        System.out.print("Enter base of triangle:");  
        b=scnr.nextInt();  
        scnr.nextLine();  
        double a=0.5*l*b;  
        System.out.println("Area of triangle:"+a);  
        System.out.println("");  
    }  
}
```

```
class Circle extends Shape{  
    void printArea(){  
        Scanner scnr=new Scanner(System.in);  
        System.out.print("Enter radius of circle:");  
        l=scnr.nextInt();  
        scnr.nextLine();  
        double a=Math.PI*l*l;  
        System.out.println("Area of circle:"+a);  
        System.out.println("");  
    }  
}
```

```
}
```

```
class abs{  
    public static void main(String[] args){  
        Rectangle r=new Rectangle();  
        Triangle t=new Triangle();  
        Circle c=new Circle();  
  
        Shape s;  
  
        s=r;  
        s.printArea();  
  
        s=t;  
        s.printArea();  
  
        s=c;  
        s.printArea();  
    }  
}
```

Output:

```
C:\Users\student\AppData\Roaming\Codecademy\Python\Exercises\Area of Geometric Figures\area.py
in abs "
Enter length of rectangle:10
Enter width of rectangle:3
Area of rectangle:30.0

Enter height of triangle:10
Enter base of triangle:5
Area of triangle:25.0

Enter radius of circle:7
Area of circle:153.93804002589985
```

Program 5

Implementing Inheritance

Code:

```
import java.util.Scanner;

abstract class Account{

    Scanner scnr=new Scanner(System.in);

    String customer_name;

    int acc_no;

    String acc_type;

    int years;

    double balance=0;

    void customer(String name,int num,int type){

        customer_name=name;

        acc_no=num;

        if(type==1){

            acc_type="Savings Account";

            System.out.print("Enter number of years of deposit:");

            years=scnr.nextInt();

            scnr.nextLine();

        }

        else{

            acc_type="Current Account";

        }

    }

    abstract void display();
}
```

```

abstract void withdraw(double wdr);

abstract void deposit(double dep);

}

class Cur_acc extends Account{

void min_bal(){

if (balance<200) {

System.out.println("Penalty imposed due to low balance.");

balance-=50;

}

}

void deposit(double dep){

balance+=dep;

}

void display(){

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

}

void withdraw(double wdr){

if((balance-wdr)>0){

System.out.println("Money withdrawn successfully.");

balance=balance-wdr;

min_bal();

System.out.println("Available balance:"+balance);

}

}

```

```

else{
    System.out.println("Insufficient balance.");
    System.out.println("Available balance:"+balance);
}

}

class Sav_acc extends Account{

void deposit(double dep){

    balance_tot+=dep+(balance_tot*Math.pow((1+0.3),(years)))-balance_tot;

}

double r=0.3;

double ci=(balance*Math.pow((1+0.3),(years)))-balance;

double balance_tot=balance+ci;

void min_bal(){

if (balance_tot<200){

    System.out.println("Penalty imposed due to low balance.");

    balance_tot-=50;

}

}

void display(){

System.out.println("Interest:"+((balance_tot*Math.pow((1+0.3),(years)))-balance_tot));

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

}

```

```

void withdraw(double wdr){

    if((balance_tot-wdr)>0){

        System.out.println("Money withdrawn successfully.");

        balance_tot=balance_tot-wdr;

        min_bal();

        System.out.println("Available balance:"+balance_tot);

    }

    else{

        System.out.println("Insufficient balance.");

        System.out.println("Available balance:"+balance_tot);

    }

}

}

```

```

class Banker{

    public static void main(String args[]){

        String name;

        double dep,wdr;

        int num,type,choice=1,act;

        Scanner scnr=new Scanner(System.in);

        Account a;

        System.out.print("Enter customer name:");

        name=scnr.nextLine();

        System.out.print("Enter account number:");

```

```
num=scnr.nextInt();

scnr.nextLine();

System.out.print("Enter type of account(1 for savings, 0 for current):");

type=scnr.nextInt();

scnr.nextLine();

if(type==1){

    a=new Sav_acc();

}

else{

    a=new Cur_acc();

}

a.customer(name,num,type);

while(choice==1){

    System.out.println("1)Display balance");

    System.out.println("2)Deposit money");

    System.out.println("3)Withdraw money");

    System.out.println("What would you like to do?(1,2,3)");

    act=scnr.nextInt();

    scnr.nextLine();

    switch(act){

        case 1:

            a.display();

            break;

        case 2:
```

```
System.out.println("Enter amount to deposit:");

dep=scnr.nextDouble();

scnr.nextLine();

a.deposit(dep);

break;

case 3:

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

wdr=scnr.nextDouble();

scnr.nextLine();

a.withdraw(wdr);

break;

default:

System.out.println("Invalid input.");

break;

}

System.out.print("Would you like to perform any other actions?(1 for yes,0 for no)");

choice=scnr.nextInt();

scnr.nextLine();

}

}

}
```

Output:

```
C:\Users\Admin\Desktop\Rudra Singh 1B\24CS257> C:\Program Files (Java
Storage\9c7fb83aab1159ad099aad915c84d01c\redhat.java\jdt_ws\Rudra Singh 1B
Enter customer name:A
Enter account number:12
Enter type of account(1 for savings, 0 for current):1
Enter number of years of deposit:2
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
1
Interest:0.0
Balance:0.0
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
2
Enter amount to deposit:
1000
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
1
Interest:690.000000000002
Balance:1000.0
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
2
Enter amount to deposit:
10
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
1
Interest:1173.000000000002
Balance:1700.000000000002
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
```

```
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
3
Enter amount to withdraw:
2000
Insufficient balance.
Available balance:1700.000000000002
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
3
Enter amount to withdraw:
500
Money withdrawn successfully.
Available balance:1200.000000000002
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
1
Interest:828.0000000005
Balance:1200.000000000002
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
3
Enter amount to withdraw:
1130
Money withdrawn successfully.
Penalty imposed due to low balance.
Available balance:20.0000000000227
Would you like to perform any other actions?(1 for yes,0 for no)0
○ PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257> █
```

```
● -cp ' 'C:\Users\Admin\AppData\Roaming\Code\User\workspaceStorage\9c7fb83aab1159
Enter customer name:B
Enter account number:10
Enter type of account(1 for savings, 0 for current):0
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
1
Balance:0.0
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
2
Enter amount to deposit:
1000
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
1
Balance:1000.0
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
3
Enter amount to withdraw:
100000
Insufficient balance.
Available balance:1000.0
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
3
Enter amount to withdraw:
500
Money withdrawn successfully.
Available balance:500.0
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
3
```

```
3
Enter amount to withdraw:
500
Money withdrawn successfully.
Available balance:500.0
Would you like to perform any other actions?(1 for yes,0 for no)1
1)Display balance
2)Deposit money
3)Withdraw money
What would you like to do?(1,2,3)
3
Enter amount to withdraw:
430
Money withdrawn successfully.
Penalty imposed due to low balance.
Available balance:20.0
Would you like to perform any other actions?(1 for yes,0 for no)0
○ PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257> █
```

Program 6

Using Packages

Code:

CIE Package : Class Internals:

```
package CIE;

import java.util.Scanner;

public class Internals extends Student{

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

    public void CIEmarks(){

        Scanner scnr=new Scanner(System.in);

        int i;

        System.out.println("Enter CIE marks:");

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

            System.out.print("Enter marks for subject "+(i+1)+":");
            marksin[i]=scnr.nextInt();

            scnr.nextLine();
        }
    }
}
```

CIE Package : Class Student:

```
package CIE;

import java.util.Scanner;
```

```
public class Student {  
    public String usn = new String();  
    public String name = new String();  
    public int sem;  
    Scanner scnr=new Scanner(System.in);  
  
    public void inputDetails(){  
        System.out.print("Enter USN:");  
        usn=scnr.nextLine();  
        System.out.print("Enter Name:");  
        name=scnr.nextLine();  
        System.out.print("Enter Sem:");  
        sem=scnr.nextInt();  
        scnr.nextLine();  
    }  
  
    public void Details(){  
        System.out.println("Name:"+name);  
        System.out.println("Usn:"+usn);  
        System.out.println("Sem:"+sem);  
    }  
}
```

SEE Package : Class External:

```
package SEE;

import CIE.Internals;

import java.util.Scanner;

public class External extends Internals{

    int i=0;

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

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

    public void SEEmarks(){

        Scanner scnr=new Scanner(System.in);

        System.out.println("Enter SEE marks:");

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

            System.out.print("Enter marks for subject "+(i+1)+":");

            marks[i]=scnr.nextInt()/2;

            scnr.nextLine();

        }

    }

    public void Final_marks(External in){

        System.out.println("Final marks:");

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

            finalMarks[i]=marks[i]+in.marksin[i];

        }

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

    }
```

```
        System.out.println("Marks for subject"+(i+1)+":"+finalMarks[i]);  
    }  
}  
}
```

Main:

```
import SEE.External;  
  
class Main{  
    public static void main(String args[]){  
        External e=new External();  
        e.inputDetails();  
        e.CIEmarks();  
        e.SEEmarks();  
        e.Details();  
        e.Final_marks(e);  
    }  
}
```

Output:

```
spacestorage\05ea\b1045e3342a2\00509adce04c10\eduat.java\jut_ws\lab6\b748e622\b1n  Main
ws\x5clab6_b748e622\x5cbn' 'Main' ;7d8d5fd2-cafe-44b9-8c91-93810239fc37Enter USN:1BF24CS257
Enter Name:Rudra
Enter Sem:3
Enter CIE marks:
Enter marks for subject 1:49
Enter marks for subject 2:49
Enter marks for subject 3:46
Enter marks for subject 4:47
Enter marks for subject 5:48
Enter SEE marks:
Enter marks for subject 1:100
Enter marks for subject 2:100
Enter marks for subject 3:97
Enter marks for subject 4:98
Enter marks for subject 5:99
Name:Rudra
Usn:1BF24CS257
Sem:3
Final marks:
Marks for subject1:99
Marks for subject2:99
Marks for subject3:94
Marks for subject4:96
Marks for subject5:97
PS C:\Users\Admin\Desktop\Rudra Singh 1BF24CS257\lab6> █
```

Program 7

Implementing User Defined Exceptions

Code:

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

```
class WrongAge extends Exception{
```

```
    public WrongAge(int i){
```

```
        if(i==1){
```

```
            System.out.println("Age cannot be negative or zero.");
```

```
    }
```

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

```
        System.out.println("Father's age cannot be less than son's age.");
```

```
    }
```

```
}
```

```
class Father{
```

```
    int f_age;
```

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

```
    Father() throws WrongAge{
```

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

```
        f_age=scnr.nextInt();
```

```
        scnr.nextLine();
```

```
        if(f_age<=0){
```

```
        throw new WrongAge(1);

    }

}

void display(){

    System.out.println("Father's age:"+f_age);

}

}
```

```
class Son extends Father{

    int s_age;

    Son() throws WrongAge{

        System.out.print("Enter son's age:");

        s_age=scnr.nextInt();

        scnr.nextLine();

        if(s_age<=0){

            throw new WrongAge(1);

        }

        else if(s_age>=f_age){

            throw new WrongAge(2);

        }

    }

    void display(){

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

    }

}
```

```
super.display();

}

}

public class age_taker {

    public static void main(String[] args) {

        try{

            Son s=new Son();

            System.out.println("Valid ages.");

            s.display();

        }

        catch(WrongAge w){

            System.out.println("Therefore, wrong age.");

        }

    }

}
```

Output:

```
PS C:\Users\Admin\Desktop\Rudra Singh 1
● Enter father's age:0
Age cannot be negative or zero.
Therefore, wrong age.
● PS C:\Users\Admin\Desktop\Rudra Singh 1
Enter father's age:30
Enter son's age:-4
Age cannot be negative or zero.
Therefore, wrong age.
● PS C:\Users\Admin\Desktop\Rudra Singh 1
Enter father's age:13
Enter son's age:30
Father's age cannot be less than son's
Therefore, wrong age.
● PS C:\Users\Admin\Desktop\Rudra Singh 1
Enter father's age:30
Enter son's age:13
Valid ages.
Son's age:13
Father's age:30
```

Program 8

Multi-Threading

Code:

```
class Typer extends Thread{  
    public void run(){  
        while (true){  
            System.out.println("BMS College of Engineering");  
            try {  
                Thread.sleep(10000);  
            }  
            catch (InterruptedException e){  
                System.out.println("Interrupted");  
            }  
        }  
    }  
  
    class Typer2 extends Thread{  
        public void run(){  
            while (true){  
                System.out.println("CSE");  
                try {  
                    Thread.sleep(2000);  
                }  
                catch (InterruptedException e){  
                    System.out.println("Interrupted");  
                }  
            }  
        }  
    }  
}
```

```
        }
    }
}

public class BMS_CS{
    public static void main(String args[]) {
        Typer t1=new Typer();
        Typer2 t2=new Typer2();
        t1.start();
        t2.start();
    }
}
```

Output:

```
PS C:\Users\Admin\Desktop\Rudra S>
④ BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
④ PS C:\Users\Admin\Desktop\Rudra S
```