## VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



#### LAB REPORT

on

# Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

K L SRUJAN (24BECS419)

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
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#### **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 programming (23CS3PCOOJ)" carried out by **K L SRUJAN (24BECS419)**, who is bonafide 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. 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.

Ms. Ambuja K Assistant Professor Department of CSE, BMSCE Dr. Jyothi S Nayak Professor & HOD Department of CSE, BMSCE

#### Github Link: https://github.com/K-L-SRUJAN/OOJ

**LAB 1** 

```
of print even number without %
                                                          2) dividing numbers by zero
                                                            # melude (studio.h)
   # melude < studio. h>
   int main () {
                                                             tut main () {
                                                               inta;
print; ("enter number");
scar; ("%d", & a);
     int a;
      prints (" enter the limit : ");
      Scanf ( " % d, & a);
      for (int 1=0; hum (a; i+= 1){
                                                                printy (" 1.0", 6);
          fut num : +++;
         of C num >a){
                                                               warning: division by zero
                                                               enter number 10
         prints (" % d \n", rum);
                                                               floating point enception
                                                            my pros & cons of C
                                                             is Efficiency: close intration with hardware
2) Square of odd number
                                                              er pontability: can easily run on different
# Include (studian)
                                                                machines
                                                              37 Rich library Support. numerous number
printy ( " enter limit; ");
                                                                of bulk in - bunchion
Scanb C-7.0, & a);
tut num;
for ( int r: 1; numca ; i+= 2) {
                                                             or complea Syntan: can be described for beginner
   fut num s ir i;
                                                               especially with pointers & memory management
                                                             25 No Built in memory: Clarks built in gratures
    break;
                                                                 but automatic garting collection
   print (" "/d \n", num);
```

#### Code:

#### Program1

```
#include <stdio.h>
int main(){
    int a;
    printf("Enter the limit :");
    scanf("%d",&a);
    int num;
    for(int i=0;i<a;i+=2){
        if(i>a){
            break;
        }
        printf("%d\n",i);
    }
}
```

```
Enter the limit :5
0
2
4
=== Code Execution Successful ===
```

```
Program 2
#include <stdio.h>
int main(){
  int a;
  printf("Enter the limit :");
  scanf("%d",&a);
  int num;
  for(int i=1;i<a;i+=2){
    num=i*i;
    if(num>a){
      break;
    }
    printf("%d\n",num);
  }
}
```

```
Output

Enter the limit :27

1

9

25

=== Code Execution Successful ===
```

#### Program 5

```
34 Low level: less productive por application level productive con application programming
   compared to high level languages
5> program using 16, else, while E I while
 # Include 2 studio. h.
   fut maines {
   printy ("enter a number");

scary ("xd", &a);
   int a, b=1;
   106 Ca 122=0) { ...
        printfl" number is even "); should
   cen {
printed: number is odd ");
    while ( 6 (= a) { ...... + 1 ......
      18(Cx1)==0){
       privily C" number is: 2d", 6);
      white Car 100) {
      Mc a < 100 / 1 = 03 ( are ) ( athum) ( and )
```

```
#include <stdio.h>
int main() {
  int a,b=1;
  printf("Enter your number :");
  scanf("%d",&a);
  if(a\%2==0){
     printf("\nnumber is even ");
  }
  else{
     printf("\nNumber is odd ");
  printf("\nnumber is : ");
  while (b \le a)
    printf("\n^{d}",b);
    b++;
  }
  while (a<10){
    printf("\n\%d",a);
    if(a\%2==0){
       printf("even\n");
```

```
else{
     printf("odd\n");
   a++;
 }
Output:
Enter your number :5
Number is odd
number is :
3
5odd
6even
7odd
8even
9odd
```

## **Program 6**

```
by simple calculation using switch care
# include Estudio.ht
fut main () {
     char operator;
      int rum!, rum 4, numt;
      printp(" Enter the operatio +, -, *, 1");
      Scarp("%ot", &s operator);
printy("enter no:"); scarp("%d"gnum!, & num 2);
      switch (operator)[
          cerse '+':
             numf = num 1+ num 27
             printy (" num 1 + num 1 = " d", num + );
        case 1-1:
          print ( C" num 1 + numez 7. d", numt);
             numb= num1 - num1;
             numb = mem 1 + num 1; 3 = 3 d 3 d.
             prints (" num (+ num) = %d", num+)
          case 11:
              numa 1/ ( concern 2 ! = 0) {
                        numt = num1/num1;
                        print ("die of num! Enum 2 % just
                        break;
                    print (" dinominator can not be 0")
           diabault:
                 print ("chosk valid option");
```

```
#include <stdio.h>
int main() {
  char operators;
  int num1, num2, numt;
  printf("Enter the operator (+, -, /, *): ");
  scanf(" %c", &operators); // Use %c to read a character, and add a space before %c to consume
newline
  printf("Enter number 1: ");
  scanf("%d", &num1); // Correct address-of operator
  printf("Enter number 2: ");
  scanf("%d", &num2); // Correct address-of operator
  switch (operators) {
    case '+':
       numt = num1 + num2;
       printf("\nResult: num1 + num2 :%d ", numt);
       break;
    case '-':
```

```
numt = num1 - num2;
    printf("\nResult: num1 - num2 : %d", numt);
    break;
  case '*':
    numt = num1 * num2;
    printf("\nResult: num1 * num2 : %d", numt);
  case '/':
    if (num2 != 0) {
       numt = num1 / num2;
       printf("\nResult: num1 / num2 :%d ", numt);
       printf("\nError: Division by zero is not allowed.");
    break;
  default:
    printf("\nInvalid operator selection.");
}
return 0;
```

```
Enter the operator (+, -, /, *): +
Enter number 1: 50
Enter number 2: 40

Result: num1 + num2 :90
=== Code Execution Successful ===
```

# **Program 7**

```
Oale 1/10/24
77 Addition , of two no no number.
 public class numberopertion ?
         public static void main (String[] args) [
                int a = 22;
                into b = 33;
      system out. printle ("Addition of two number:"+w
        System outprintler C "Subtraction of two numbers" - a
87 Product of two user entred number; import jan with scanner;
 public class number product (
           public static void main ( String [ ] orgs) {
           Scenner Scen = new Scenner (System. In);
  system outprintle (" Euter the Grist number = ");
           double a = scennest Double ();
        system. out printle ( " Enter the Second number = ");
         double b = scan, neut Bouble();
         int c = a'b;
       System. out printle ( " The product of no 15: "+c);
         Scan. close (s;
```

#### Code:

```
class Main {
  public static void main(String[] args) {
    int a=22;
    int b=23;

    System.out.println("Addtion of two numbers : "+(a+b));
    System.out.println("Subtraction of two numbers : "+(a-b));
  }
}
```

```
PS D:\JAVA\jva> javac Program7.java
PS D:\JAVA\jva> java Program7
Addtion of two numbers : 45
Subtraction of two numbers : -1
```

# **Program 8**

#### Code:

```
import java.util.Scanner;
class Main {
   public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the first numbers : ");
        double a=sc.nextInt();
        System.out.println("Enter the second numbers : ");
        double b=sc.nextInt();

        double c=a*b;
        System.out.println("The Product of numbers : "+c);
     }
}
```

```
PS D:\JAVA\jva> java Program8
Enter the first numbers :
50
Enter the second numbers :
50
The Product of numbers : 2500.0
```

# **Program 9:**

```
sean. close cs;
3> find noot of entered number:
             java. uhl. Scannor;
   public class
                     deno root {
               public static void main (Strang [] args) {
                      Scanner Scan znew Scanner ( System. in);
                                                                   Output 1: The addition of two number is: 55
                                                                                 The Subtraction of two number is: -11;
                     System. out. println(" Enter the first no :");
                     double secon = scan new Bouble();
                    System. out-println("Enter the second no:):
                                                                    Output 1:
                   double b = scenneutbouble();
                   System out println ("Enter the third no!);
                                                                             Enter the first number: 2
                   double c = Scan neut Double (30);
                                                                             Enter the second number: 3
                  do int discriminant = b*b-H*a*c;
                                                                             product of the two no is: 6
                   if ( discriminent >0) [
                           int root1 = (-b+ Math. sqnt(discriminal)
                                                                    output 3: case 1: no roots:
                         fut 200+2= (6 - Math. sgrt (discriminal) for
                                                                          Enter the first no: $1
                                                                          Enter the see no: 61
                         printly
                         System out printled "The roots are "
                                                                          Enter the thrid no: 14
                          noof1 +" + " + noof1");
                                                                          no zeros /roots
                  elm if ( discriminent == 0) {
                                                                  cese 1:
                                                                         Eulin the birst no: 1
                        Sylem. Out. printle (" The enter number is
                                                                         Euler the sec no: -3
                         one roof");
                                                                          Enter the third no: 2
                 else ?
                      System. Out. printle (" No zeros / rock");
                                                                         The rooks are 2,1
```

Enter the second no: 1

Enter the second no: 2

Enter the third no: 1

The equation has one roof

#### Code:

```
import java.util.Scanner;
public class Program9 {
  public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
    System.out.print("Enter the first number: ");
    double a = scanner.nextDouble();
    System.out.print("Enter the second number: ");
    double b = scanner.nextDouble();
    System.out.print("Enter the third number: ");
    double c = scanner.nextDouble();
    double dis=b*b-4*a*c;
    if (dis>0) {
      double root1= ((-b)+Math.sqrt(dis))/2*a;
      double root2= ((-b)-Math.sqrt(dis))/2*a;
      System.out.println("Roots are: " + root2 + " and " + root1);
    } else if(dis==0){
      System.out.println("Entered number have one root");
    else{
       System.out.println("Entered number have no roots");
    scanner.close();
```

```
PS D:\JAVA\jva> java Program9
Enter the first number: 1
Enter the second number: 1
Enter the third number: 1
Entered number have no roots
PS D:\JAVA\jva> java Program9
Enter the first number: 1
Enter the second number: 2
Enter the third number: 1
Entered number have one root
PS D:\JAVA\jva> java Program9
Enter the first number: 1
Enter the first number: 1
Enter the first number: 1
Enter the second number: -3
Enter the third number: 2
Roots are : 1.0 and 2.0
```

# LAB 2

# **Program 10:**

```
ort java will Scanner
Class Student &
     THE USH;
     String name?
     int[] credits;
    inted marks)
    jut num subjects;
    void accordinates ?
        Scanner Scenew Scanner (System ins
        System. out. printled " Enter USM");
        usn & St. next INTCS;
       System out printle (" Enter dame");
       name: sc. nextline ();
      System out printle ("Enter number of subjects")
       num subjects z screet Intel;
      Oreda's a new out [ neem subject];
      marks + new int [ numsubject ]
      Gen (inti 20: 12 summerbjet; itt) {
              System out printled" Enter lendsto of Subject " First)
              ancelit[: ]: sc nextint();
              System. out. printle (" Enter the marks of Subje "+i+1)
              manuscili sue neutlatis;
      double culsapal) {
           out tookul sendots to
           Put total gradepoints : 0;
           boultut 100 & icacemsubjects it its
                   it gradepoint = get had point (mariotis);
                  total gradepoint += gradepoint + cerclit [:]:
                  to tal Cerclota +2 oreclet [+];
                  return (double) total Crashpoints / total builts;
```

```
Fut getbrade point (int martes) ?
      of Cmarks > 290) return 10
      if (marks > 280) return 9°
     if ( martes > = 20) return 8;
     of C marks > 2 60) return 7;
      if (marks > 2 50) return 6;
      4. ( mary prosetion 5;
       returno!
 word display es {
      system, out printle (" in Student Details")
            Syskm. out privile ("USN + usu);
           System out printled " Mane "+ name)
             System. out prutter (" Subject oike 10 %);
      from Couties; is numberbject; 14+38
            System out printle ("Subject + + (it) +" Curd+ II]+
             mark: " + mark [ '));
       system out priviler ("S and " " + 1"; (alouted savars))
public class Main &
      public water word main ( String ( ) args) ?
             Student steedent : new Shedent (1)
             student. aug t Delauls is
              student. display (s.
```

#### Code:

import java.util.Scanner;

```
class Student {
   String usn;
   String name;
   int[] credits;
   int[] marks;
   int numSubjects;

void acceptDetails() {
    Scanner sc = new Scanner(System.in);
}
```

```
System.out.print("Enter USN: ");
  usn = sc.nextLine();
  System.out.print("Enter Name: ");
  name = sc.nextLine();
  System.out.print("Enter number of subjects: ");
  numSubjects = sc.nextInt();
  credits = new int[numSubjects];
  marks = new int[numSubjects];
  for (int i = 0; i < numSubjects; i++) {
     System.out.print("Enter credits for subject " + (i + 1) + ": ");
     credits[i] = sc.nextInt();
     System.out.print("Enter marks for subject " + (i + 1) + ": ");
     marks[i] = sc.nextInt();
}
double calculateSGPA() {
  int totalCredits = 0;
  int totalGradePoints = 0;
  for (int i = 0; i < numSubjects; i++) {
     int gradePoint = getGradePoint(marks[i]);
     totalGradePoints += gradePoint * credits[i];
     totalCredits += credits[i];
  return (double) totalGradePoints / totalCredits;
int getGradePoint(int marks) {
  if (marks  >= 90 ) return 10;
  if (marks \geq 80) return 9;
  if (marks \geq 70) return 8;
  if (\text{marks} >= 60) return 7;
  if (marks \geq 50) return 6;
```

```
if (marks \geq 40) return 5;
    return 0;
  }
  void displayDetails() {
     System.out.println("\nStudent Details:");
     System.out.println("USN: " + usn);
     System.out.println("Name: " + name);
     System.out.println("Subject Details:");
     for (int i = 0; i < numSubjects; i++) {
       System.out.println("Subject " + (i + 1) + " - Credits: " + credits[i] + ", Marks: " + marks[i]);
    System.out.printf("SGPA: %.2f\n", calculateSGPA());
public class Program10 {
  public static void main(String[] args) {
     Student student = new Student();
     student.acceptDetails();
    student.displayDetails();
```

```
PS D:\JAVA\jva> <mark>java</mark> Program10
Enter USN: 419
Enter Name: Srujan
Enter number of subjects:
Enter credits for subject 1:
Enter marks for subject 1: 90
      credits for subject 2:
Enter marks for subject 2: 80
Enter credits for subject 3:
Enter marks for subject 3: 70
Student Details:
USN: 419
Name:
      Srujan
Subject Details:
Subject 1 - Credits:
Subject 2 - Credits:
Subject 3 - Credits:
                        4,
                            Marks:
                        3,
             Credits:
                            Marks:
                                    80
             Credits:
                        3,
```

# LAB 3 Program11:

```
public void schoone ( s
                                                                                                                         public class Godesbord {
                                                                                this name: name;
11) Greate aclass Gook which Contains your
                                                                                                                                 Scanner sc: new Scanner ( System. in);
                                                                         public String get Author (String author) {
   members name, author, price, num pages:
                                                                                                                                 Systemat printle ("Enter the no of book:
                                                                           return author;
   Include a constructor to set the value for the
                                                                                                                                 Int us sc. nextInt();
   members. Include method to set and get the
                                                                                                                                 BOOK[] books = new Book [n];
   details of the objects. Include a tostring ()
                                                                         public void set Author (String author) (
   method that could display the complete details
                                                                                                                                 Lon (tut := 0; (cn; 1+1){
                                                                               this author: author;
                                                                                                                                    System. out. printle ("Enter the name of Bo
   of the book.
                                                                                                                                    name ( ): Scheetline ();
                                                                          public word get Price ( )[
import java. with Scanner;
                                                                                                                                    System. out printle ( - Enter the name of Autho
                                                                              reteven price;
 Rublic dan Book {
                                                                                                                                    author = sc next Line 1);
       private String name;
                                                                          public but setfrice ( int price) {
                                                                                                                                    System. Och printle (" Enter the Price " ");
       private String author; was a story and
                                                                                                                                    price: se. next Int()) a months of
       private int price;
       privale int numpages;
                                                                                                                                   System. out. printle (" Enter the no of Pages
                                                                          public settle get Numpages () {
                                                                                                                                   num pages : sc. next Int();
      11 constructor
                                                                               return rum pages;
       public Book ( String name, String author, int price, int
                                                                          public ist setnum.pages () {
                    numpages) {
                                                                                                                        John book [1]: new Book ( name, awhor, price
          public so String get Hame (
                                                                                this num-pages: num-pages s
           this name = name;
           this author: author;
                                                                                                                           (gor ( int : 0; icn; i+) (
                                                                         public String bostning () {
                                                                                                                                System.out. printle (book Ers. to String cs);
        this price = price;
           this numpages = neur pages;
                                                                              return "Name: "+ name , " In Author: "+ Author
                                                                                    "Ani in Price: " + price + "judium pages; " when
      public String get Name () {
           vehou name;
```

```
Output:

Enter the number of Books 1

Enter the detail of Gooks 5

Enter the name of Rook; Java

Enter the name of author: abc

Enter the number of pages: 500

Enter the number of pages: 500

Name of Book : stand Java

Name of Book : 200

Price of Book : 200

Wumber of pages: 500
```

```
import java.util.Scanner;
class Book {
  private String name;
  private String author;
  private double price;
  private int numPages;
  public Book(String name, String author, double price, int numPages) {
    this.name = name;
    this.author = author;
    this.price = price;
    this.numPages = numPages;
  }
  public void setName(String name) {
    this.name = name;
  public String getName() {
    return name;
  }
  public void setAuthor(String author) {
    this.author = author;
  }
  public String getAuthor() {
    return author;
  }
  public void setPrice(double price) {
    this.price = price;
  public double getPrice() {
    return price;
  public void setNumPages(int numPages) {
    this.numPages = numPages;
  public int getNumPages() {
    return numPages;
```

```
@Override
  public String toString() {
     return "Book Details:\n" +
         "Name: " + name + "\n" +
         "Author: " + author + "\n" +
         "Price: " + price + "\n" +
         "Number of Pages: " + numPages;
}
public class Program11 {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter the number of books: ");
     int n = sc.nextInt();
     sc.nextLine();
     Book[] books = new Book[n];
     for (int i = 0; i < n; i++) {
       System.out.println("Enter details for book " +(i + 1) + ":");
       System.out.print("Name: ");
       String name = sc.nextLine();
       System.out.print("Author: ");
       String author = sc.nextLine();
       System.out.print("Price: ");
       double price = sc.nextDouble();
       System.out.print("Number of Pages: ");
       int numPages = sc.nextInt();
       sc.nextLine();
       books[i] = new Book(name, author, price, numPages);
     System.out.println("\nBook Details:");
     for (int i=0;i<n;i++) {
       System.out.println(books[i].toString());
       System.out.println();
     }
  }
```

```
PS D:\JAVA\jva> java Program11
Enter the number of books: 2
Enter details for book 1:
Name: Marvel
Author: stan lee
Price: 500
Number of Pages: 300
Enter details for book 2:
Name: Java
Author: abc
Price: 100
Number of Pages: 300
Book Details:
Book Details:
Name: Marvel
Author: stan lee
Price: 500.0
Number of Pages: 300
Book Details:
Name: Java
Author: abc
Price: 100.0
Number of Pages: 300
```

#### **LAB 4:**

# **Program 12:**

```
public class Own extends Arimal
12) & writ a java program to creat an abstract
 class arimal with abstract method eart & sleep
                                                                           System out pri what "I am har brow
                                                                         void eath !
 creat subclas both, type to down that extends
                                                                         eat grain a leave. );
   animal class and implement eat a deep
  methods differently based on their specific
                                                                                                                   sluping ...
                                                                          Systemout printled" I have to be adealy
    public abstract. Animal {
                                                                                                                      an herbiours, i cut grass and heave
      public abstract void eat () 8;
                                                                  public class Allanimals &
                                                                                                                    , have to be atout while sleeping ...
                                                                        public static void main (String engra)}
       public abstract and sleep is;
   public class to low extends Animal {
                                                                            Gober eat();
                                                                              Motor slup();
                                                                              Animal tigers: new Tiger 1),
              Ostal Description
              word eaters
                                                                           higher cates;
                   System out printly (" I east other arriveds
                                                                              Animal durs = new Der ();
system out princh ( - I am aux ");
                                                                           system out private (-
                 System out printle (" Sleeping ... ");
                                                                               diers. slupis;
   public class Tiger Extends Animael ?
         void eaters
             system out print but "I cut other curinal cornioner)
           system out println( Tiger is skepping. ...);
        void sleep () {
```

```
Code:
abstract class Animal {
  abstract void eat();
  abstract void sleep();
}

class Lion extends Animal {
  void eat() {
    System.out.println("i eat other animal meat.");
  }

void sleep() {
    System.out.println("Sleeping.");
  }
}

class Tiger extends Animal {
  @Override
```

```
void eat() {
     System.out.println("I eat other herbiours .");
  }
  @Override
  void sleep() {
     System.out.println("Tiger is sleeping.");
  }
}
class Deer extends Animal {
  void eat() {
     System.out.println("I am herbivours and i eat grass.");
  }
  void sleep() {
     System.out.println("I have to be alert while sleeping.");
  }
}
public class Program12 {
  public static void main(String[] args) {
     Animal lion = new Lion();
     Animal tiger = new Tiger();
     Animal deer = new Deer();
     System.out.println("I am Lion");
     lion.eat();
    lion.sleep();
     System.out.println("I am tiger");
     tiger.eat();
     tiger.sleep();
     System.out.println("I am dear");
     deer.eat();
     deer.sleep();
  }
```

```
PS D:\JAVA\jva> java Program12
I am Lion
i eat other animal meat.
Sleeping.
I am tiger
I eat other herbiours .
Tiger is sleeping.
I am dear
I am herbivours and i eat grass.
I have to be alert while sleeping.
```

# Program13:

```
134 Printing area of briangle
                                                                   public void print Aruac) [
                                                                        double onea: 0.5 bt; system out priviled. The area of briungle
     using abstract class.
  public abstract class shape {
              public abstract print Area(); double 1,0,00
                                                                class Cincle extends Shape {
                                                                        double n;
 class Actough extends Shap {
                                                                        public Cincle ( double n) {
            public void print Area () {
                                                                              this. 7: 7;
                 System out printler ( " Area of Rectargle)
                                                                         public void print Area () {
                                                                           double area: 3.142 + (n+n);
             int it
                                                                            System out. printle (" Area of Circle ! " + area);
            Tat 5:
          double l;
          double b;
          public state | Rufangli (double 1, clouble 5){
                                                                    public static void main ( String argold) [
                                                               public class Area ?
                                                                         Shapiru: new Rufangle (10,20);
                 Mis. L.L;
                 this. 6 = 6;
                                                                          oue. print-Arua ();
                                                                        shape tri: new Triangle (10,20);
         public void printArua(){
               double area: l+b;
System. out printle ("The area of Reacteurghes" + we
                                                                        tri. print Areas:
                                                                        Shape cin: new Circle (20);
                                                                        that. printareal);
 class Triangle extends Shape {
        test double es
           double b;
        public Triangle ( double l, clouble b) {
               this . l= 1;
               this beb;
```

```
import java.util.Scanner;

abstract class Shape {
  int l, b,r;

  abstract void printArea();
}

class Rectangle extends Shape {
  Rectangle(int length, int breadth) {
    this.l = length;
    this.b = breadth;
  }
  void printArea() {
    System.out.println("Rectangle Area: " + (l * b));
  }
}
```

```
class Triangle extends Shape {
  Triangle(int base, int height) {
     this.b = base;
     this.l = height;
  void printArea() {
     System.out.println("Triangle Area: " + (0.5 * b * 1));
  }
}
class Circle extends Shape {
  Circle(int radius) {
     this.r = radius;
  }
  void printArea() {
     System.out.println("Circle Area: " + (Math.PI * r * r));
  }
}
public class Program13 {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     Shape rectangle = new Rectangle(20,12);
     Shape triangle = new Triangle(20, 10);
     Shape circle = new Circle(5);
     rectangle.printArea();
     triangle.printArea();
     circle.printArea();
  }
}
```

```
PS D:\JAVA\jva> java Program13
Rectangle Area: 240
Triangle Area: 100.0
Circle Area: 78.53981633974483
```

#### **LAB 5**

#### **Program 14:**

```
144 Dwelop a Java program to create a class Bank
 that maintains two kinds of accounts for its
 customers, one called saving account and the other
 current account. The savings account provides
 conground interest and with drawal bacilities
 but no cheque book bacility. The current account
 holders should also maintain a minimum
 balance and if the balance calls below.
 this level, a service charge is imposed.
  Create a class Account meet stories customer
  name, account number and type of account.
  from this closive the classes cur-acct and
   sav-acet to make them more specific to
  their requirement. Includes he receiving
   methods in order to achieve the following
  as Accept deposit from customer and update
    the balance
   by Display the balance.
   or compute and deposit interest
 It Permit withdrawal and update the balance
 cheek for the menimen balance, impose penalty
 if necessary and update the balance.
```

```
class swarch extends Account ?
Program.
                                                        public Sourcet ( String slame, intaceno, double
import java-with scanner
class Account {
                                                                 Super ( Mame, accino, balance);
    String Mami;
                                                           public void cal ruber ( double amount) {
    tut accusi
    double balance;
                                                                double interest = 0.05; 1/5%
    public word disposite ( double comount) {
                                                                double rutinest = rutinnet balance
                                                               system out private (" Interest applied
      bataut + amount
                                                                current balance = "+ balance);
    public Account ( String Name, int accus, double
     balanes ( in the turner male a
                                                          public void with draw ( double amount) {
  fu's Name: Nami
   this auno: a uno;
                                                                 if ( anoust 2 = balance) {
      this balance: balance;
                                                                       balance -= amount;
                                                                      System. out println(- withouranal
                                                          successfull of is + amount = "; current balance
    public void disposite ( double amount) (
          balance += amount
    system out printled "Ouposite successfull
                                                           + balance);
           (wortent balance = " + balance);
                                                          alre 5
                                                            system. out. printle (" Insufficient balance");
    public void display()f
         System out println ( Current Balance = "+ balance
```

```
public class Con-out ecteds Account {
                                                                 System. Out printle ( - pres 1 por Sewing account
      public visid with hum-cut ( string Nam
                                                                 2 you (wount account );
   fysher out printle ( + 1-7 balance ; 2-4 with also
                                                                    penden (* 1-7 bedand
3 - deposit ; 11-7 interest 7;
26 (2-21) (
                  balane -= conount)
                                                                      sc display (1)
                    balance - a pounalty;
                                                                    elu 16 (x== 1) {
                                                                       system out printle ( " Extr amount !");
Ket y: Sc. Beel Sut ( );
             System out prinstal a Panally applied
                                                                         sc. witholrow Cy);
                                                                      System. Out printle ( " Enter amount : ");
       System. out-printle (" with channel success
      Current Balance: "+ balance );
                                                                       Sc. deposite (inty):
                                                                  elu al lezzal
                                                                     sc. cal interesters
     public static void nein ( String erg I I) {
            Scanner so = new Scanner (System zw) july 1 (20)
             Columbia (100)
             Savaret sav: new Savaret (1);
Curaret cun: new Curaret (1);
        Savacet Save new Savacet ( "Savijan", 203, 1000)
         much cuy : new Curacet ( "Smujan", 201, 2000)
```

```
while (1=0) {
public class Cur-aut extends Account E
      public view with Aum-ach ( String Many
                                                                  2 you current account ");
       double balance) {
                                                                      x : SC. meet Int co;
     not intrimunitalisms (vac) get puralty = 50; blic void withdraw (double amount)?
                                                                          system out grantle ( - 1-7 balance ; 2-4 w
                                                                     3- Escapetable de ( 12 ) E
       of Canount & minimum vans
                                                                       sc display (1)
                     balance - a pounalty;
                                                                     elm 14 (x== 2) {
                                                                          System and printle ( - Exter amount : ").
Ket y: Sc. Beet Int ();
              System. out printle ! Panally applied
       wrient balanc = + + balance );
                                                                          sc. witholian Cy);
                                                                     em 4 ( === 3) {
                                                                       System. Out getinble ( " Enter amount : ");
        System. out. printle (" with chawal successful
       Current Balance : "+ bulance );
                                                                        Sc. deposite (mby);
                                                                   the of Cerry?
                                                                      sc. calintinestus
      public static void nein ( String arg F I) {
             Samuel Sc = New Scanner (System in);
whii
intico;
              white Creoty
              Savaret save new Savaret (+)
              Curacit un : nus Curacit () !
         Sweet save new Sweet ( "Srejan", 103, 1000)
```

```
import java.util.Scanner;
class Account{
               String Name;
               int accno;
               double balance;
               public Account(String Name,int accno,double balance){
               this.Name=Name:
               this.accno=accno;
               this.balance=balance;
}
               public void deposite(double amount){
               balance+=amount;
               System.out.println("Deposite successfull current balance = "+balance);
}
               public void display(){
                      System.out.println("Current balance = "+balance);
               }
}
class Savacct extends Account{
               public Savacct(String Name,int accno,double balance){
               super(Name,accno,balance);
               }
               public void calinter(){
                      double interrate=0.05;
                      double interest =interrate*balance;
                      balance+=interest;
                      System.out.println("Interest applied Current balance = "+balance);
               }
               public void withdraw(double amount){
                      if(amount<=balance){</pre>
                             balance-=amount;
```

```
System.out.println("Withdraw successfull; Current Balance =
"+balance);
                      }
                      else{
                             System.out.println("Insufficient balance");
                      }
               }
class Curacct extends Account{
               public Curacct(String Name,int accno,double balance){
               super(Name,accno,balance);
               int minbalance=1000;
               int pan=50;
               public void withdraw(double amount){
                      if(amount<balance){</pre>
                             balance-=amount;
                             System.out.println("Withdraw successfull; Current Balance =
"+balance);
                      }
                      else{
                             balance-=amount;
                             balance-=pan;
                             System.out.println("Low balance warring Panalty of 50 applied;
Current Balance = "+balance);
               }
}
class Bank{
               public static void main(String args[]){
                      Scanner sc=new Scanner(System.in);
                      Savacct sav=new Savacct("Srujan",203,1000);
                      Curacet cur=new Curacet("Srujan",203,1000);
                     int i=0;
                      int x;
                      int y;
                      double z;
                      while(i==0)
                             System.out.println("Enter 1-> Saving acc; 2 -> Current acc");
                             x=sc.nextInt();
```

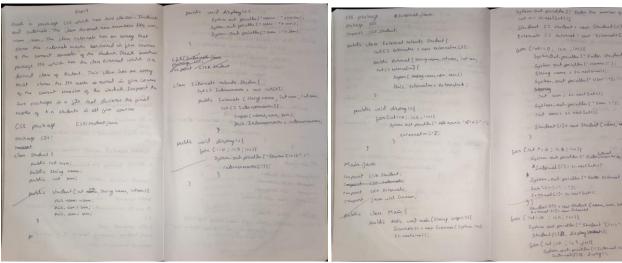
```
if(x==1){
                                     System.out.println("Enter 1-> Balance; 2-> Deposite; 3 ->
Withdraw; 4-> Interest; other to exit");
                                     y=sc.nextInt();
                                     if(y==1){
                                             sav.display();
                                     else if(y==2){
                                             System.out.println("Enter the amount : ");
                                             z=sc.nextInt();
                                             sav.deposite(z);
                                     else if(y==3){
                                             System.out.println("Enter the amount : ");
                                             z=sc.nextInt();
                                             sav.withdraw(z);
                                     else if(y==4){
                                             sav.calinter();
                                      }
                                     else{
                                             System.out.println("exiting");
                                             break;
                                      }
                              }
                              else if(x==2){
                                     System.out.println("Enter 1-> Balance; 2-> Deposite; 3 ->
Withdraw; other to exit");
                                     y=sc.nextInt();
                                     if(y==1){
                                             cur.display();
                                     else if(y==2){
                                             System.out.println("Enter the amount : ");
                                             z=sc.nextInt();
                                             cur.deposite(z);
                                     else if(y==3){
                                             System.out.println("Enter the amount : ");
                                             z=sc.nextInt();
                                             cur.withdraw(z);
                                      }
                                     else{
                                             System.out.println("exiting");
                                             break;
```

```
} else{ break; } 
}
```

```
PS D:\JAVA\jva> java Program14
Enter 1-> Saving acc ; 2 -> Current acc
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
Enter the amount :
2000
Deposite successfull current balance = 3000.0
Enter 1-> Saving acc ; 2 -> Current acc
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
Current balance = 3000.0
Enter 1-> Saving acc ; 2 -> Current acc
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
Interest applied Current balance = 3150.0
Enter 1-> Saving acc ; 2 -> Current acc
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw ; 4-> Interest ; other to exit
Enter the amount :
Withdraw successfull ; Current Balance = 2950.0
Enter 1-> Saving acc ; 2 -> Current acc
Enter 1-> Balance ; 2-> Deposite ; 3 -> Withdraw; other to exit
Enter the amount :
200
Withdraw successfull ; Current Balance = 800.0
Enter 1-> Saving acc ; 2 -> Current acc
```

#### LAB 6

# **Program 15:**



Student.java

# package CIE;

```
public class Student {
  public String usn;
  public String name;
  public int sem;
  public Student(String usn, String name, int sem) {
     this.usn = usn;
     this.name = name;
     this.sem = sem;
  public void displayStudentInfo() {
     System.out.println("USN: " + usn);
    System.out.println("Name: " + name);
     System.out.println("Semester: " + sem);
public class Internals extends Student {
  public int[] internalMarks = new int[5];
  public Internals(String usn, String name, int sem, int[] internalMarks) {
     super(usn, name, sem);
     this.internalMarks = internalMarks;
```

```
public void displayInternalMarks() {
     System.out.println("Internal Marks: ");
     for (int i = 0; i < internalMarks.length; <math>i++) {
       System.out.println("Course" + (i + 1) + ":" + internalMarks[i]);
  }
External.java
package SEE;
import CIE.Student;
public class External extends Student {
  public int[] seeMarks = new int[5];
  public External(String usn, String name, int sem, int[] seeMarks) {
     super(usn, name, sem);
     this.seeMarks = seeMarks;
  }
  public void displaySeeMarks() {
     System.out.println("SEE Marks: ");
     for (int i = 0; i < \text{seeMarks.length}; i++) {
       System.out.println("Course" + (i + 1) + ":" + seeMarks[i]);
  }
Main.java
import CIE.Internals;
import SEE.External;
import java.util.Scanner;
public class Main {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     System.out.println("Enter the number of students: ");
     int n = sc.nextInt();
     Internals[] internalStudents = new Internals[n];
     External[] externalStudents = new External[n];
     for (int i = 0; i < n; i++) {
       sc.nextLine();
       System.out.println("\nEnter details for Student " + (i + 1) + ":");
```

```
System.out.print("USN: ");
  String usn = sc.nextLine();
  System.out.print("Name: ");
  String name = sc.nextLine();
  System.out.print("Semester: ");
  int sem = sc.nextInt();
  int[] internalMarks = new int[5];
  int[] seeMarks = new int[5];
  System.out.println("Enter marks for 5 courses (Internal followed by SEE):");
  for (int j = 0; j < 5; j++) {
     System.out.print("Course" + (j + 1) + "Internal Marks: ");
     internalMarks[j] = sc.nextInt();
     System.out.print("Course" + (j + 1) + "SEE Marks: ");
     seeMarks[j] = sc.nextInt();
  }
  internalStudents[i] = new Internals(usn, name, sem, internalMarks);
  externalStudents[i] = new External(usn, name, sem, seeMarks);
}
for (int i = 0; i < n; i++) {
  System.out.println("\nFinal Marks for Student " + (i + 1) + ":");
  internalStudents[i].displayStudentInfo();
  System.out.println("Course-wise Marks (Internal + SEE): ");
  for (int i = 0; i < 5; i++) {
     int finalMarks = internalStudents[i].internalMarks[j] + externalStudents[i].seeMarks[j];
    System.out.println("Course" + (j + 1) + ":" + finalMarks);
  }
sc.close();
```

```
PS D:\JAVA\jva> javac CIE/Student.java CIE/Internals.java SEE/External.java Program15.java
PS D:\JAVA\jva> java Program15.java
Enter the number of students:
Enter details for Student 1:
USN: 419
Name: srujan
Semester: 3
Enter marks for 5 courses (Internal followed by SEE):
Course 1 Internal Marks: 40
Course 1 SEE Marks: 40
Course 2 Internal Marks: 40
Course 2 SEE Marks: 30
Course 3 Internal Marks: 42
Course 3 SEE Marks: 33
Course 4 Internal Marks: 44
Course 4 SEE Marks: 31
Course 5 Internal Marks: 40
Course 5 SEE Marks: 34
Enter details for Student 2:
USN: 400
Name: abc
Semester: 3
Enter marks for 5 courses (Internal followed by SEE):
Course 1 Internal Marks: 40
Course 1 SEE Marks: 50
Course 2 Internal Marks: 33
Course 2 SEE Marks: 23
Course 3 Internal Marks: 42
Course 3 SEE Marks: 32
Course 4 Internal Marks: 23
Course 4 SEE Marks: 42
Course 5 Internal Marks: 23
Course 5 SEE Marks: 33
Final Marks for Student 1:
USN: 419
Name: srujan
Semester: 3
Course-wise Marks (Internal + SEE):
Course 1: 80
Course 2: 70
Final Marks for Student 2:
USN: 400
Name: abc
Semester: 3
Course-wise Marks (Internal + SEE):
Course 1: 90
Course 2: 56
Course 3: 74
Course 4: 65
Course 5: 56
```

# LAB 7 Program 16:

```
EAB EXP 16
                                                           program 5
Program 1 Output:
                                                           interface Polygon {
 Implementation of method 1
                                                                  default double get Perineter() {
                                                                  abstanct rad double get Area ();
Dog cats bone
                                                                 Rectangle in plenent Polygon !
Program 3
                                                                   private double leuth;
                                                                    public Rectangle ( double leath, double breath) {
                                                                            Mis. lenth: lenth;
Printing duc
                                                                   public double get Perimeter () (lanks, wroth) {
                                                                           return 2 " (lenth + width);
                                                                   public double gethreal ? {
                                                                       suturn l'b;
```

```
public interface Polygon {
    default double getPerimeter() {
        return 0.0;
    }
    abstract double getArea();
}

class Rectangle implements Polygon {
    private double length;
    private double width;

public Rectangle(double length, double width) {
    this.length = length;
    this.width = width;
}
```

```
public double getArea() {
    return length * width;
  public double getPerimeter() {
    return 2*(length+width); }
}
class Square implements Polygon {
  private double length;
  public Square(double length) {
    this.length = length;
  }
  public double getArea() {
    return length * length;
  public double getPerimeter() {
    return 4*length; }
}
public class Program16 {
  public static void main(String[] args) {
    Polygon rectangle = new Rectangle(10,20);
     System.out.println("Rectangle Perimeter: " + rectangle.getPerimeter());
     System.out.println("Rectangle Area: " + rectangle.getArea());
    Polygon square = new Square(20);
     System.out.println("Rectangle Perimeter: " + square.getPerimeter());
    System.out.println("Rectangle Area: " + square.getArea());
}
```

```
PS D:\JAVA\jva> java Program16.java
Rectangle Perimeter: 60.0
Rectangle Area: 200.0
Rectangle Perimeter: 80.0
Rectangle Area: 400.0
```

#### **LAB 8**

**Program17:** 

```
write a program shall demonstrates handling of exception in inheritance tree. Create a bax
 class called "father" and derived class called
 "son" which extends the base clan. In batter class, implement a so constructor which takes the age and throws the expection
                                                                                                                              ( " son's age can not be -ue -)
                                                                                                                     ef ( to sonage > = tutherage) {
  worms Age is when the rapert age 20. In son
                                                                                                                           surous new Wrong ange Greep
  class, implement a constructor that uses
                                                                                                                         (" Son's cege com not be greated of batters coge ");
  both bother and son's age and strown an exception if son's age is > - bather's age.
                                                                                              clain main { // test cax |
public starte void main (shring angs 5) }

frot father t = new tather (40);

Son s = new Son (40,0,0);

System cart printle (** terhini age : 1;

system cart printle (** terhini age : 1;
  Class Working age Eccep colouds Exception & public WrongageExcep (String manage) {
Super (manage);
  class Lather extends wrong aget keep &
                                                                                                                  " son 's age : " + 5. sonage " ) ;
                public testion ( not gettin age) som who if ( father age 20)?

**Autour's corregage Excep
(" testion's age cannot be be in ");

}

this, bather age : bester age;
                                                                                                  3 certal two mong ceget cusp e) {
System. out printle ("Emon
                                                                                                   Extra Programs
   Latter 1: new feether (-6);
Sigtem out-printed to terrin up: "+6 feethge);
S cathe (Corrors operage) { system out-printle (-congress);
y
                                                                                                  Another new Greephon is 1 by zero
                                                                                                please enter your age - Numeric value :10
You are not authorized to view page.
tory &
     Son S: new Son ( 50,410);
    I catch t wrongage except es { System out println ( " En
                                                                                               favor long. Arithmetic Exception: / by Zero cut little 1. main ( 0,661 1. Java : at java , ban / jou
                                                                                               i wa . lang . Ani dumetic Ecception : 1 kg zero
  Les tertier age : 40 Son age : 10.
                                                                                                5 you syped :5
                                                                                              dry 20/11
```

#### Code:

```
public WrongAgeExcep (String message){
    super(message);
}
}
class Father {

public int fage;
public Father (int fage) throws WrongAgeExcep{
    if(fage<0){
        throw new WrongAgeExcep("Age can not be less than 0");
}</pre>
```

class WrongAgeExcep extends Exception{

```
this.fage=fage;
}
class Son extends Father{
  public int sage;
  public Son(int sage, int fage) throws WrongAgeExcep{
    super(fage);
    if(sage < 0){
       throw new WrongAgeExcep("Age can not be less than 0");
    if(sage>=fage){
       throw new WrongAgeExcep("Sons age can not be greater or equal to father age");
    this.sage=sage;
}
class Program17{
  public static void main(String args[]){
    try{
       Father f=new Father(40);
       Son s=new Son(10,40);
       System.out.println("Father age: "+f.fage+" Son age: "+s.sage);
     }catch (WrongAgeExcep e){System.out.println("Error : "+e.getMessage());}
  try{
       Father f=new Father(-5);
       System.out.println("Father age : "+f.fage);
     }catch (WrongAgeExcep e){System.out.println("Error : "+e.getMessage());}
  try{
       Father f=new Father(40);
       Son s=new Son(50,40);
       System.out.println("Father age: "+f.fage+" Son age: "+s.sage);
     }catch (WrongAgeExcep e){System.out.println("Error : "+e.getMessage());}
  }
```

```
PS D:\JAVA\jva> java Program17.java
Father age : 40 Son age : 10
PS D:\JAVA\jva> java Program17.java
Error : Age can not be less than 0
PS D:\JAVA\jva> java Program17.java
Error : Sons age can not be greater or equal to father age
```

#### LAB9

Program18:

```
cluss main &
                  Lab-9
write a program which creates two storeads, one
                                                               public static void main (String args [7) {
                                                                         Thread 4 = new Threadsness (- BMS College of
  should displaying ams callege of Engineering " once
                                                                            Engineering, 10000);
  every her seconds and another displaying "cse"
                                                                         Thread +1 = new Threadsment " (SE ", 2000);
   once every two seconds.
  class Threedotres extends Thread {
                                                                        +1. Start();
      private String message;
         private int intervale;
         public Threadoners C String Message, but intervally
                 this mesage;
                 this interval : interval;
                     System. out . printler (message);
                     Thread . sleep (Interval);
                     } catch ( ener Exception es {
                          System. out. printle " Thread
                          3 interepted ");
```

```
class Threadmess extends Thread {
    private String message;
    private int interval;

public Threadmess(String message , int interval){
        this.message=message;
        this.interval=interval;
    }

public void run(){
        while(true){
        try{
            System.out.println(message);
            Thread.sleep(interval);
        }

} catch(InterruptedException e){
        System.out.println("Thread interuted");
        }
```

```
}

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

        Thread t1=new Threadmess("BMS college ",10000);
        Thread t2=new Threadmess("CSE",2000);
        t1.start();
        t2.start();
}
```

```
PS D:\JAVA\jva> javac Threadexcep.java
PS D:\JAVA\jva> java Threadexcep
CSE
BMS college
CSE
CSE
CSE
CSE
BMS college
CSE
CSE
CSE
CSE
CSE
BMS college
CSE
CSE
CSE
CSE
CSE
BMS college
CSE
CSE
CSE
CSE
```