VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

OBJECT ORIENTED JAVA

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
(Autonomous Institution under VTU)
BENGALURU-560019
Oct 2022-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 **Prakhyati Bansal (1BM21CS136),** who is bona fide 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 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of Data structures Lab - **(22CS3PCOOJ)** work prescribed for the said degree.

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Index Sheet

Course Outcomes

CO1	Apply the knowledge of Java concepts to find the solution for a given problem.
CO2	Analyse the given Java application for correctness/functionalities
CO3	Develop Java programs / applications for a given requirement
CO4	Conduct practical experiments for demonstrating features of Java

Quadratic Equations- LAB1

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 discriminate b^2 -4ac is negative, display a message stating that there are no real solutions.

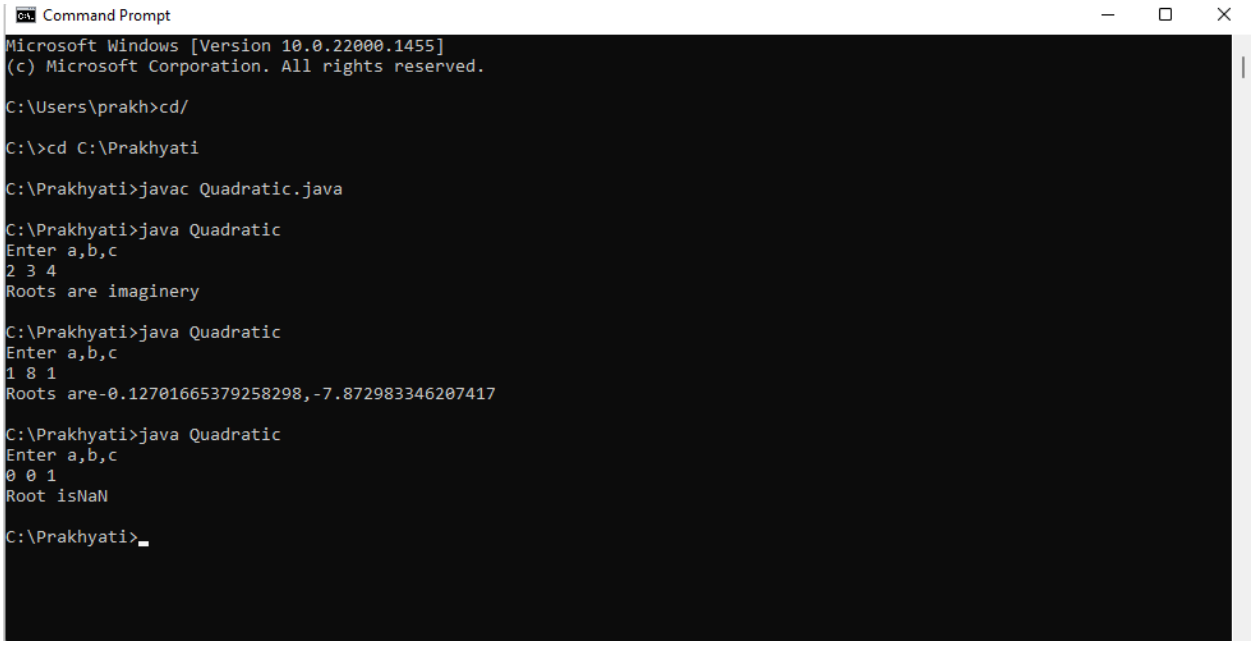
Quadratic Equation

```
import java.io.*;
import java.util.*;
class quadratic {
    public static void main (String args[])
{
Scanner s = new Scanner (System.in);
System.out.println (" Enter a,b,c");
    double a = s.nextdouble();
    double b= s.nextdouble();
    double c = s.nextdouble();
    double d = b*b-4*a*c;

 if (d>0) {
double r1 = (-b+Math.pow(d,0.5))/(2*a);
double r2= (-b-Math.pow(d,0.5))/(2*a);
System.out.println(" Roots are" +r1+" "+r2);
}
else if (d==0)
{
double r= (-b)/(2*a);
System.out.println (" Root is " +r);
}
else
System.out.println (" Roots are imagineny");
}
}
```

O/P - Enter the values of a,b,c : 1 5 6
Roots are: -2 -3

```
import java.io.*;
import java.util.*;
class Quadratic{
public static void main(String args[])
{
Scanner s= new Scanner(System.in);
System.out.println("Enter a,b,c");
double a= s. nextDouble();
double b= s. nextDouble();
double c= s. nextDouble();
double d= b*b-4*a*c;
if (d>0)
{
   double r1=(-b+ Math.pow(d,0.5) )/(2*a);
   double r2=(-b- Math.pow(d,0.5) )/(2*a);
   System.out.println("Roots are"+r1+","+r2);
}
else if (d==0)
{
   double r=(-b)/(2*a);
   System.out.println("Root is"+r);
}
else
System.out.println("Roots are imaginery");
}
}
```


Command Prompt
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.
C:\Users\prakh>cd/
C:\>cd C:\Prakhyati
C:\Prakhyati>javac Quadratic.java
C:\Prakhyati>java Quadratic
Enter a,b,c
2 3 4
Roots are imaginery
C:\Prakhyati>java Quadratic
Enter a,b,c
1 8 1
Roots are-0.12701665379258298,-7.872983346207417
C:\Prakhyati>java Quadratic
Enter a,b,c
0 0 1
Root isNaN
C:\Prakhyati>

SGPA- LAB2

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.

SGPA

```
import java.util.Scanner;
class Student
{
    String USN;
    String name;
    int [] credits = new int [20];
    int [] marks = new int [20];
    public void input (int n)
    {
        Scanner s= new
    Scanner (System.in);
        System.out.print("Enter Student USN: ");
        USN= s.nextLine();
System.out.print ("Enter Student name:");
        name = s.nextLine();
        for (int i=0; i<n; i++)
    {
System.out.print ("Enter the subject "+(i+1)+"
marks and credits respectively: ");
        marks [i]= s.nextInt();
        credits [i]= s.nextInt();
    }
}
public float calculate (int n)
{
    int sum_of_credits = 0;
    float result = 0.0f;
    for (int i=0; i<n; i++)
    {
```

```
sum_of_credits += credits[i];
if (calculate_grade_point(marks[i]) == -1)
    return -1.0f;
  else
  {
result = result + (float) (calculate_grade_
point(marks[i]) * credits[i]);
  }
  }
return (result / sum_of_credits);
}
public int calculate_grade_point(int marks)
{
   if (marks >= 90)
      return 10;
else if ((marks >= 80) && (marks < 90))
      return 9;
else if ((marks >= 70) && (marks < 80))
      return 8;
else if ((marks >= 60) && (marks < 70))
      return 7;
else if (marks >= 50) && (marks < 60))
      return 6;
else if (marks >= 40) && (marks < 50))
      return 5;
   return -1;
}
```

```
public void display(int n, float result)
{
System.out.println("\n");
System.out.println("Students Details");
System.out.println();
System.out.println("Students USN:" + USN);
System.out.println("Students Name:" + name);
System.out.println("Students Marks and
                    credits");

for(int i=0; i<n; i++)
{
System.out.println("Subject " -->\t Marks:
" +marks[i]+" credits: "+credits[i]);

}
System.out.println("SGPA :"+result);
}
}
public class SGPA
{
public static void main(String args[])
{
Scanner s= new Scanner(System.in);
Student s1 = new Student();
System.out.print("Enter the number of
subjects: ");
int n = s.nextInt();
s1.input(n);
float result = s1.calculate(n);
```

```
        if (result == -1.0f)
        {
            System.out.println();
            System.out.println("The student has failed in a subject. SGPA cannot be calculated!");
            System.exit(0);
        }
        s1.display(n, result);
    }
}
```

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```
import java.util.Scanner;
class Student
{
   String USN;
   String name;
   int[] credits = new int[20];
   int[] marks = new int[20];
   public void input(int n)
   {
      Scanner s = new Scanner(System.in);
      System.out.print("Enter Student USN: ");
      USN = s.nextLine();
      System.out.print("Enter Student Name: ");
      name = s.nextLine();
      for(int i=0;i<n;i++)
      {
         System.out.print("Enter the Subject "+(i+1)+" marks and credits respectively: ");
         marks[i] = s.nextInt();
         credits[i] = s.nextInt();
      }
   }
   public float calculate(int n)
   {
      int sum_of_credits = 0;
      float result=0.0f;
      for(int i=0;i<n;i++)
      {
         sum_of_credits+=credits[i];
         if(calculate_grade_point(marks[i])==-1)
```

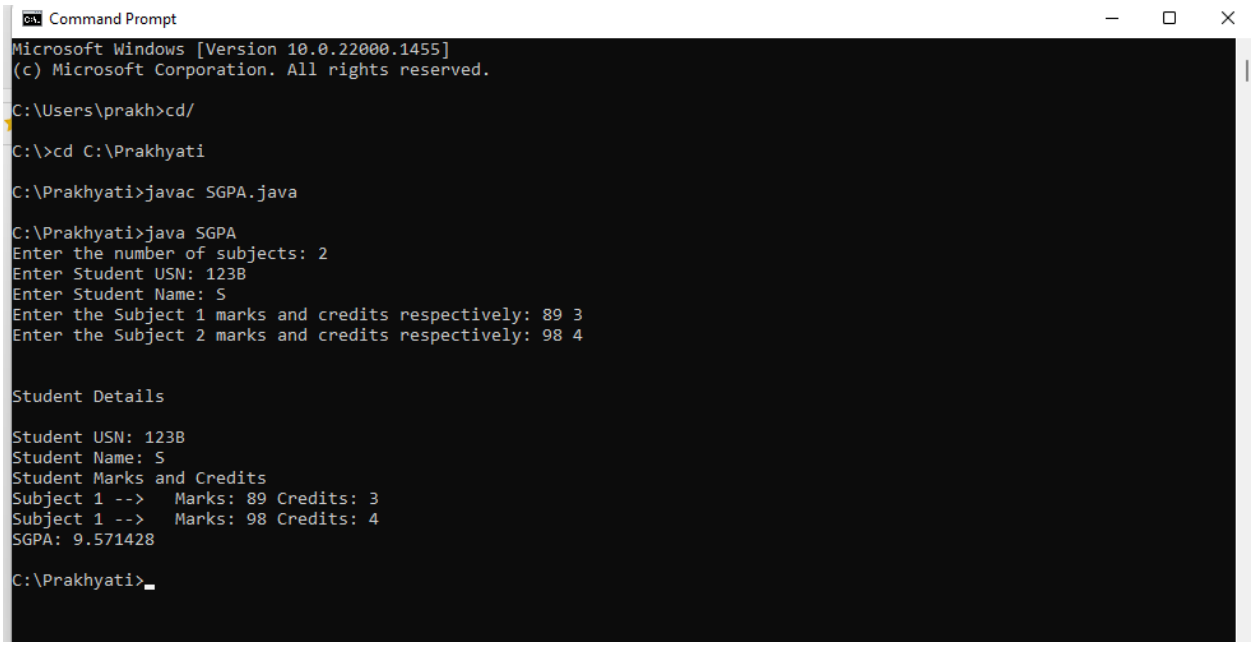
```
            return -1.0f;
        else
        {
            result = result +(float) (calculate_grade_point(marks[i])*credits[i]);
        }
    }
    return (result/sum_of_credits);
}

public int calculate_grade_point(int marks)
{
    if(marks>=90)
        return 10;
    else if ((marks>=80)&&(marks<90))
        return 9;
    else if ((marks>=70)&&(marks<80))
        return 8;
    else if ((marks>=60)&&(marks<70))
        return 7;
    else if ((marks>=50)&&(marks<60))
        return 6;
    else if ((marks>=40)&&(marks<50))
        return 5;
    return -1;
}

public void display(int n,float result)
{
    System.out.println("\n");
```

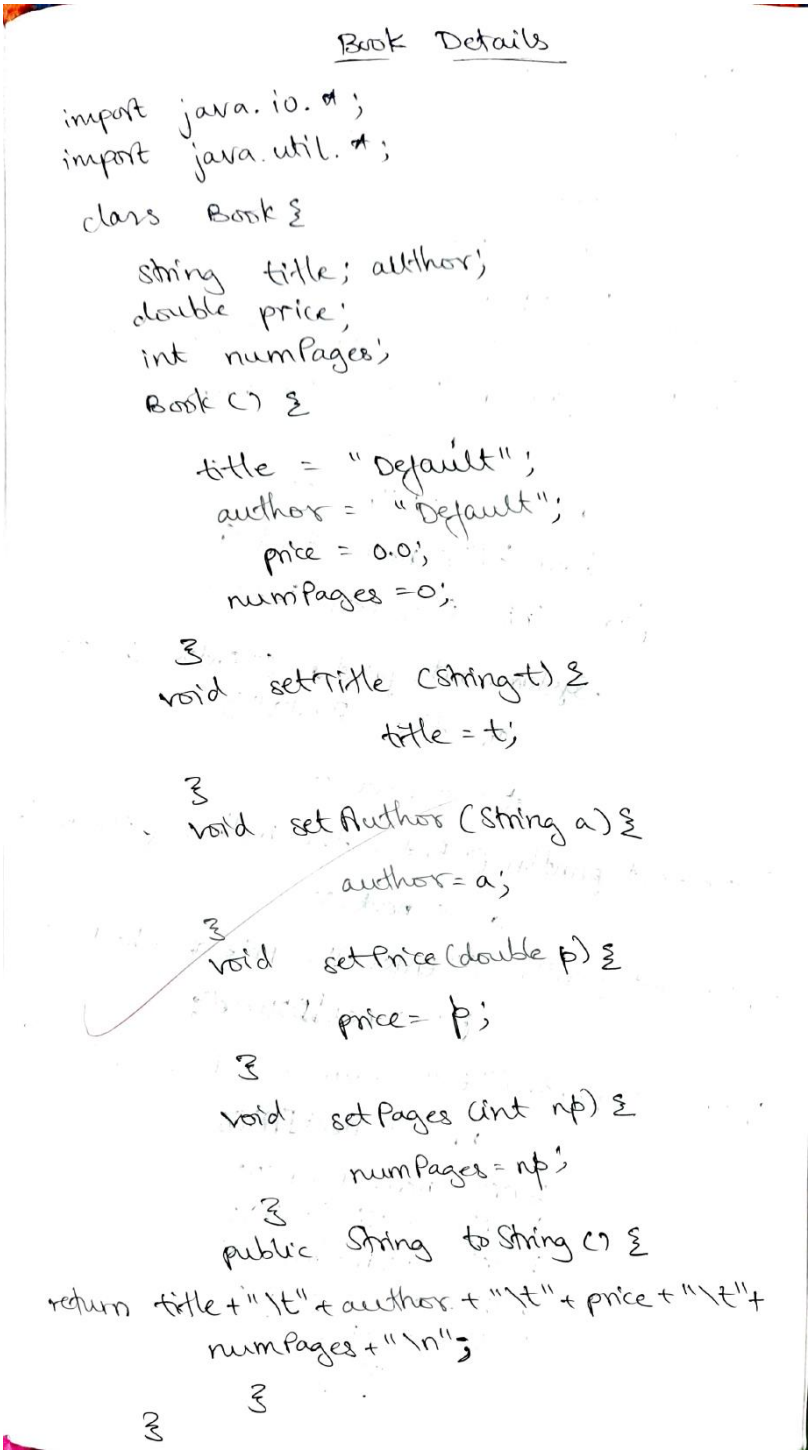
```
        System.out.println("Student Details");
        System.out.println();
        System.out.println("Student USN: "+USN);
        System.out.println("Student Name: "+name);
        System.out.println("Student Marks and Credits");
        for(int i=0;i<n;i++)
        {
            System.out.println("Subject 1 -->\tMarks: "+marks[i]+" Credits: "+credits[i]);
        }
        System.out.println("SGPA: "+result);
    }
}
public class SGPA
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        Student s1 = new Student();
        System.out.print("Enter the number of subjects: ");
        int n = s.nextInt();
        s1.input(n);
        float result = s1.calculate(n);
        if(result == -1.0f)
        {
            System.out.println();
            System.out.println("The Student has failed in a subject. SGPA cannot be calculated!");
            System.exit(0);
        }
        s1.display(n,result);
```

```
    }
}
```


Command Prompt
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.
C:\Users\prakh>cd/
C:\>cd C:\Prakhyati
C:\Prakhyati>javac SGPA.java
C:\Prakhyati>java SGPA
Enter the number of subjects: 2
Enter Student USN: 123B
Enter Student Name: S
Enter the Subject 1 marks and credits respectively: 89 3
Enter the Subject 2 marks and credits respectively: 98 4
Student Details
Student USN: 123B
Student Name: S
Student Marks and Credits
Subject 1 -->   Marks: 89 Credits: 3
Subject 1 -->   Marks: 98 Credits: 4
SGPA: 9.571428
C:\Prakhyati>

Book Details- LAB3

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 toString( ) method that could display the complete details of the book. Develop a Java program to create n book objects.



Book Details

```
import java.io.*;
import java.util.*;
class Book {
    String title; allthor;
    double price;
    int numPages;
    Book () {
        title = "Default";
        author = "Default";
        price = 0.0;
        numPages = 0;
    }
    void setTitle (String t) {
        title = t;
    }
    void setAuthor (String a) {
        author = a;
    }
    void setPrice (double p) {
        price = p;
    }
    void setPages (int np) {
        numPages = np;
    }
    public String toString () {
return title + "\t" + author + "\t" + price + "\t" +
        numPages + "\n";
    }
}
```

```
class BookDetails {
public static void main (String args[]) {
        String t,a;
        double p;
       int np, n;
    Scanner s = new Scanner (System.in);
System.out.println ("Enter the number of
                    Books");
        n = s.nextInt();
        Book b[] = new Book[n];
for (int i=0; i<n; i++) {
        System.out.println ("Enter the Title
                of the Books");
        t = s.next();
System.out.println ("Enter the Author of the Books");
        a = s.next();
System.out.println ("Enter the Price of the Books");
        p = s.nextDouble();
System.out.println ("Enter number of pages of Book");
        np = s.nextInt();
        b[i] = new Book();
        b[i].setTitle (t);
        b[i].setAuthor (a);
        b[i].setPrice (p);
        b[i].setPages (np);
}
```

```
System.out.println("Title\t Author\t Price\t
        Price \n");
    for (int i=0; i<n; i++) {
        System.out.println(b[i]);
    }
}
}
```

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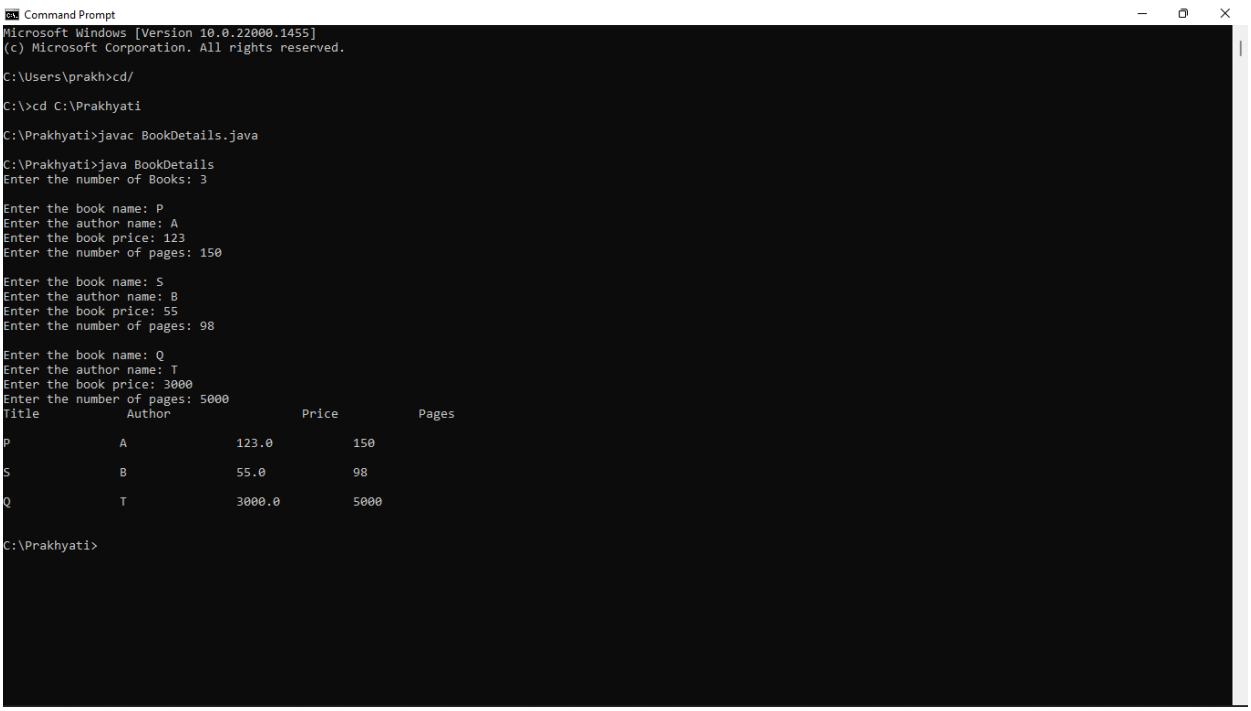
```
import java.util.*;
import java.io.*;

class Book
{
String title,author;
float price;
int num_pages;

Book()
{
title = "Default Value";
author = "Default Value";
price = 0.0f;
num_pages = 0;
}

void setTitle(String title)
{
this.title=title;
}

void setAuthor(String author)
{
this.author=author;
}

void setPrice(float price)
{
```

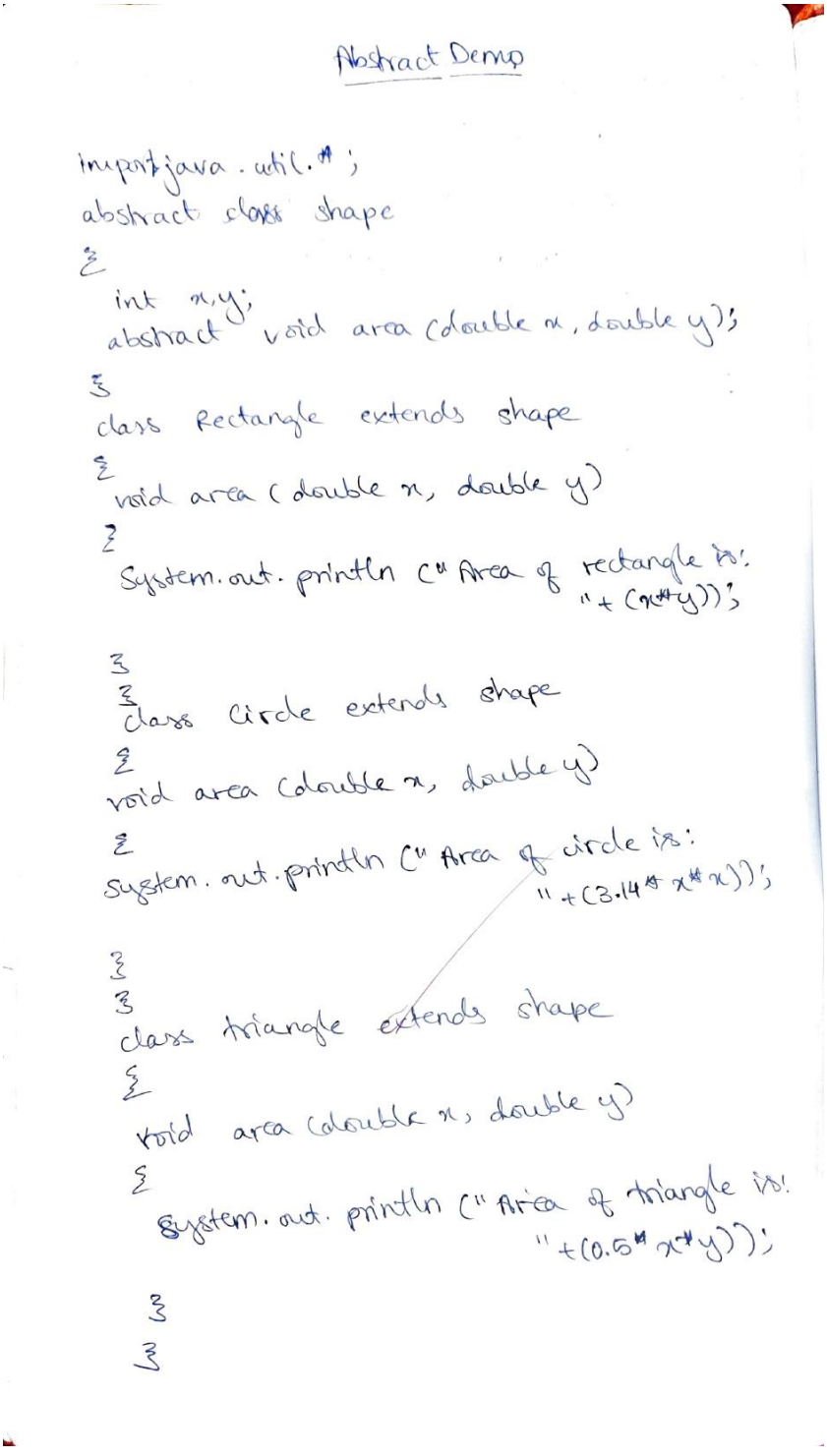
```
this.price=price;
}

void setPages(int num_pages)
{
this.num_pages = num_pages;
}


public String toString()
{
return title+"\t\t"+author+"\t\t"+price+"\t\t"+num_pages+"\n";
}



}

public class BookDetails

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

String t, a;
float p;
int np,n;
Scanner s = new Scanner(System.in);
System.out.print("Enter the number of Books: ");
n = s.nextInt();
```

```
Book[] b = new Book[n];
for(int i=0;i<n;i++)
{
System.out.println();
System.out.print("Enter the book name: ");
t = s.next();
System.out.print("Enter the author name: ");
a = s.next();
System.out.print("Enter the book price: ");
p = s.nextFloat();
System.out.print("Enter the number of pages: ");
np = s.nextInt();

b[i] = new Book();
b[i].setTitle(t);
b[i].setAuthor(a);
b[i].setPrice(p);
b[i].setPages(np);
}

System.out.println("Title \t\t Author \t\t Price \t\t Pages\n");
for(int i=0; i<n;i++)
{
System.out.println(b[i]);
}
}
}
```


Command Prompt
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.
C:\Users\prakh>cd/
C:\>cd C:\Prakhyati
C:\Prakhyati>javac BookDetails.java
C:\Prakhyati>java BookDetails
Enter the number of Books: 3
Enter the book name: P
Enter the author name: A
Enter the book price: 123
Enter the number of pages: 150
Enter the book name: S
Enter the author name: B
Enter the book price: 55
Enter the number of pages: 98
Enter the book name: Q
Enter the author name: T
Enter the book price: 3000
Enter the number of pages: 5000
Title Author Price Pages
P A 123.0 150
S B 55.0 98
Q T 3000.0 5000
C:\Prakhyati>

Abstract- LAB4

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea( ). 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 printArea( ) that prints the area of the given shape.



Abstract Demo

```
import java.util.*;
abstract class shape
{
  int x,y;
  abstract void area (double x, double y);
}
class Rectangle extends shape
{
  void area (double x, double y)
  {
   System.out.println ("Area of rectangle is:
                        " + (x*y));
  }
}
class Circle extends shape
{
void area (double x, double y)
{
System.out.println ("Area of circle is:
                     " + (3.14 * x * x));
}
}
class triangle extends shape
{
  void area (double x, double y)
  {
    System.out.println ("Area of triangle is:
                         " + (0.5 * x * y));
  }
}
```

```
public class AbstractDemo
{
public static void main (String [] args)
{
Rectangle r= new Rectangle();
r. area (2,5);
Circle c= new Circle();
c. area (5,5);
Triangle t= new Triangle();
t. area (2,5);
}
}
```

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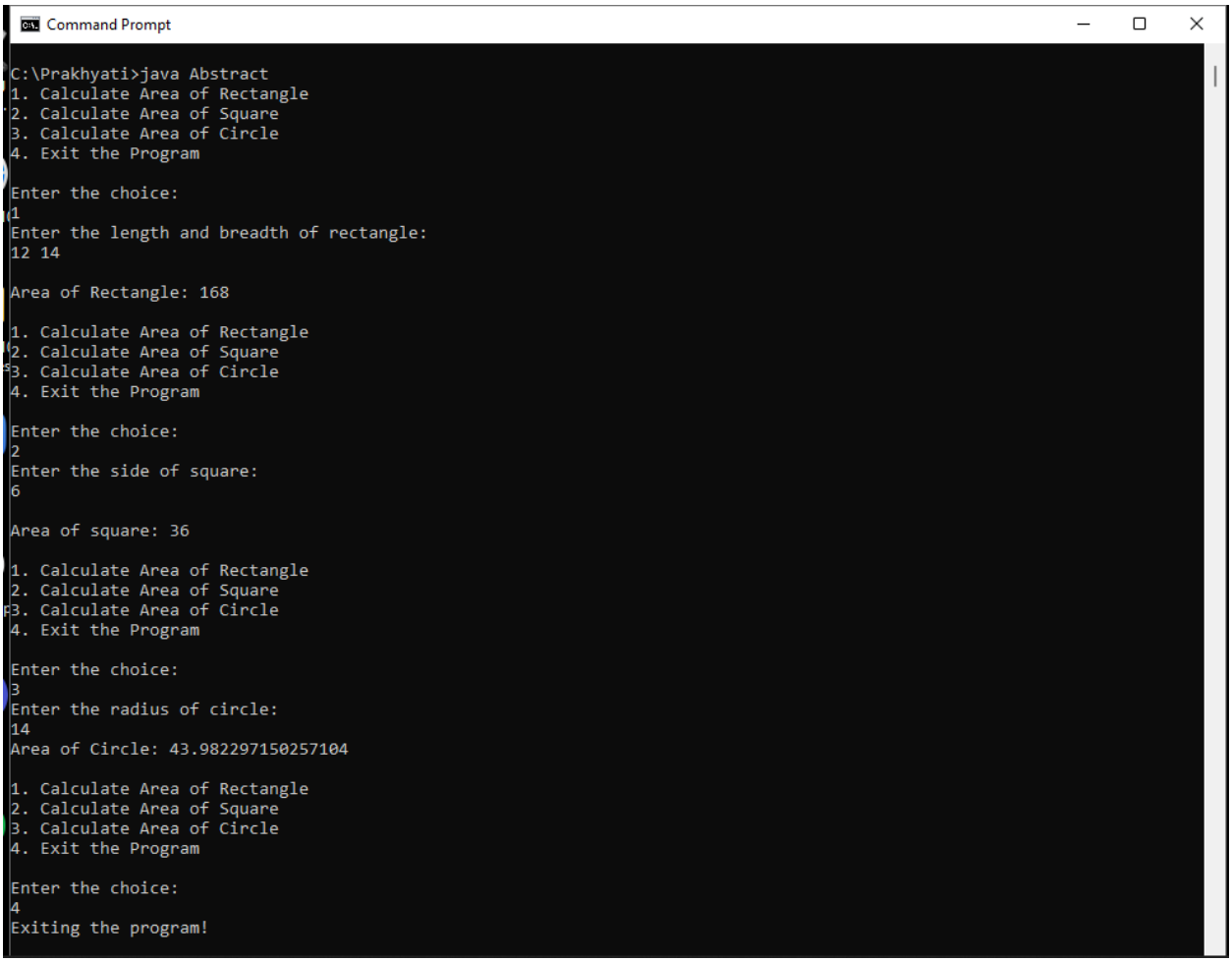
OUTPUT-

```
area of rectangle is: 10.0
area of circle is: 78.5
area of triangle is: 5.0
```

```
import java.util.Scanner;
abstract class Shape
{
   int a,b;
   abstract void printArea();
}

class Rectangle extends Shape
{
   void printArea()
   {
      int area;
      Scanner s = new Scanner(System.in);
      System.out.println("Enter the length and breadth of rectangle: ");
      a = s.nextInt();
      b = s.nextInt();
      area = a*b;
      System.out.println("\nArea of Rectangle: "+area+"\n");
   }
}

class Square extends Shape
{
   void printArea()
   {
      int area;
      Scanner s = new Scanner(System.in);
      System.out.println("Enter the side of square: ");
      a = s.nextInt();
```

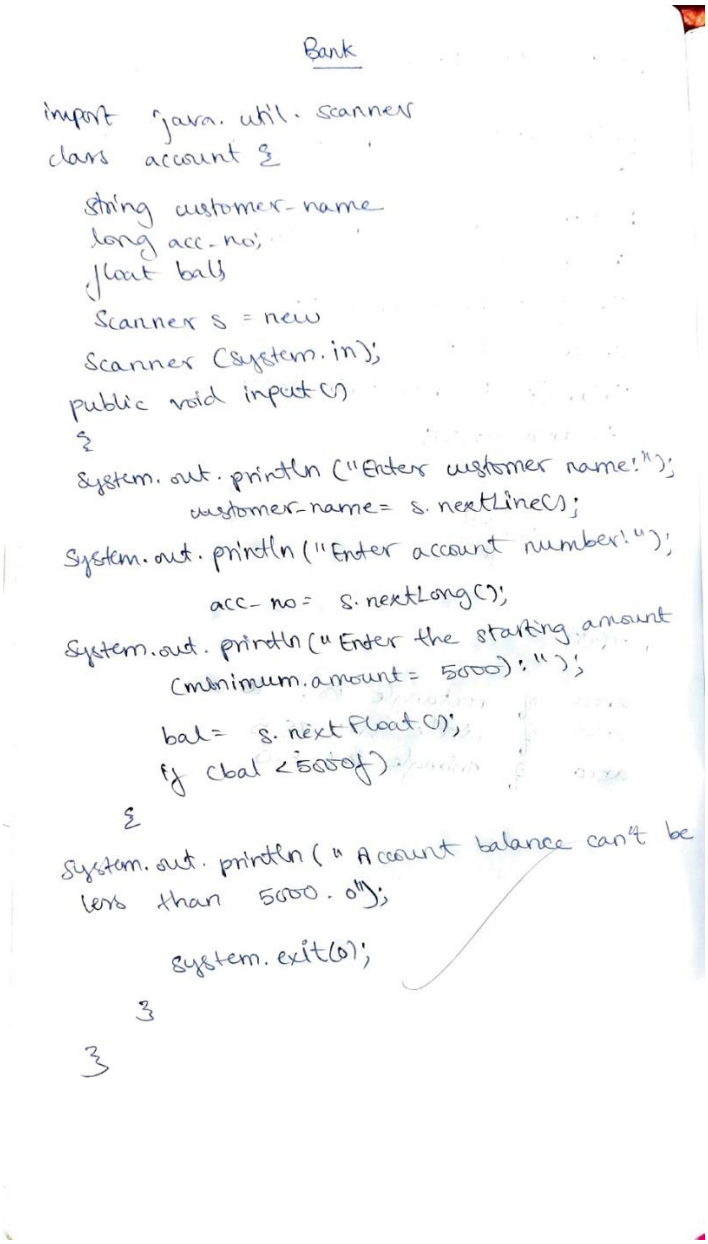
```
        area = a*a;
        System.out.println("\nArea of square: "+area+"\n");
    }
}

class Circle extends Shape
{
    void printArea()
    {
        double area;
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the radius of circle: ");
        a = s.nextInt();
        area = Math.PI*a;
        System.out.println("Area of Circle: "+area+"\n");
    }
}

public class Abstract
{
    public static void main(String[] args)
    {
        int choice;
        Scanner s = new Scanner(System.in);
        do
        {
            System.out.println("1. Calculate Area of Rectangle\n2. Calculate Area of Square\n3. Calculate
Area of " +
                    "Circle\n4. Exit the Program\n\nEnter the choice: ");
```

```
            choice = s.nextInt();
            switch(choice)
            {
               case 1: Rectangle r = new Rectangle();
                       r.printArea();
                       break;
               case 2: Square sq = new Square();
                      sq.printArea();
                       break;
               case 3: Circle c = new Circle();
                       c.printArea();
                       break;
               case 4: System.out.println("Exiting the program!");
                       System.exit(0);
                       break;
               default: System.out.println("\nInvalid Choice!\n");
            }
         }while(true);
      }
}
```


Command Prompt
C:\Prakhyati>java Abstract
1. Calculate Area of Rectangle
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program
Enter the choice:
1
Enter the length and breadth of rectangle:
12 14
Area of Rectangle: 168
1. Calculate Area of Rectangle
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program
Enter the choice:
2
Enter the side of square:
6
Area of square: 36
1. Calculate Area of Rectangle
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program
Enter the choice:
3
Enter the radius of circle:
14
Area of Circle: 43.982297150257104
1. Calculate Area of Rectangle
2. Calculate Area of Square
3. Calculate Area of Circle
4. Exit the Program
Enter the choice:
4
Exiting the program!

Bank- LAB5

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-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: 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.



```
Bank

import java.util.Scanner;
class account {
    String customer_name;
    long acc_no;
    float bal;
    Scanner s = new
    Scanner(System.in);
public void input()
{
System.out.println("Enter customer name:");
        customer_name= s.nextLine();
System.out.println("Enter account number:");
        acc_no= s.nextLong();
System.out.println("Enter the starting amount
    (minimum amount= 5000):");
        bal= s.nextFloat();
        if(bal<5000f)
    {
System.out.println("Account balance can't be
less than 5000.0");
        System.exit(0);
    }
}
```

```
public void display()
{
  System.out.println("Customer Name:"
                     +customer_name);
  System.out.println("Account Number:"+acc_no);
  System.out.println("Amount :"+bal);
 }
}

class Savings extends Account
{
  Scanner s= new Scanner(System.in);
  float deposit, withdraw, interest;
  public void deposit()
  {
   System.out.println("Enter the amount to
        be deposited:");
       deposit = s.nextFloat();
        bal+ = deposit;
   System.out.println("Balance:"+bal);
  }
public void withdraw()
{
System.out.println("Enter the amount to be
                    withdrawn:");
       withdraw = s.nextfloat();
   if(bal < 5000)
   {
     System.out.println("Insufficient balance");
   }
```

```
    else
    {
        bal -= withdraw;
        System.out.println(" Amount withdrawn: "
                + withdraw+"\n Balance: " +bal);
    }
}
public void check_Bal()
{
    if (bal<5000)
    {
System.out.println ("Insufficient Balance!\n
                Balance : " +bal);
    }
    else
    {
    System.out.println (" Balance : " +bal);
    }
}
public void interest()
{
    interest = (bal*6)/100;
    bal += interest;
System.out.println (" Interest Credited: " +interest"
            "\n Balance : " +bal);

}
}
```

```
class Current extends Account
{
  float deposit, withdraw, penalty;
  public void deposit()
  {
System.out.println("Enter amount to be
                    deposited:");
        deposit = s.nextFloat();
        bal += deposit;
    System.out.println("Balance:" +bal);
  }
public void check_Bal()
{   if (bal < 5000)
    {
      penalty = (0.1f * bal);
System.out.println("Initial Account Balance:"
                    +bal);
        bal = bal - penalty;
System.out.println("Low balance! \n Penalty
Amount:" + penalty + "\n Account
        balance :" + bal);

    }
  else
  {
    System.out.println("Balance:" +bal);
  }
}
```

```
public boolean check_Bal_part_2()
{
    if (bal < 5000)
    {
        penalty = (0.1f * bal);
System.out.println("Initial Account Balance:"+bal);
            bal = bal- penalty;
System.out.println("Low Balance! \n Penalty
        Amount:"+penalty+"\n Account
            balance:" +bal);
        return false;
    }
    return true;
}
public void withdraw()
{
System.out.println("Enter Amount to withdraw:");
        withdraw= s.nextFloat();
        if (check_Bal_part_2())
        {
            bal -= withdraw;
System.out.println("Amount withdrawn:
        "+ withdraw+"\n Balance:"+bal);
        }
}
```

```
public void chequebook ()
{
  System.out.println(" cheque Book has been
                      issued! ");
}
}
public class Bank
{
public static void main (String[] args)
{
  Scanner s = new Scanner (System.in);
  String ch;
  int n;
  Current c = new Current();
  Savings sa = new Savings ();
System.out.println(" Enter the account
  type ( s for savings, c for current):");
                ch = s.next();
  switch (ch.toLowerCase()) {
  {
   case "s" : sa.input ();
              do
              {
System.out.println(" 1. Deposit \n 2. withdrawal
\n 3. Check balance \n 4. Check interest" \n
5. Show Account Details \n 6. Exit Transaction
\n\n Enter your choice: ");
                n = s.nextInt();
```

```
switch (n)
{
    case 1: sa.deposit ();
            break;
    case 2: sa. withdraws();
            break;
    case 3: sa. check-Bal();
            break;
    case 4: sa. Interest ();
            break;
    case 5: sa. display ();
            break;
    case 6: system.out. println ("Existing
                Transaction!");
            System. exit(0);
            break;
    default : system. out. println ("Invalid
                operation");
    }
  } while(true);
case"c" : c. input ();
    do {
System. out. print (" 1. Deposit \n 2. withdrawal
\n 3. check balance \n 4. Issue Cheque Book"
\n 5. Show Account Details \n 6. Exit
Transaction \n\n Enter your choice: ");
            n = s. next Int ();
```

```
switch (n)
{
case 1: c. deposit ();
        break;
case 2: c. withdrawal ();
        break;
case 3: c. check_Bal ();
        break;
case 4: c. interest ();
        break;
case 5: c. displayc ();
        break;
case 6: System.out. println ("Exiting
            transaction!");
        System. exit (0);
        break;
        default: system. out. println
    ("Invalid operation");
}while (true);
default : system . out. println ("Invalid
                    choice");
          break;
}
}
```

Output:

Enter account type: S
Enter customer name: Pr
Enter account number: 123
Enter the starting amount (min. amt=500)
: 7000

O/P seen
30/12/22

```
import java.util.Scanner;
class Account
{
   String customer_name;
   long acc_no;
   float bal;
   Scanner s = new Scanner(System.in);
   public void input()
   {
      System.out.print("\nEnter the Customer Name: ");
      customer_name = s.nextLine();
      System.out.print("\nEnter the Account Number: ");
      acc_no = s.nextLong();
      System.out.print("\nEnter the Starting Amount (Minimum Amount = 5000): ");
      bal = s.nextFloat();
      if(bal<5000f)
      {
         System.out.println("\nAccount Balance cannot be less than 5000.0 \n");
         System.exit(0);
      }
   }
   public void display()
   {
      System.out.println("\nCustomer Name: "+customer_name);
      System.out.println("Account Number: "+acc_no);
      System.out.println("Amount: "+bal);
   }
}
```

```
class Savings extends Account
{
   Scanner s = new Scanner(System.in);
   float deposit,withdraw,interest;
   public void deposit()
   {
      System.out.print("\nEnter the amount to be deposited: ");
      deposit = s.nextFloat();
      bal+=deposit;
      System.out.println("\nBalance: "+bal);
   }
   public void withdraw()
   {
      System.out.print("\nEnter the amount to be withdrawn: ");
      withdraw = s.nextFloat();
      if(bal<5000)
      {
         System.out.println("\nInsufficient Balance");
      }
      else
      {
         bal-=withdraw;
         System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance: "+bal);
      }
   }
   public void check_Bal()
   {
      if(bal<5000)
      {
```

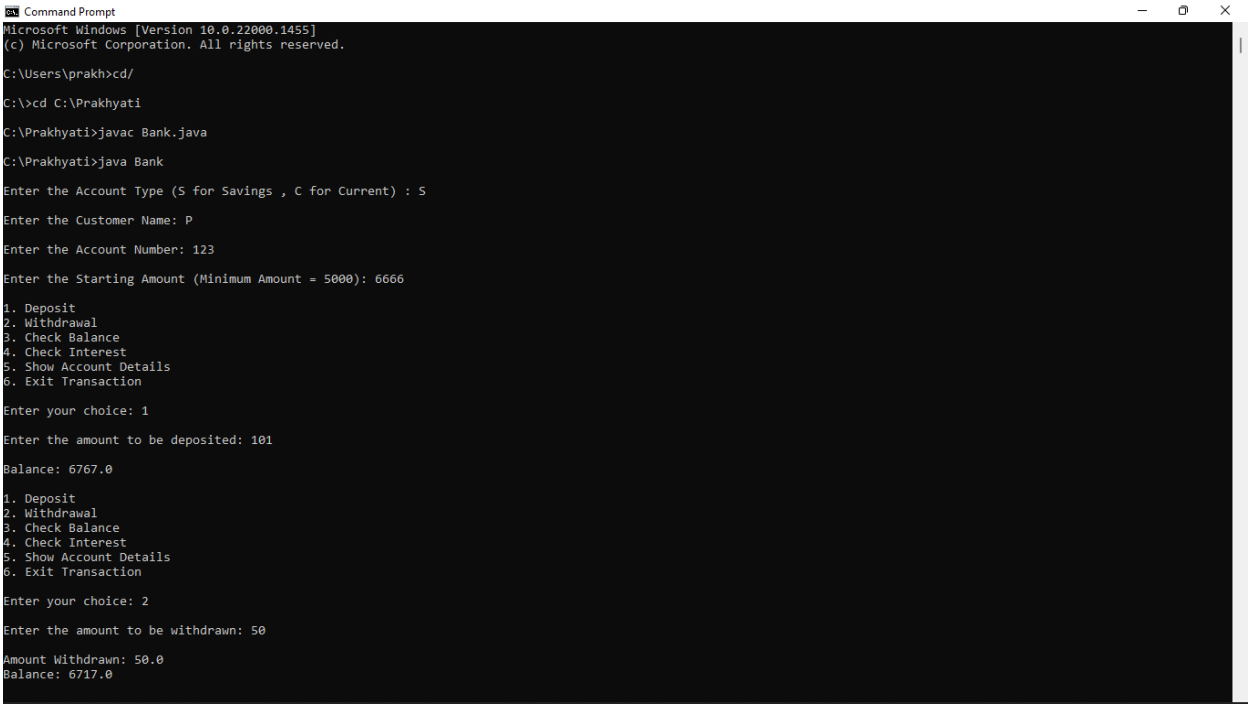
```
            System.out.println("\nInsufficient Balance!!\nBalance: "+bal);
        }
        else
        {
            System.out.println("\nBalance: "+bal);
        }
    }
    public void interest()
    {
        interest=(bal*6)/100;
        bal+=interest;
        System.out.println("\nInterest Credited: "+interest+"\nBalance :"+bal) ;
    }
}

class Current extends Account
{
    float deposit, withdraw, penalty;

    public void deposit()
    {
        System.out.print("\nEnter Amount to be deposited: ");
        deposit = s.nextFloat();
        bal += deposit;
        System.out.println("Balance: " + bal);
    }

    public void check_Bal()
    {
```

```
    if (bal < 5000)
    {
        penalty = (0.1f * bal);
        System.out.println("\nInitial Account Balance: "+bal);
        bal = bal-penalty;
        System.out.println("\nLow balance!\nPenalty Amount: " + penalty + "\nAccount balance: " + bal);
    }
    else
    {
        System.out.println("\n Balance: " + bal);
    }
}

public boolean check_Bal_part_2()
{
    if (bal < 5000)
    {
        penalty = (0.1f * bal);
        System.out.println("\nInitial Account Balance: "+bal);
        bal = bal-penalty;
        System.out.println("\nLow Balance!\nPenalty Amount: " + penalty + "\nAccount balance: " + bal);
        return false;
    }
    return true;
}

public void withdraw()
{
    System.out.print("\nEnter Amount to withdraw: ");
```

```
        withdraw = s.nextFloat();
        if(check_Bal_part_2())
        {
            bal-=withdraw;
            System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance: "+bal);
        }
    }

    public void chequebook()
    {
        System.out.println("\nCheque Book has been Issued!");
    }
}

public class Bank
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        String ch;
        int n;
        Current c = new Current();
        Savings sa = new Savings();
        System.out.print("\nEnter the Account Type (S for Savings , C for Current) : ");
        ch = s.next();

        switch(ch.toLowerCase())
        {
            case "s" :  sa.input();
```

```
                do
                {
                   System.out.print("\n1. Deposit \n2. Withdrawal \n3. Check Balance \n4. Check Interest"
                         +"\n5. Show Account Details \n6. Exit Transaction\n\nEnter your choice: ");
                   n = s.nextInt();
                   switch(n)
                   {
                      case 1 : sa.deposit();
                            break;
                      case 2 : sa.withdraw();
                            break;
                      case 3 : sa.check_Bal();
                            break;
                      case 4 : sa.interest();
                            break;
                      case 5 : sa.display();
                            break;
                      case 6 : System.out.println("\nExiting Transaction!");
                            System.exit(0);
                            break;
                      default : System.out.println("\nInvalid Operation");
                   }
                }while(true);
          case "c" : c.input();
                do {
                   System.out.print("\n1. Deposit \n2. Withdrawal \n3. Check Balance \n4. Issue Cheque
Book"
                         + "\n5. Show Account Details \n6. Exit Transaction\n\nEnter your choice: ");
                   n = s.nextInt();
```

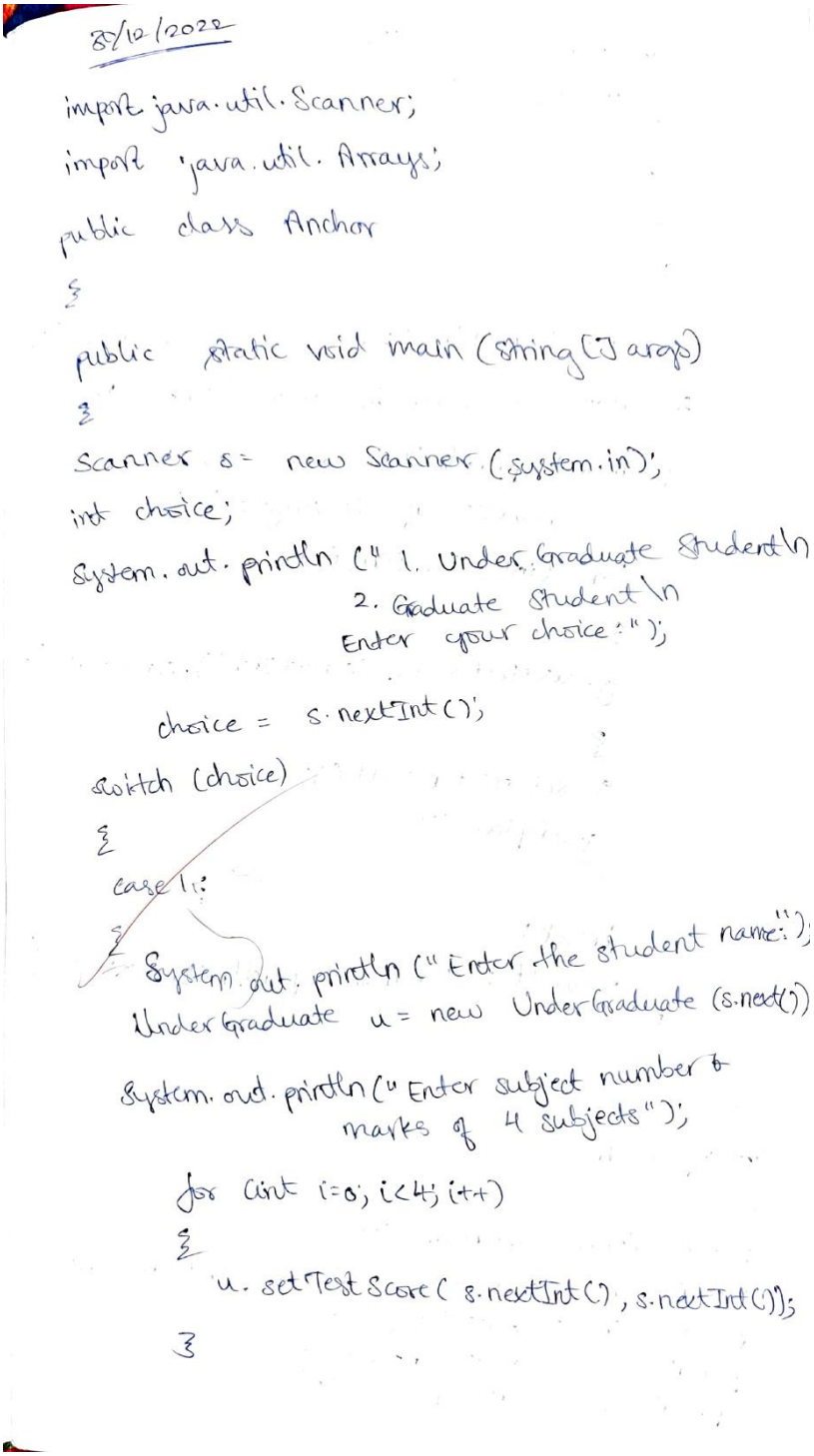
```
                switch (n) {
                    case 1:
                        c.deposit();
                        break;
                    case 2:
                        c.withdraw();
                        break;
                    case 3:
                        c.check_Bal();
                        break;
                    case 4:
                        c.chequebook();
                        break;
                    case 5:
                        c.display();
                        break;
                    case 6:
                        System.out.println("\nExiting Transaction!");
                        System.exit(0);
                        break;
                    default:
                        System.out.println("\nInvalid Operation");
                }
            }while(true);
        default : System.out.println("\nInvalid Choice");
            break;
        }
    }
}
```


Command Prompt
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.
C:\Users\prakh>cd/
C:\>cd C:\Prakhyati
C:\Prakhyati>javac Bank.java
C:\Prakhyati>java Bank
Enter the Account Type (S for Savings , C for Current) : S
Enter the Customer Name: P
Enter the Account Number: 123
Enter the Starting Amount (Minimum Amount = 5000): 6666
1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction
Enter your choice: 1
Enter the amount to be deposited: 101
Balance: 6767.0
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 withdrawn: 50
Amount Withdrawn: 50.0
Balance: 6717.0


Command Prompt
1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction
Enter your choice: 3
Balance: 6717.0
1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction
Enter your choice: 4
Interest Credited: 403.02
Balance :7120.02
1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction
Enter your choice: 5
Customer Name: P
Account Number: 123
Amount: 7120.02
1. Deposit
2. Withdrawal
3. Check Balance
4. Check Interest
5. Show Account Details
6. Exit Transaction
Enter your choice: 6

Anchor- LAB6

Anchor College offers both graduate and postgraduate programs. The college stores the names of the students, their test scores, and the final result for each student. Each student has to take 4 tests in total. You need to create an application for the college by implementing the classes based off of discussed conditions.



```
8/12/2022

import java.util.Scanner;
import java.util.Arrays;
public class Anchor
{
public static void main (String[] args)
{
Scanner s= new Scanner (System.in);
int choice;
System.out.println (" 1. Under Graduate Student\n
                      2. Graduate Student\n
                     Enter your choice:");

    choice = s.nextInt();
switch (choice)
{
 case 1:
 {
  System.out.println (" Enter the student name:");
  UnderGraduate u= new UnderGraduate (s.next())

  System.out.println (" Enter subject number &
                       marks of 4 subjects");

    for (int i=0; i<4; i++)
    {
      u.setTestScore ( s.nextInt(), s.nextInt());
    }
```

```
            u.setTestResult();
              u.display();
            }
            break;
          case 2:
          {
          System.out.println("Enter new student name:");
          Graduate g= new Graduate(s.next());
          System.out.println("Enter subject number &
                  marks of 4 subjects");
              for (int i=0; i<4; i++)
              {
              g.setTestScore(s.nextInt(),s.nextInt());
              }
              g.setTestResult();
              g.display();
              }
              break;
              default : System.out.println("Invalid choice!");
        }
      }
    }
interface A
{
public String getName();
public void setTestScore(int no, int marks);
public int[] getTestScore();
public void setTestResult();
public int getTestResult();
```

```
public void display();
}
abstract class Student implements A
{
  string name;
  int [] test = new int [4];
  int sum;
  abstract public void generateResult();
  Student()
  {}
  Student (String name)
  {
  this.name = name;
  }
  public String getName()
  {
  return this.name;
  }
  public void setTestScore (int no, int marks)
  {
   test [no.1] = marks;
   }
   public int[] getTestScore()
   {
    return test;
   }
   public void setTestResult()
   {
   for (int i=0; i<4; i++)
   {
```

```
        sum = sum+test[i];
      }
       sum/=4
      }
      public int getTestResult()
      {
      return sum;
      }
      public void display()
      {
    System.out.println("Student Name:" +getName());
    System.out.println("Student Marks:"
                    +Arrays.toString(getTestScore()));
     System.out.println("Result:");
     generateResult();
   }
}
class UnderGraduate extends Student.
{
UnderGraduate()
{}
 UnderGraduate(String Name)
{
this.name = name;
}
public void generateResult()
{
```

```
if (get TestResult ()>= 60)
System.out.println(" Pass" );
else
 System. out. println (" Fail");
}
}
class Graduate extends Student
{
Graduate()
{}
Graduate (String name)
{
this. name = name;
}
public void generate Result()
{
if (get TestResult()>=70)
System.out. println (" Pass");
else
System.out. println (" Fail");
}
}
```

OUTPUT-

6/11/23 1) Under Graduate Student
2) Graduate Student
Enter your choice: 1
Enter student name: P
Enter subject number & marks of 4 subjects
1 33
2 44
3 55
4 66
student name: P
student marks: [33, 44, 55, 66]
result: fail

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

public class Anchor
{
public static void main(String[] args)
{
Scanner s = new Scanner(System.in);
int choice;
System.out.print("\n1. UnderGraduate Student\n2. GraduateStudent\nEnter your choice: ");
choice = s.nextInt();
switch(choice)
{
case 1:
{
System.out.print("\nEnter the student name: ");
UnderGraduate u = new UnderGraduate(s.next());
System.out.println("Enter the subject number and marks of 4 subjects");
for(int i=0;i<4;i++)
{
u.setTestScore(s.nextInt(),s.nextInt());
}
u.setTestResult();
u.display();
}
break;
case 2:
{
```

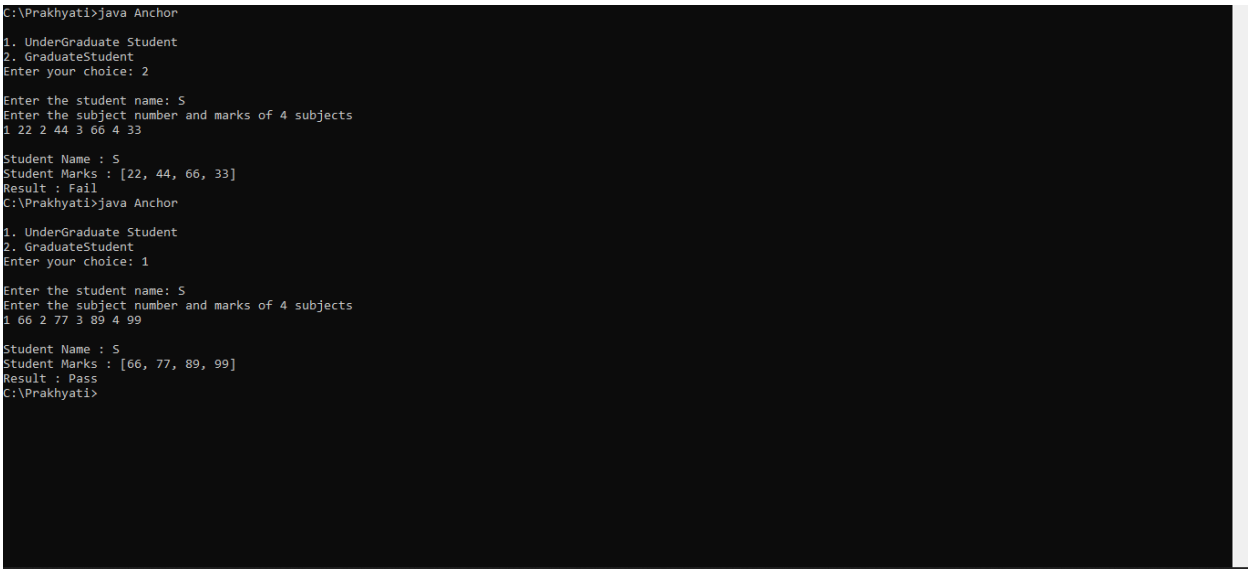
```
System.out.print("\nEnter the student name: ");
Graduate g = new Graduate(s.next());
System.out.println("Enter the subject number and marks of 4 subjects");
for(int i=0;i<4;i++)
{
g.setTestScore(s.nextInt(),s.nextInt());
}
g.setTestResult();
g.display();
}
break;
default: System.out.println("Invalid Choice!");
}
}
}

interface A
{
public String getName();
public void setTestScore(int no,int marks);
public int[] getTestScore();
public void setTestResult();
public int getTestResult();
public void display();
}

abstract class Student implements A
{
String name;
```

```
int[] test = new int[4];
int sum;
abstract public void generateResult();
Student()
{}
Student(String name)
{
this.name = name;
}
public String getName()
{
return this.name;
}
public void setTestScore(int no,int marks)
{
test[no-1] = marks;
}
public int[] getTestScore()
{
return test;
}
public void setTestResult()
{
for(int i=0;i<4;i++)
{
sum=sum+test[i];
}
sum/=4;
}
```

```
public int getTestResult()
{
return sum;
}
public void display()
{
System.out.println("\nStudent Name : "+getName());
System.out.println("Student Marks : "+Arrays.toString(getTestScore()));
System.out.print("Result : ");
generateResult();
}
}
class UnderGraduate extends Student
{
UnderGraduate()
{}
UnderGraduate(String name)
{
this.name = name;
}
public void generateResult()
{
if(getTestResult()>=60)
System.out.print("Pass");
else
System.out.print("Fail");
}
}
class Graduate extends Student
```

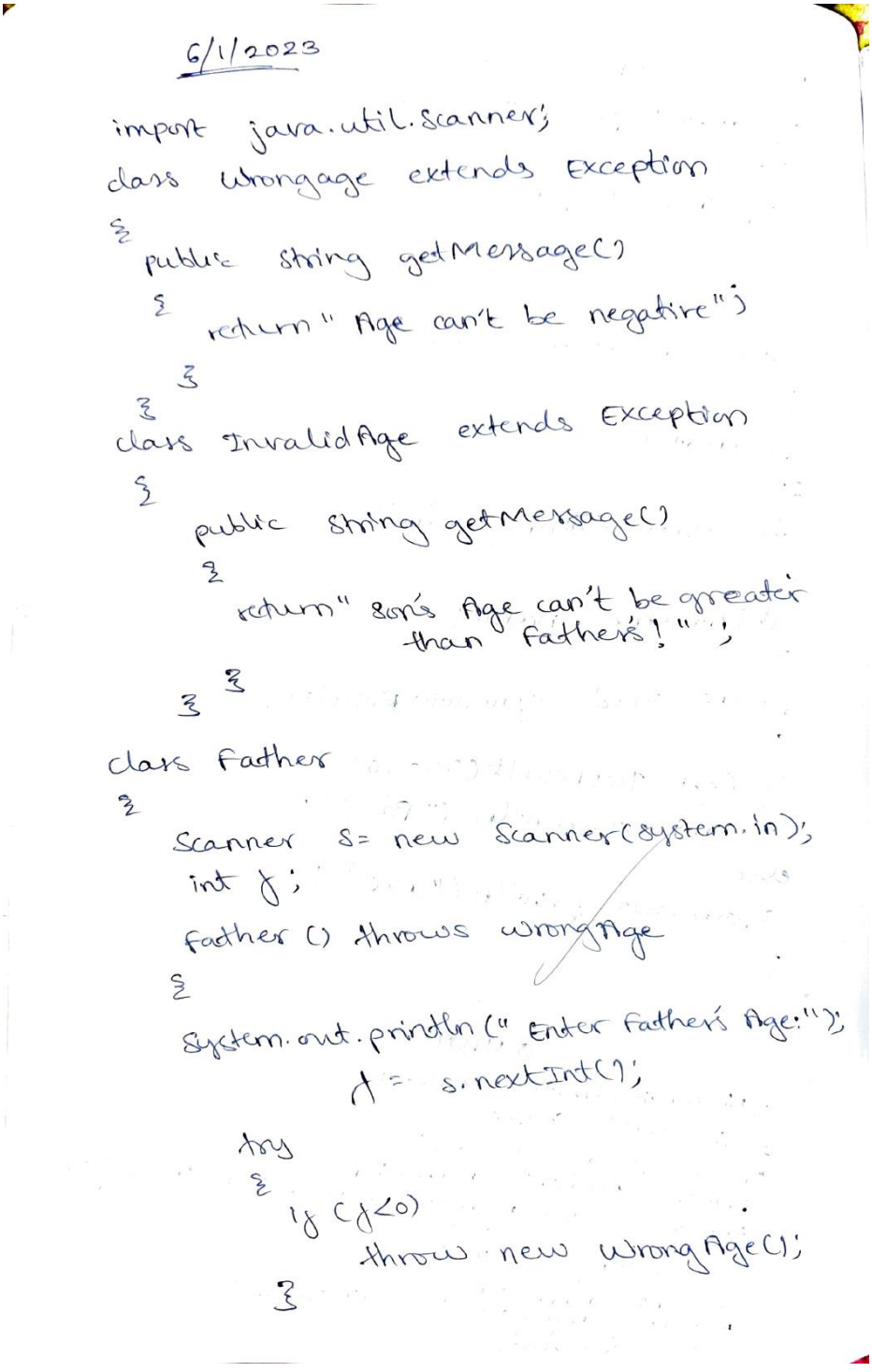
```
{
Graduate()
{}
Graduate(String name)
{
this.name = name;
}
public void generateResult()
{
if(getTestResult()>=70)
System.out.print("Pass");
else
System.out.print("Fail");
}
}
```


Command Prompt
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.
C:\Users\prakh>cd/
C:\>cd C:\Prakhyati
C:\Prakhyati>javac Anchor.java
C:\Prakhyati>java Anchor
1. UnderGraduate Student
2. GraduateStudent
Enter your choice: 1
Enter the student name: P
Enter the subject number and marks of 4 subjects
1 33 2 55 3 66 4 77
Student Name : P
Student Marks : [33, 55, 66, 77]
Result : Fail
C:\Prakhyati>java Anchor
1. UnderGraduate Student
2. GraduateStudent
Enter your choice: 1
Enter the student name: P
Enter the subject number and marks of 4 subjects
1 98 2 88 3 95 4 93
Student Name : P
Student Marks : [98, 88, 95, 93]
Result : Pass


C:\Prakhyati>java Anchor
1. UnderGraduate Student
2. GraduateStudent
Enter your choice: 2
Enter the student name: S
Enter the subject number and marks of 4 subjects
1 22 2 44 3 66 4 33
Student Name : S
Student Marks : [22, 44, 66, 33]
Result : Fail
C:\Prakhyati>java Anchor
1. UnderGraduate Student
2. GraduateStudent
Enter your choice: 1
Enter the student name: S
Enter the subject number and marks of 4 subjects
1 66 2 77 3 89 4 99
Student Name : S
Student Marks : [66, 77, 89, 99]
Result : Pass
C:\Prakhyati>

Age- LAB7

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=father’s age.



```
6/1/2023

import java.util.Scanner;
class Wrongage extends Exception
{
  public String getMessage()
  {
    return " Age can't be negative";
  }
}
class InvalidAge extends Exception
 {
    public String getMessage()
    {
      return" Son's Age can't be greater
              than Father's!";
    }
}
class Father
{
   Scanner s= new Scanner(System.in);
   int y;
   Father () throws WrongAge
  {
   System.out.println(" Enter Father's Age:");
              y = s.nextInt();
      try
      {
        if (y<0)
          throw new WrongAge();
      }
```

```
    catch (WrongAge e1)
    {
     System.out.println (e1.getMessage());
     System.exit (0);
    }
  }
}
class Son extends Father
{
    int son;
    Son() throws WrongAge, InvalidAge
    {
      super();
  System.out.print ("Enter the Son's age:");
      son = s.nextInt();
  try
      {
        if (son<0)
          throw new WrongAge();
      }
      catch (WrongAge e2)
      {
      System.out.println (e2.getMessage());
      }
      try (son>7)
        throw new InvalidAge();
        }
        catch (InvalidAge e3)
        {
        System.out.println (e3.getMessage());
        system.exit(0);
```

```
        } System.out.println("Ages are appropriate");
    }
}
public class Try-1
{
public static void main (String[] args)
    throws WrongAge, InvalidAge
    {
        new Son();
    }
}
```

output

```
Enter Father's Age: 40
Enter Son's Age: 60
Son's Age can't be greater than Fathers!

Enter Father's Age: 40
Enter Son's Age: -16
Age can't be negative

Enter Father's Age: 48
Enter Son's Age: 18
Ages are appropriate.
```

01/11/23

```
import java.util.Scanner;

public class Age
{
   public static void main(String[] args) throws WrongAge,InvalidAge
   {
      new Son();
   }
}

class WrongAge extends Exception
{
   public String getMessage()
   {
      return "Age Cannot Be Negative";
   }
}

class InvalidAge extends Exception
{
   public String getMessage()
   {
      return "Son's Age cannot be greater than Father's!";
   }
}
class Father
{
   Scanner s = new Scanner(System.in);
   int f;
```

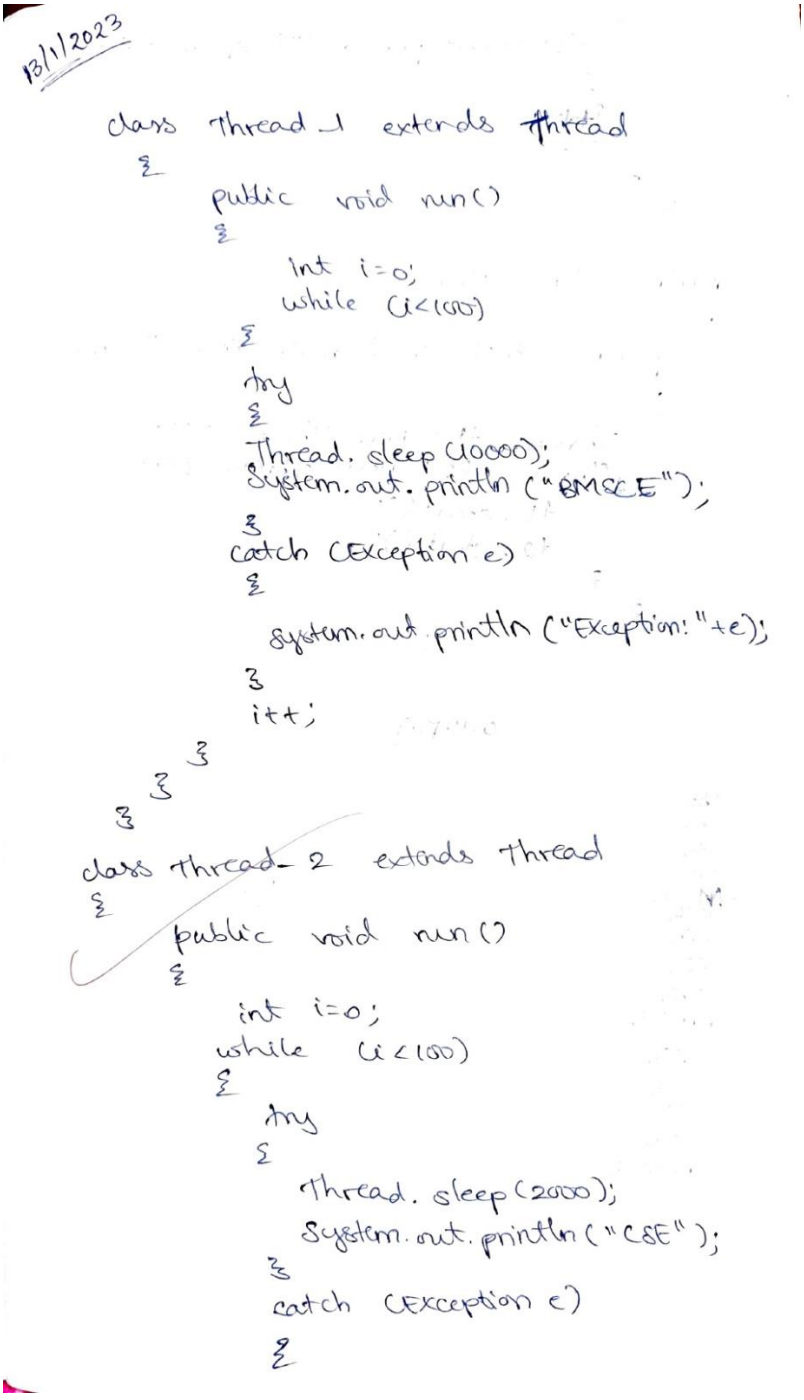
```
    Father() throws WrongAge
    {
        System.out.print("Enter the Father's Age: ");
        f = s.nextInt();
        try
        {
        if(f<0)
            throw new WrongAge();
        }
        catch(WrongAge e1)
        {
            System.out.println(e1.getMessage());
            System.exit(0);
        }
    }
}

class Son extends Father
{
    int son;
    Son() throws WrongAge,InvalidAge
    {
        super();
        System.out.print("Enter the Son's Age: ");
        son = s.nextInt();
        try
        {
        if(son<0)
            throw new WrongAge();
```

```
        }
        catch(WrongAge e2)
        {
            System.out.println(e2.getMessage());
    System.exit(0);
        }
        try
        {
        if(son>f)
            throw new InvalidAge();
        }
        catch(InvalidAge e3)
        {
            System.out.println(e3.getMessage());
    System.exit(0);
        }
System.out.println("Ages are appropriate");
     }
}
```


Command Prompt
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.
C:\Users\prakh>cd/
C:\>cd C:\Prakhyati
C:\Prakhyati>javac Age.java
C:\Prakhyati>java Age
Enter the Father's Age: 48
Enter the Son's Age: 16
Ages are appropriate
C:\Prakhyati>java Age
Enter the Father's Age: 13
Enter the Son's Age: 18
Son's Age cannot be greater than Father's!
C:\Prakhyati>java Age
Enter the Father's Age: 40
Enter the Son's Age: -12
Age Cannot Be Negative
C:\Prakhyati>

Repetition- LAB8

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.



```
13/1/2023

class Thread_1 extends Thread
{
    public void run()
    {
        int i=0;
        while (i<100)
        {
        try
        {
        Thread.sleep(10000);
        System.out.println("BMSCE");
        }
        catch (Exception e)
        {
          System.out.println("Exception:"+e);
        }
        i++;
    }
  }
}
class Thread_2 extends Thread
{
    public void run()
    {
        int i=0;
      while (i<100)
      {
        try
        {
          Thread.sleep(2000);
          System.out.println("CSE");
        }
        catch (Exception e)
        {
```

```
            System.out.println ("Exception" + e);
            }
            i++;
        }
    }
}
public class Try
{
    public static void main (String [] args)
    {
        Thread t1 = new Thread_1();
        Thread t2 = new Thread_2();
            t1.start();
            t2.start();
    }
}
```

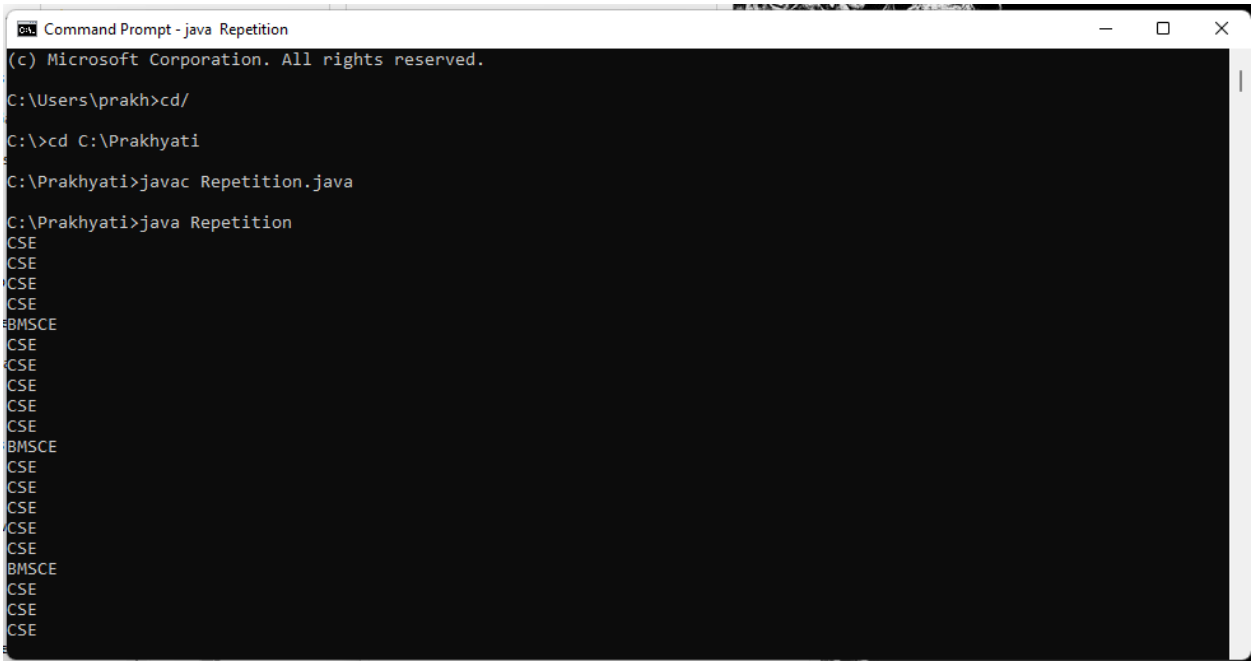
OUTPUT

```
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
BMSCE
:
```

13/11/23

```
class Thread_1 extends Thread
{
   public void run()
   {
      int i = 0;
      while(i<100)
      {
         try
         {
            Thread.sleep(10000);
            System.out.println("BMSCE");
         }
         catch(Exception e)
         {
            System.out.println("Exception: "+e);
         }
         i++;
      }
   }
}

class Thread_2 extends Thread
{
   public void run()
   {
      int i = 0;
      while(i<100)
      {
         try
```

```
            {
               Thread.sleep(2000);
               System.out.println("CSE");
            }
            catch(Exception e)
            {
               System.out.println("Exception "+e);
            }
            i++;
         }
      }
   }

public class Repetition
{
   public static void main(String[] args)
   {
      Thread t1 = new Thread_1();
      Thread t2 = new Thread_2();
      t1.start();
      t2.start();
   }
}
```


Command Prompt - java Repetition
(c) Microsoft Corporation. All rights reserved.
C:\Users\prakh>cd/
C:\>cd C:\Prakhyati
C:\Prakhyati>javac Repetition.java
C:\Prakhyati>java Repetition
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE