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Subject: Object oriented programming using Java.

Practical Assignment [Programs 1 to 15]

1).Write a simple “Hello World” java program, compilation, debugging, executing using java compiler and interpreter.

→Ans.

```
class ex1 {  
    public static void main(String args[])  
    {  
        System.out.println("Hello World");  
    }  
}
```

o/p will be :

```
D:\Mca Work\OOPJ\Assi-1>java k_ex1.java  
Hello World
```

```
D:\Mca Work\OOPJ\Assi-1>
```

2).Write a program to pass Starting and Ending limit and print all prime numbers and Fibonacci numbers between this ranges.

→Ans.

```
import java.util.Scanner;

public class k_ex2 {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the starting limit: ");

        int start = scanner.nextInt();

        System.out.print("Enter the ending limit: ");

        int end = scanner.nextInt();

        System.out.println("Prime numbers between " + start + " and " + end + ":");

        for (int i = start; i <= end; i++) {

            if (isPrime(i)) {

                System.out.print(i + " ");

            }

        }

        System.out.println("\nFibonacci numbers between " + start + " and " + end + ":");

        int first = 0, second = 1;

        while (first <= end) {

            if (first >= start) {

                System.out.print(first + " ");

            }

            int next = first + second;

            first = second;

            second = next;

        }

        scanner.close();
    }

    private static boolean isPrime(int num) {

        if (num <= 1) {

            return false;
        }
    }
}
```

```
}

for (int i = 2; i <= Math.sqrt(num); i++) {

    if (num % i == 0) {

        return false;

    }

}

return true;

}

}
```

o/p will be :

```
D:\Mca Work\OOPJ\Assi-1>java k_ex2.java
Enter the starting limit: 5
Enter the ending limit: 25
Prime numbers between 5 and 25:
5 7 11 13 17 19 23
Fibonacci numbers between 5 and 25:
5 8 13 21
D:\Mca Work\OOPJ\Assi-1>
```

3. Write a java program to check whether number is palindrome or not.

→ Ans.

```
import java.util.Scanner;  
class k_ex3  
{  
    public static void main(String arg[])  
    {  
        int num,t,s,rem;  
        Scanner sc=new Scanner(System.in);  
        System.out.println("Enter any number ");  
        num=sc.nextInt();  
        t=num;  
        for(s=0;num>0;num/=10)  
        {  
            rem=num%10;  
            s=(s*10)+rem;  
        }  
        if(s==t)  
            System.out.println(t+" is a palindrome number ");  
        else  
            System.out.println(t+" is not a palindrome number ");  
    }  
}
```

o/p will be :

```
D:\Mca Work\OOPJ\Assi-1>java k_ex3.java
Enter any number
528
528 is not a palindrome number
```

```
D:\Mca Work\OOPJ\Assi-1>java k_ex3.java
Enter any number
545
545 is a palindrome number
```

4. Write a java program to print value of x^n .

→Ans.

```
public class k_ex4 {  
    public static void main(String args[]) {  
        int base = 5;  
        int exponent = 3;  
        int result = 1;  
        for (int i = 0; i < exponent; i++) {  
            result *= base;  
        }  
        System.out.println(base + " raised to the power of " + exponent + " is " +  
result);  
    }  
}
```

o/p will be :

```
D:\Mca Work\OOPJ\Assi-1>java k_ex4.java  
5 raised to the power of 3 is 125
```

5. Write a java program to check Armstrong number.

→Ans.

```
import java.util.Scanner;  
public class k_ex5 {  
  
    public static void main(String[] args) {  
  
        int num, number, temp, total = 0;  
        System.out.println("Enter 3 Digit Number");  
        Scanner scanner = new Scanner(System.in);  
        num = scanner.nextInt();  
        scanner.close();  
        number = num;  
  
        for( ;number!=0;number /= 10)  
        {  
            temp = number % 10;  
            total = total + temp*temp*temp;  
        }  
  
        if(total == num)  
            System.out.println(num + " is an Armstrong number");  
        else  
            System.out.println(num + " is not an Armstrong number");  
    }  
}
```

o/p will be :

```
D:\Mca Work\OOPJ\Assi-1>java k_ex5.java
Enter Number
153
153 is an Armstrong number
```

```
D:\Mca Work\OOPJ\Assi-1>java k_ex5.java
Enter Number
22
22 is not an Armstrong number
```

6. Write a program in Java to find minimum of three numbers using conditional operator.

→Ans.

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

```
public class k_ex6{  
    public static void main(String args[]) {  
        Scanner sc = new Scanner(System.in);
```

```
        System.out.println("Enter the first number:");  
        int a = sc.nextInt();  
        System.out.println("Enter the second number:");  
        int b = sc.nextInt();  
        System.out.println("Enter the third number:");  
        int c = sc.nextInt();
```

```
        int minimum = (a < b) ? (a < c ? a : c) : (b < c ? b : c);
```

```
        System.out.println("The minimum number is: " + minimum);
```

```
}
```

```
}
```

o/p will be :

```
D:\Mca Work\OOPJ\Assi-1>java k_ex6.java
Enter the first number:
69
Enter the second number:
49
Enter the third number:
79
The minimum number is: 49
```

7. Write a java program which should display maximum number of given 4 numbers.

→ Ans.

```
import java.util.Scanner;  
public class k_ex7{  
    public static void main(String args[]) {  
        Scanner scanner = new Scanner(System.in);  
        System.out.println("Enter four numbers:");  
        int num1 = scanner.nextInt();  
        int num2 = scanner.nextInt();  
        int num3 = scanner.nextInt();  
        int num4 = scanner.nextInt();  
        int max = num1;  
        if (num2 > max) {  
            max = num2;  
        }  
        if (num3 > max) {  
            max = num3;  
        }  
        if (num4 > max) {  
            max = num4;  
        }  
        System.out.println("The maximum number is: " + max);  
    }  
}
```

o/p will be :

```
D:\Mca Work\OOPJ\Assi-1>java k_ex7.java
Enter four numbers:
105
154
113
106
The maximum number is: 154
```

8 Write a program in Java to multiply two matrix. Declare a class Matrix where 2D array is declared as instance variable and array should be initialized, within class.

→Ans.

```
public class matrix{  
    private int[][] data;  
    private int rows;  
    private int cols;  
    public matrix(int[][] input){  
        rows=input.length;  
        cols=input[0].length;  
        data =new int[rows][cols];  
        for(int i=0;i<rows;i++){  
            for(int j=0;j<cols;j++){  
                data[i][j]=input[i][j];  
            }  
        }  
    }  
    private void displayMatrix(){  
        for(int i=0;i<rows;i++){  
            System.out.print("| ");  
            for(int j=0;j<cols;j++){  
                System.out.print(data[i][j]+" ");  
            }  
            System.out.print("|\n");  
            System.out.println();  
        }  
    }  
}
```

```
private matrix mulitiplication(matrix secondMatrix){  
  
    int[][] result=new int[rows][secondMatrix.cols];  
    for(int i=0;i<rows;i++){  
        for(int j=0;j<secondMatrix.cols;j++){  
            int sum=0;  
            for(int k=0;k<cols;k++){  
                sum=sum+ data[i][k]*secondMatrix.data[k][j];  
            }  
            result[i][j]=sum;  
        }  
    }  
    return new matrix(result);  
}  
  
public static void main(String args[]){  
  
    int[][] matrix1={{ {1,2} , {3,4} } ;  
    int[][] matrix2={{ {5,6}, {7,8} } ;  
    matrix mat1=new matrix(matrix1);  
    matrix mat2=new matrix(matrix2);  
    System.out.println("\nMatrix 1:");  
    mat1.displayMatrix();  
    System.out.println("\nMatrix 2:");  
    mat2.displayMatrix();  
    matrix result= mat1.mulitiplication(mat2);  
    System.out.println("\nResult of mulitiplication: ");
```

```
result.displayMatrix();  
}  
}  
}
```

o/p will be :

```
D:\Mca\OOPJ\Assi-1>java matrix
```

```
Matrix 1:
```

```
| 1 2 |  
| 3 4 |
```

```
Matrix 2:
```

```
| 5 6 |  
| 7 8 |
```

```
Result of multiplication:
```

```
| 19 22 |  
| 43 50 |
```

9 .Write a java program to create a class “Matrix” that would contain integer values having varied Numbers of columns for each row. Print row-wise sum of the integer values for eachrow.

→Ans.

```
public class Matrix {  
  
    private int[][] data;  
  
    private int rows;  
  
    private int cols;  
  
    public Matrix(int[][] input){  
  
        rows=input.length;  
        data=new int[rows][];  
        for(int i=0; i<rows;i++){  
            cols=input[i].length;  
            data[i]=new int[cols];  
            for(int j=0;j<cols;j++){  
                data[i][j]=input[i][j];  
            }  
        }  
    }  
  
    private void displayMatrix(){  
        for(int i=0;i<data.length;i++){  
            for(int j=0;j<data[i].length;j++){  
                System.out.print(data[i][j]+" ");  
            }  
            System.out.println();  
        }  
    }  
}
```

```
}

}

private void printSum(){

for(int i=0;i<data.length;i++){

int rowSum=0;

for(int j=0;j<data[i].length;j++){

rowSum=rowSum+data[i][j];

}

System.out.print("Row "+(i+1)+" sum: "+rowSum);

System.out.println();

}

}

public static void main(String args[]){

int[][] matrix1={{1,2,3,4},{5,6},{7,8,9}};

int[][] matrix2={{2,5,8,9},{6,3},{4,7,1},{1,5,9,7,3,8}};

Matrix mat1=new Matrix(matrix1);

Matrix mat2=new Matrix(matrix2);

System.out.println("Matrix 1:");

mat1.displayMatrix();

System.out.println("\nSum of each row (matrix 1)");

mat1.printSum();

System.out.println("\nMatrix 2:");

mat2.displayMatrix();

System.out.println("\nSum of each row (matrix 2)");

mat2.printSum();

}
```

```
}
```

o/p will be:

```
D:\Mca\OOPJ\Assi-1>javac Matrix.java
```

```
D:\Mca\OOPJ\Assi-1>java Matrix
Matrix 1:
1 2 3 4
5 6
7 8 9
```

```
Sum of each row (matrix 1)
Row 1 sum: 10
Row 2 sum: 11
Row 3 sum: 24
```

```
Matrix 2:
2 5 8 9
6 3
4 7 1
1 5 9 7 3 8
```

```
Sum of each row (matrix 2)
Row 1 sum: 24
Row 2 sum: 9
Row 3 sum: 12
Row 4 sum: 33
```

10. Write a Java application which takes several command line arguments, which are supposed to be names of students and prints output as given below: (Suppose we enter 3 names then output should be asfollows)..
Number of arguments = 3 1.First Student Name is = Arun 2.Second Student Name is = Hiren 3.Third Student Name is = Hitesh.

→Ans.

```
public class k_ex10 {  
    public static void main(String[] args) {  
        int numOfArgs = args.length;  
        String[] numberWords = {  
            "First", "Second", "Third", "Fourth", "Fifth",  
            "Sixth", "Seventh", "Eighth", "Ninth", "Tenth"  
        };  
        System.out.println("\nNumber of arguments: " + numOfArgs);  
        for (int i = 0; i < numOfArgs; i++) {  
            System.out.println((i + 1) + ". " + numberWords[i] + " Student name is:  
" + args[i]);  
        }  
    }  
}
```

```
D:\Mca\OOPJ\Assi-1>java k_ex10 Arun Hiren Hitesh
```

```
Number of arguments: 3  
1. First Student name is: Arun  
2. Second Student name is: Hiren  
3. Third Student name is: Hitesh
```

```
D:\Mca\OOPJ\Assi-1>
```

11). Write a Java application to count and display frequency of letters and digits from the String given by user as command-line argument.

→Ans.

```
public class k_ex11 {  
    public static void main(String[] args) {  
  
        if (args.length <= 0) {  
            System.out.println("Please provide a string as a command-line  
argument.");  
            return;  
        }  
        String input = args[0];  
  
        int letters = 0;  
        int digits = 0;  
  
        input = input.toLowerCase();  
        for (int i = 0; i < input.length(); i++) {  
            char ch = input.charAt(i);  
  
            if (ch >= 'a' && ch <= 'z') {  
                letters++;  
            }  
  
            else if (ch >= '0' && ch <= '9') {  
                digits++;  
            }  
        }  
    }  
}
```

```
}

System.out.println("Input String : " + input);

System.out.println("Letter Count : " + letters);

System.out.println("Digit Count : " + digits);

}

}
```

o/p will be.

```
D:\Mca\OOPJ\Assi-1>javac --release 8 -Xlint:-options k_ex11.java

D:\Mca\OOPJ\Assi-1>java k_ex11 Hello123
Input String : hello123
Letter Count : 5
Digit Count : 3

D:\Mca\OOPJ\Assi-1>
```

12). Create a class “Student” that would contain enrollment No, name, and gender andmarks as instance variables and count as static variable which stores the count of the objects; constructors and display(). Implement constructors to initialize instance variables. Also demonstrate constructor chaining. Create objects of class “Student” and displays all values of objects.

→Ans.

```
import java.util.*;  
class Student  
{  
    private int enrollmentNo;  
    private String name;  
    private String gender;  
  
    public Student()  
    {  
        enrollmentNo=0;  
        name="undefine";  
        gender="male";  
    }  
    public Student(int en, String nm, String gn)  
    {  
        setEnrollmentNo(en);  
        setName(nm);  
        setGender(gn);  
    }  
  
    public int getEnrollmentNo()  
    {
```

```
        return(enrollmentNo);
    }

public void setEnrollmentNo(int en)
{
    enrollmentNo=en;
}

public String getName()
{
    return(name);
}

public void setName(String nm)
{
    name=nm.toUpperCase();
}

public String getGender()
{
    return(gender);
}

public void setGender(String gn)
{
    gender=gn.toUpperCase();
}

public void displayStudent()
{
    System.out.println("~~~~~");
}
```

```

        System.out.println("Enrollment No : "+getEnrollmentNo());
        System.out.println("Student Name : "+getName());
        System.out.println("Gender      : "+getGender());
        System.out.println("~~~~~");
    }

}

public class k_ex12
{
    public static void main(String args[])
    {
        Student s = new Student();
        s.displayStudent();
        Student s1 = new Student(1,"kshitij","male");
        s1.displayStudent();

    }
}

```

o/p will be.

```

D:\Mca\OOPJ\Assi-1>javac --release 8 -Xlint:-options k_ex12.java
D:\Mca\OOPJ\Assi-1>java k_ex12
~~~~~
Enrollment No : 0
Student Name   : undefine
Gender         : male
~~~~~
~~~~~
Enrollment No : 1
Student Name   : KSHITIJ
Gender         : MALE
~~~~~

```

13) Write a program in Java to demonstrate use of this keyword. Check whether this can access the Static variables of the class or not.

→Ans.

```
import java.util.*;  
  
class Student {  
    private int enrollmentNo;  
    private String name;  
    private String gender;  
    private static int count = 0;  
  
    public Student() {  
        this.enrollmentNo = 0;  
        this.name = "undefine";  
        this.gender = "male";  
        count++;  
    }  
  
    public Student(int en, String nm, String gn) {  
        this();  
        this.setEnrollmentNo(en);  
        this.setName(nm);  
        this.setGender(gn);  
    }  
  
    public int getEnrollmentNo() {  
        return this.enrollmentNo;  
    }  
  
    public void setEnrollmentNo(int en) {  
        this.enrollmentNo = en;  
    }  
  
    public String getName() {
```

```
    return this.name;
}

public void setName(String nm) {
    this.name = nm.toUpperCase();
}

public String getGender() {
    return this.gender;
}

public void setGender(String gn) {
    this.gender = gn.toUpperCase();
}

public void displayStudent() {
    System.out.println("~~~~~");
    System.out.println("Enrollment No : " + this.getEnrollmentNo());
    System.out.println("Student Name : " + this.getName());
    System.out.println("Gender      : " + this.getGender());
    System.out.println("~~~~~");
}

public static int getCount() {
    return count;
}

public void demonstrateThisKeyword() {
    System.out.println("Name using 'this': " + this.name);
    System.out.println("Count without using 'this': " + Student.count);
}

public class k_ex13 {
```

```
public static void main(String[] args) {  
    Student s = new Student();  
    s.displayStudent();  
    Student s1 = new Student(1, "kshitij", "male");  
    s1.displayStudent();  
    System.out.println("Total number of students: " +  
        Student.getCount());  
    s1.demonstrateThisKeyword();  
}  
}
```

o/p will be.

```
D:\Mca\OOPJ\Assi-1>javac --release 8 -Xlint:-options k_ex13.java  
D:\Mca\OOPJ\Assi-1>java k_ex13  
~~~~~  
Enrollment No : 0  
Student Name : undefine  
Gender : male  
~~~~~  
~~~~~  
Enrollment No : 1  
Student Name : KSHITIJ  
Gender : MALE  
~~~~~  
Total number of students: 2  
Name using 'this': KSHITIJ  
Count without using 'this': 2
```

14) Create a class “Rectangle” that would contain length and width as an instance variable and count as a static variable.

Define constructors [constructor overloading (default, parameterized and copy)] to initialize variables of objects. Define methods to find area and to display variables’value of objects which are created.

→Ans.

```
class Rectangle {  
    private double length;  
    private double width;  
    private static int count = 0;  
    static {  
        System.out.println("Static initializer block executed.");  
        count = 0;  
    }  
    {  
        System.out.println("Instance initializer block executed.");  
        length = 1.0;  
        width = 1.0;  
    }  
    public Rectangle() {  
        count++;  
        System.out.println("Default constructor executed.");  
    }  
    public Rectangle(double length, double width) {  
        this();  
        this.length = length;  
        this.width = width;  
        System.out.println("Parameterized constructor executed.");  
    }  
}
```

```
}

public Rectangle(Rectangle rect) {
    this(rect.length, rect.width);
    System.out.println("Copy constructor executed.");
}

public double calculateArea() {
    return length * width;
}

public static int getCount() {
    return count;
}

public void display() {
    System.out.println("Length: " + length);
    System.out.println("Width: " + width);
    System.out.println("Area: " + calculateArea());
}

}

public class k_ex14 {
    public static void main(String[] args) {

        System.out.println("Total rectangles before creation: " +
        Rectangle.getCount());

        Rectangle rect1 = new Rectangle();
        rect1.display();
    }
}
```

```
    Rectangle rect2 = new Rectangle(5.0, 3.0);
    rect2.display();
    Rectangle rect3 = new Rectangle(rect2);
    rect3.display();
    System.out.println("Total rectangles after creation: " +
Rectangle.getCount());
}
}
```

o/p will be.

```
D:\Mca\OOPJ\Assi-1>javac --release 8 -Xlint:-options k_ex14.java
D:\Mca\OOPJ\Assi-1>java k_ex14
Static initializer block executed.
Total rectangles before creation: 0
Instance initializer block executed.
Default constructor executed.
Length: 1.0
Width: 1.0
Area: 1.0
Instance initializer block executed.
Default constructor executed.
Parameterized constructor executed.
Length: 5.0
Width: 3.0
Area: 15.0
Instance initializer block executed.
Default constructor executed.
Parameterized constructor executed.
Copy constructor executed.
Length: 5.0
Width: 3.0
Area: 15.0
Total rectangles after creation: 3
```

15) Write a java program static block which will be executed before main () method in a Class.

→Ans.

```
public class k_ex15 {  
    static {  
        System.out.println("Static block executed before the main method.");  
    }  
    public static void main(String[] args) {  
        System.out.println("Main method executed.");  
    }  
}
```

o/p will be.

```
D:\Mca\OOPJ\Assi-1>javac --release 8 -Xlint:-options k_ex15.java  
D:\Mca\OOPJ\Assi-1>java k_ex15  
Static block executed before the main method.  
Main method executed.  
D:\Mca\OOPJ\Assi-1>
```