LAB 10

Program to illustrate Array Manipulation

1. 1-Dimensional Array

Code

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

/* Program to illustrate
   Array Manipulations */

public class Lab10_1D {
    public static void main(String[] args) {

        try (Scanner sc = new Scanner(System.in)) {

            Integer[] A1 = new Integer[] {1, 4, 0, 6, 3, 9};
            int[] A2 = new int[] {2, 5, 9, 8, 1, 5};
            int[] A3 = new int[] {};
            int i, sum = 0;

            System.out.print("\nArray A1: ");
            for(int k: A1) {
                System.out.print(k + " ");
                sum = sum + k;
            }

            //Sorting an array
            Arrays.sort(A1);
            System.out.print("\nA1 after sorting (ascending): ");
            for(int k: A1)
                System.out.print(k + " ");

            Arrays.sort(A1, Collections.reverseOrder());
            System.out.print("\nA1 after sorting (descending): ");
            for(int k: A1) {
                System.out.print(k + " ");
            }

            //Finding length of an array
            System.out.println("\nArray Length (A1): " + A1.length);
            //Finding sum of all elements of an array
            System.out.println("Sum of all elements in A1: " + sum);
```

```
        System.out.print("\nArray A2: ");
        for(int k: A2) {
            System.out.print(k + " ");
        }

        System.out.print("\n\nArray A3: ");
        for(int k: A3) {
            System.out.print(k + " ");
        }

        System.out.print("\nIs A3 Empty? ");
        System.out.println(A3.length == 0 || A3 == null);

        //Appending an element to an array
        System.out.println("\nAppending 6 to A2 and assigning it to A3");
        A3 = Arrays.copyOf(A2, A2.length + 1);
        A3[A3.length - 1] = 6;
        System.out.print("Array A3: ");
        for(int k: A3) {
            System.out.print(k + " ");
        }

        int temp, len = A3.length;
        //Reversing an array
        for(i = 0; i < len / 2; i++) {
            temp = A3[i];
            A3[i] = A3[len - 1 - i];
            A3[len - 1 - i] = temp;
        }

        System.out.print("\nArray A3 reversed: ");
        for(int k: A3) {
            System.out.print(k + " ");
        }

        //Adding two arrays
        System.out.print("\n\nA1 + A2: ");
        if(A1.length != A2.length)
            System.out.println("Addition not possible!");
        else {
            for(i = 0; i < A2.length; i++)
                System.out.printf("%d ", (A1[i] + A2[i]));
        }

        //Finding min and max values of array
        int min = A2[0], max = A2[0];
        for(int k: A2) {
            if(k < min)
                min = k;

            if(k > max)
```

```
                max = k;
            }
            System.out.println("\n\nMinimum value in A2: " + min);
            System.out.println("Maximum value in A2: " + max);

            //Finding a given element in an array, and printing its position
            int pos = -1;
            System.out.print("\nElement to be found (A2): ");
            int element = sc.nextInt();

            for(i = 0; i < A2.length; i++) {
                if(A2[i] == element)
                    pos = i;
            }

            if(pos == -1)
                System.out.println("Element " + element + " not found");
            else {
                pos ++;
                System.out.print("Element " + element);
                System.out.println(" found at position " + pos);
                System.out.println();
            }
        }
    }
}
```

Output

```
PS D:\NITJ\Sem 4\Java\Lab 10> javac Lab10_1D.java
PS D:\NITJ\Sem 4\Java\Lab 10> java Lab10_1D

Array A1: 1 4 0 6 3 9
A1 after sorting (ascending): 0 1 3 4 6 9
A1 after sorting (descending): 9 6 4 3 1 0
Array Length (A1): 6
Sum of all elements in A1: 23

Array A2: 2 5 9 8 1 5

Array A3:
Is A3 Empty? true

Appending 6 to A2 and assigning it to A3
Array A3: 2 5 9 8 1 5 6
Array A3 reversed: 6 5 1 8 9 5 2

A1 + A2: 11 11 13 11 2 5

Minimum value in A2: 1
Maximum value in A2: 9

Element to be found (A2): 5
Element 5 found at position 6
```

```
PS D:\NITJ\Sem 4\Java\Lab 10> java Lab10_1D

Array A1: 1 4 0 6 3 9
A1 after sorting (ascending): 0 1 3 4 6 9
A1 after sorting (descending): 9 6 4 3 1 0
Array Length (A1): 6
Sum of all elements in A1: 23

Array A2: 2 5 9 8 1 5

Array A3:
Is A3 Empty? true

Appending 6 to A2 and assigning it to A3
Array A3: 2 5 9 8 1 5 6
Array A3 reversed: 6 5 1 8 9 5 2

A1 + A2: 11 11 13 11 2 5

Minimum value in A2: 1
Maximum value in A2: 9

Element to be found (A2): 7
Element 7 not found
PS D:\NITJ\Sem 4\Java\Lab 10>
```

2. 2-Dimensional Array

Code

```java
import java.util.Scanner;

public class Lab10_2D {
    public static void main(String[] args) {

        int[][] A = new int[][] {{1, 7, 3}, {9, 4, 5}, {5, 0, 7}};
        int i, j;
        int sum = 0;
        int min = A[0][0], max = A[0][0];

        try(Scanner sc = new Scanner(System.in)) {
            System.out.println("\nArray A: ");
            for(i = 0; i < A.length; i++) {
                for(j = 0; j < A[i].length; j++) {
                    sum += A[i][j];
                    System.out.print(A[i][j] + " ");

                    if(A[i][j] < min)
                        min = A[i][j];

                    if(A[i][j] > max)
                        max = A[i][j];
                }
                System.out.println();
            }

            System.out.println("Array Length: " + A.length * (A[0].length));
            System.out.println("Sum of elements: " + sum);
            System.out.println("Maximum value in A: " + max);
            System.out.println("Minimum value in A: " + min);

            //Finding a given element in an array, and printing its position
            int posi = -1, posj = -1;
            System.out.print("\nElement to be found (A4): ");
            int element = sc.nextInt();

            for(i = 0; i < A.length; i++) {
                for(j = 0; j < A[i].length; j++) {
                    if(A[j][i] == element) {
                        posi = i;
                        posj = j;
                    }
                }
            }
```

```
            if(posi == -1)
                System.out.println("Element " + element + " not found");
            else {
                posi ++; posj ++;
                System.out.print("Element " + element);
                System.out.println(" found at position " + posj + ", " + posi);
                System.out.println();
            }
        }
    }
}
```

Output

```
PS D:\NITJ\Sem 4\Java\Lab 10> javac Lab10_2D.java
PS D:\NITJ\Sem 4\Java\Lab 10> java Lab10_2D

Array A:
1 7 3
9 4 5
5 0 7
Array Length: 9
Sum of elements: 41
Maximum value in A: 9
Minimum value in A: 0

Element to be found (A4): 8
Element 8 not found
PS D:\NITJ\Sem 4\Java\Lab 10> java Lab10_2D

Array A:
1 7 3
9 4 5
5 0 7
Array Length: 9
Sum of elements: 41
Maximum value in A: 9
Minimum value in A: 0

Element to be found (A4): 4
Element 4 found at position 2, 2

PS D:\NITJ\Sem 4\Java\Lab 10>
```