

MODULE: 1

- ◆ **Practical-1**: Install JDK, setup Java environment and write a program to print-
“CODING IS FUN, ENJOY IT!”.

```
// Install JDK  
public class one {  
    public static void main(String[] args) {  
        System.out.println("\nCODING IS FUN, ENJOY IT!\n");  
    }  
}
```

> **Output:**

```
CODING IS FUN, ENJOY IT!
```

◆ **Practical- 2: Write a program in Java to generate first n prime numbers.**

// Generate first n Prime Number

```
import java.util.Scanner;

public class two{

    public static void main (String[]args){
        Scanner sc = new Scanner(System.in);
        int count = 0, n = 0, i = 1, j = 1;
        System.out.print("Enter number of prime numbers to be printed: ");
        int a = sc.nextInt();
        while (n < a)
        {
            j = 1;
            count = 0;
            while (j <= i)
            {
                if (i % j == 0)
                    count++;
                j++;
            }
            if (count == 2)
            {
                System.out.printf ("%d ", i);
                n++;
            }
            i++;
        }
    }
}
```

> Output:

```
Enter number of prime numbers to be printed: 10
2 3 5 7 11 13 17 19 23 29
```

♦ **Practical- 3: Write a program to enter two numbers and perform all arithmetic, comparison, logical and bitwise operations on them.**

// Arithmetic, Comparison, Bitwise Operations

import java.util.Scanner;

public class three {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

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

int a = sc.nextInt();

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

int b = sc.nextInt();

//Arithmetic Operations

System.out.println("\nAddition: " + (a + b));

System.out.println("Multiplication: " + (a * b));

System.out.println("Subtraction: " + (a - b));

System.out.println("Division: " + (a / b));

System.out.println("Modulus: " + (a % b));

System.out.println("Exponation: " + (a ^ b));

//Comparision Operations

System.out.println("\nGreater than: " + (a > b));

System.out.println("Greater than or equals to: " + (a >= b));

System.out.println("Less than: " + (a < b));

System.out.println("Less than or equals to: " + (a <= b));

System.out.println("Equals to: " + (a == b));

System.out.println("Not equals to: " + (a != b));

//Bitwise Operations

System.out.println("\na&b = " + (a & b));

System.out.println("a|b = " + (a | b));

System.out.println("a^b = " + (a ^ b));

System.out.println("~a = " + ~a);

}

}

Enter first number: 6
Enter second number: 3

Addition: 9
Multiplication: 18
Subtraction: 3
Division: 2
Modulus: 0
Exponation: 5

Greater than: true
Greater than or equals to: true
Less than: false
Less than or equals to: false
Equals to: false
Not equals to: true

a&b = 2
a|b = 7
a^b = 5
~a = -7

- ♦ **Practical- 4: Write a program that scans marks and credits of 2 subjects of the student and Calculate: Grade of each subject (using else if ladder), Gradepoint of each subject from grade (using switch case), SPI using gradepoints and credits of 2 subjects.**

```
// Calculating Grade & SPI
import java.util.Scanner;

public class four {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        //Calculating grade, gradepoints and SPI
        String grade1, grade2;
        int gradepoints1, gradepoints2;
        //Inputing marks and credits of first subject
        System.out.print("\nEnter marks of first subject: ");
        int m1 = sc.nextInt();
        System.out.print("Enter credits of first subject: ");
        int c1 = sc.nextInt();
        //Inputing marks and credits of second subject
        System.out.print("\nEnter marks of second subject: ");
        int m2 = sc.nextInt();
        System.out.print("Enter credits of second subject: ");
        int c2 = sc.nextInt();
        //Calculating grades of first subject
        if(m1 >= 80){
            grade1 = "O";
        }
        else if(m1 >= 70){
            grade1 = "A+";
        }
        else if(m1 >= 60){
            grade1 = "A";
        }
        else if(m1 >= 55){
            grade1 = "B+";
        }
        else if(m1 >= 50){
```

```
    grade1 = "B";
}
else if(m1 >= 45){
    grade1 = "C";
}
else if(m1 >= 40){
    grade1 = "P";
}
else {
    grade1 = "F";
}
//Calculating grades of second subject
if(m2 >= 80){
    grade2 = "O";
}
else if(m2 >= 70){
    grade2 = "A+";
}
else if(m2 >= 60){
    grade2 = "A";
}
else if(m2 >= 55){
    grade2 = "B+";
}
else if(m2 >= 50){
    grade2 = "B";
}
else if(m2 >= 45){
    grade2 = "C";
}
else if(m2 >= 40){
    grade2 = "P";
}
else {
    grade2 = "F";
}
```

//Calculating gradepoints of first subject

```
switch(grade1){  
    case "O":  
        gradepoints1 = 10;  
        break;  
    case "A+":  
        gradepoints1 = 9;  
        break;  
    case "A":  
        gradepoints1 = 8;  
        break;  
    case "B+":  
        gradepoints1 = 7;  
        break;  
    case "B":  
        gradepoints1 = 6;  
        break;  
    case "C":  
        gradepoints1 = 5;  
        break;  
    case "P":  
        gradepoints1 = 4;  
        break;  
    default:  
        gradepoints1 = 0;  
        break;  
}  
switch(grade2){  
    case "O":  
        gradepoints2 = 10;  
        break;  
    case "A+":  
        gradepoints2 = 9;  
        break;  
    case "A":  
        gradepoints2 = 8;
```

```

        break;
    case "B+":
        gradepoints2 = 7;
        break;
    case "B":
        gradepoints2 = 6;
        break;
    case "C":
        gradepoints2 = 5;
        break;
    case "P":
        gradepoints2 = 4;
        break;
    default:
        gradepoints2 = 0;
        break;
}

float spi = (float)((c1 * gradepoints1) + (c2 * gradepoints2)) / (c1 + c2);
System.out.println("\nGrade of first subject is " + grade1);
System.out.println("Gradepoint of first subject is " + gradepoints1);
System.out.println("Grade of second subject is " + grade2);
System.out.println("Gradepoint of second subject is " + gradepoints2);
System.out.println("SPI is " + spi);
}
}

```

> Output:

```

Enter marks of first subject: 98
Enter credits of first subject: 2

Enter marks of second subject: 95
Enter credits of second subject: 1

Grade of first subject is 0
Gradepoint of first subject is 10
Grade of second subject is 0
Gradepoint of second subject is 10
SPI is 10.0

```

◆ **Practical- 5: Write a program in Java to find maximum of three numbers using nested if-else and conditional operator.**

// Maximum of Three

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

```
public class five {
```

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

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

```
        //Finding maximum of three numbers
```

```
        System.out.print("Enter first number: ");
```

```
        int a = sc.nextInt();
```

```
        System.out.print("Enter second number: ");
```

```
        int b = sc.nextInt();
```

```
        System.out.print("Enter third number: ");
```

```
        int c = sc.nextInt();
```

```
        if(a > b){
```

```
            if(a > c){
```

```
                System.out.println(a + " is the greatest number");
```

```
            }
```

```
        else{
```

```
            System.out.println(c + " is the greatest number");
```

```
        }
```

```
    }
```

```
    else{
```

```
        if(c > b){
```

```
            System.out.println(c + " is the greatest number");
```

```
        }
```

```
    else{
```

```
        System.out.println(b + " is the greatest number");
```

```
    }
```

```
    }
```

```
}
```

```
}
```

Enter first number: 6

Enter second number: 3

Enter third number: 2

6 is the greatest number

♦ **Practical- 6: Write a program to accept a line and check how many consonants and vowels are there in line.**

```
// Checking number of Consonants & Vowels
import java.util.Scanner;
public class six {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        //Counting vowels and consonants in a line
        System.out.print("Enter a string: ");
        String s = sc.nextLine();
        int vowel = 0;
        int space = 0;
        for(int i = 0; i < s.length(); i++){
            char letter = s.charAt(i);
            if(letter == 'a' || letter == 'e' || letter == 'i' || letter == 'o' || letter == 'u'){
                vowel = vowel + 1;
            }
            else if(letter == ' '){
                space++;
            }
        }
        int conso = s.length() - vowel - space;
        System.out.println("Number of vowels are " + vowel);
        System.out.println("Number of consonants are " + conso);
    }
}
```

> Output:

```
Enter a string: Objected oriented programming with java
Number of vowels are 12
Number of consonants are 23
```

♦ **Practical- 7: Write a program to count the number of words that start with capital letters.**

```
// Number of words that start with capital letter
import java.util.Scanner;

public class seven {

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        //Counting number of words that start with capital letters
        System.out.print("Enter a sentence: ");
        String line = sc.nextLine();
        int word = 0;
        char firstletter = line.charAt(0);
        if(firstletter >= 65 && firstletter <= 90){
            word ++;
        }
        for(int i = 0; i < line.length(); i ++){
            char letter = line.charAt(i);
            if(letter == ' '){
                char first = line.charAt(i + 1);
                if(first >= 65 && first <= 90){
                    word ++;
                }
            }
        }
        System.out.println("Total words starting with capital letters are " + word);
    }
}
```

> Output:

```
Enter a sentence: Objected Oriented Programming With Java
Total words starting with capital letters are 5
```

- ♦ **Practical- 8:** Create a class which ask the user to enter a sentence, and it should display count of each vowel type in the sentence. The program should continue till user enters a word “quit”. Display the total count of each vowel for all sentences.

```
import java.util.Scanner;

public class CountVowels {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);
        String x = "yes";
        while (x.equals("yes")){
            System.out.print("Enter a sentence: ");
            String str = sc.nextLine();
            String s = str.toLowerCase();
            int n = s.length();
            int a=0, e=0, i=0, o=0, u=0;
            for (int j=0;j<n;j++){
                char letter = s.charAt(j);
                if(letter == 'a' ){
                    a++;
                }
                if(letter == 'e' ){
                    e++;
                }
                if(letter == 'i' ){
                    i++;
                }
                if(letter == 'o' ){
                    o++;
                }
                if(letter == 'u' ){
                    u++;
                }
            }
            System.out.println("Number of 'a': " + a);
            System.out.println("Number of 'e': " + e);
            System.out.println("Number of 'i': " + i);
            System.out.println("Number of 'o': " + o);
        }
    }
}
```

```
        System.out.println("Number of 'u': " + u);
        System.out.println("Do you want to continue?");
        x = sc.nextLine();
    }
    System.out.println("Thankyou! for your Time");
    sc.close();
}
}
```

> Output:

```
Enter a sentence: Objected oriented Programming with java
Number of 'a': 3
Number of 'e': 4
Number of 'i': 3
Number of 'o': 3
Number of 'u': 0
Do you want to continue?
quit
Thankyou! for your Time
```

- ♦ **Practical- 9: Write an interactive program to print a string entered in a pyramid form. For instance, the string “stream” has to be displayed as follows:**

S

S t

S t r

S t r e

S t r e a

S t r e a m

```
// String in Pyramid form
import java.util.*;
class Pyramid
{
    public static void main(String[] m)
    {
        char c;
        int i,j;
        Scanner in= new Scanner(System.in);
        String s;
        System.out.println("Enter A string : ");
        s=in.next();
        int k,d;
        for(i=0;i<s.length();i++){
            for(k=0;k<s.length()-i;k++) {
                System.out.print(" ");
            }
            for(j=0;j<=i;j++){
                c=s.charAt(j);
                System.out.print(c+" ");
            }
            System.out.println(" ");
        }
    }
}
```

```
}
```

> Output:

```
Enter A string :
```

```
stream
```

```
  s
```

```
  s t
```

```
  s t r
```

```
  s t r e
```

```
  s t r e a
```

```
  s t r e a m
```

- ♦ **Practical- 10: Write an interactive program to print a diamond shape. For example, if user enters the number 3, the diamond will be as follows:**

```

      *

    * *

  * * *

    * *

      *

```

```

// Diamond Pattern

import java.util.Scanner;

public class Diamond {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        int n = sc.nextInt();

        for (int i=1; i<=n; i++){

            for (int j=n-i; j>0; j--){

                System.out.print(" ");

            }

            for (int k=1; k<=i; k++){

                System.out.print("* ");

            }

            System.out.println();

        }

        for (int i=1; i<=n; i++){

            for (int k=1; k<=i; k++){

                System.out.print(" ");

            }

```

```
        for (int j=n-i; j>0; j--){  
            System.out.print("* ");  
        }  
        System.out.println();  
    }  
    sc.close();  
}  
}
```

> Output:

```
3  
  *  
 * *  
* * *  
 * *  
  *
```


- ◆ **Practical- 11: Develop minimum 4 program based on variation in methods i.e., passing by value, passing by reference, returning values and returning objects from methods.**

// Passing by value

```
import java.util.Scanner;

class CallByValue {

    static void swap(int a, int b){

        int c = a;

        a=b;

        b=c;

    }

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        int a = sc.nextInt();

        int b = sc.nextInt();

        System.out.println("Values before: "+a+", "+b);

        swap(a,b);

        System.out.println("Values after: "+a+", "+b);

    }

}
```

> **Output:**

```
3
6
Values before: 3, 6
Values after: 3, 6
```

// Passing By Reference

```

import java.util.Scanner;

class Test{

    int a, b;

    void swap(Test t){

        int c = a;

        a = b;

        b = c;

    }

}

public class CallByReference {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        Test t = new Test();

        t.a = sc.nextInt();

        t.b = sc.nextInt();

        // t.a = 5;

        // t.b = 6;

        System.out.println("Values before: "+t.a+", "+t.b);

        t.swap(t);

        System.out.println("Values after: "+t.a+", "+t.b);

    }

}

```

3

6

Values before: 3, 6

Values after: 6, 3

// Returning value

```
import java.util.Scanner;

class CallByValue {

    static void swap(int a, int b){

        int c = a;

        a=b;

        b=c;

    }

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        int a = sc.nextInt();

        int b = sc.nextInt();


        System.out.println("Values before: "+a+", "+b);

        swap(a,b);

        System.out.println("Values after: "+a+", "+b);

    }

}
```

> Output:

```
3
6
Values before: 3, 6
Values after: 3, 6
```

// Returning Object

```

import java.util.Scanner;

class Test{

    int a;

    Test(int i){

        a = i;

    }

    Test incr(){

        Test t = new Test(a + 10);

        return t;

    }

}

class Main

{

    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

        int n = input.nextInt();

        Test t1 = new Test(n);

        Test t2;

        t2 = t1.incr();

        System.out.println("Value before: "+t1.a);

        System.out.println("Value after: "+t2.a);

    }

}

```

3

Value before: 3

Value after: 13

♦ **Practical- 12: Write a Java Program to find area of Geometric figures using method Overloading.**

// Area of various Geometric Figures using Method Overloading

```
public class AreaMethOverload{

    public static void findArea(int l){

        System.out.println("Area of Square is :"+ (l*l));

    }

    public static void findArea(int l, int b){

        System.out.println("Area of Rectangle is :"+ (l*b));

    }

    public static void findArea(int l, int b, int h){

        System.out.println("Area of Trapezoid is :"+ (0.5*(l+b)*h));

    }

    public static void main(String[] args) {

        findArea(5);

        findArea(5,6);

        findArea(5,6,7);

    }

}
```

> **Output:**

```
Area of Square is :25
Area of Rectangle is :30
Area of Trapezoid is :38.5
```

♦ **Practical- 13: Write a program in Java to create a simple scientific calculator using Math Class.**

// Scientific Calculator using Math Function

```
import java.util.Scanner;

import java.lang.Math;

public class Calculator {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.println("(+) Addition\n(-) Subtraction\n(*) Multiplication\n(/) Division\n(%)
Remainder\n(^) Square\n(s) Square root");

        System.out.print("\nEnter your Choice: ");

        String n = sc.nextLine();

        System.out.print("Enter two numbers: ");

        int a = sc.nextInt();

        int b = sc.nextInt();

        if (n==""){

            System.out.println("Addition: "+ Math.addExact(a,b));

        }

        else if (n=="-"){

            System.out.println("Subtraction: "+ Math.subtractExact(a,b));

        }

        else if (n=="*"){

            System.out.println("Multiplication: "+ Math.multiplyExact(a,b));

        }

        else if (n=="/"){

            System.out.println("Division: "+ Math.floorDiv(a,b));

        }

        else if (n=="%"){
```

```
        System.out.println("Modulus: "+ (a%b));
    }
    else if (n=="s"){
        System.out.println("Square root: "+ (Math.sqrt(a)));
    }
    else if (n=="^"){
        System.out.println("Square root: "+ (Math.pow(a,2)));
    }
    sc.close();
}
}
```

> Output:

```
(+) Addition
(-) Subtraction
(*) Multiplication
(/) Division
(%) Remainder
(^) Square
(s) Square root
```

```
Enter your Choice: +
Enter two numbers: 6 3
```

```
Addition: 9
```

♦ **Practical- 14: Write a program in Java to sort the elements of list so that they are in ascending order (Take dynamic array).**

// Sorting Array

```
import java.util.Scanner;

public class SortArray {

    public static void main(String[] args) {

        int n, temp;

        Scanner sc = new Scanner(System.in);

        // Taking input of array

        System.out.print("Enter no. of elements you want in array: ");

        n = sc.nextInt();

        int a[] = new int[n];

        System.out.println("Enter all the elements:");

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

        {

            a[i] = sc.nextInt();

        }

        // Sorting loop

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

        {

            for (int j = i + 1; j < n; j++)

            {

                if (a[i] > a[j])

                {

                    temp = a[i];

                    a[i] = a[j];

                    a[j] = temp;

                }

            }

        }

    }

}
```



```
    }  
}  
  
// Printing the array  
  
System.out.print("Ascending Order: ");  
  
for (int i = 0; i < n - 1; i++)  
{  
    System.out.print(a[i] + ", ");  
}  
  
System.out.print(a[n - 1]);  
  
}  
}
```

> Output:

```
Enter no. of elements you want in array: 6  
Enter all the elements:  
4  
8  
2  
1  
0  
6  
Ascending Order: 0, 1, 2, 4, 6, 8
```

♦ **Practical- 15: Write a program in Java to multiply two matrixes (Take dynamic arrays).**

// Multiplication of Matrices

import java.util.Arrays;

import java.util.Scanner;

public class MatrixMultiply {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

int i,j,k;

// Taking dimensions of Arrays

System.out.print("Enter no. of rows of 1st array: ");

int row1 = sc.nextInt();

System.out.print("Enter no. of columns of 1st array: ");

int col1 = sc.nextInt();

System.out.print("Enter no. of rows of 2nd array: ");

int row2 = sc.nextInt();

System.out.print("Enter no. of columns of 2nd array: ");

int col2 = sc.nextInt();

if (col1==row2){

// First Array

System.out.println("\nEnter elements of 1st array");

int a[][] = new int[row1][col1];

for (i=0; i<row1; i++){

for (j=0; j<col1; j++){

System.out.printf("Enter element[%d][%d] : ",i,j);

a[i][j] = sc.nextInt();

}

}

```
System.out.println("1st Array: "+Arrays.deepToString(a));
```

// Second Array

```
System.out.println("\nEnter elements of 2nd array");
```

```
int b[][] = new int[row2][col2];
```

```
for (i=0; i<row2; i++){
```

```
    for (j=0; j<col2; j++){
```

```
        System.out.printf("Enter element[%d][%d] : ",i,j);
```

```
        b[i][j] = sc.nextInt();
```

```
    }
```

```
}
```

```
System.out.println("2nd Array: "+Arrays.deepToString(a));
```

// Multiplying Array

```
int c[][] = new int[row1][col2];
```

```
for (i = 0; i < row1; i++) {
```

```
    for (j = 0; j < col2; j++) {
```

```
        for (k = 0; k < row2; k++){
```

```
            c[i][j] += a[i][k] * b[k][j];
```

```
        }
```

```
    }
```

```
}
```

```
System.out.print("\nThe Multiplied array is ");
```

```
System.out.println(Arrays.deepToString(c));
```

```
}
```

```
else{
```

```
    System.out.println("\nArrays can't be multiplied!!");
```

```
}
```

```
}
```

```
}
```

> Output:

```
Enter no. of rows of 1st array: 2
Enter no. of columns of 1st array: 2
Enter no. of rows of 1st array: 2
Enter no. of columns of 1st array: 2
```

```
Enter elements of 1st array
Enter element[0][0] : 1
Enter element[0][1] : 2
Enter element[1][0] : 3
Enter element[1][1] : 4
1st Array: [[1, 2], [3, 4]]
```

```
Enter elements of 2nd array
Enter element[0][0] : 1
Enter element[0][1] : 2
Enter element[1][0] : 3
Enter element[1][1] : 4
2nd Array: [[1, 2], [3, 4]]
```

```
The Multiplied array is [[7, 10], [15, 22]]
```