IARE

INSTITUTE OF AERONAUTICAL ENGINEERING

(An Autonomous Institute affiliated to JNTUH, Hyderabad)

Dundigal, Hyderabad - 500 043

LABORATORY WORK BOOK

Name of the Student: Racherla Santhosh

Class: IT-B Semester: 03

Course Code: AGSD11 Course Name: DS Laboratory

Name of the Course Faculty: Ms. K. Laxminarayanamma Faculty ID: IARE10033

Exercise Number: 03 Week Number: 03 Date: 10/09/2024

Roll Number									
2	3	9	5	1	A	1	2	G	3

S. No.	Exercise Number	EXERCISE NAME	MARKS AWARDED						
			Aim/ Preparation	Algorithm / Procedure / Performance in the Lab		Source Code / Calculations and Graphs	Program Execution / Results and Error Analysis	Viva - Voce	Total
			4	4		4	4	4	20
1	3.1	Bubble Sort							
2	3.2	Selection Sort							
3	3.3	Insertion Sort							
4									
5									
6									
7									
8									
9									
10									
11									
12			4		4	4	4	4	20

Santhosh

Signature of the Student

Signature of the Faculty

3. Sorting.

3.1 Bubble Sort :-

AIM :- Write a Program using Bubble Sort, It is the Simplest Sorting algorithm that Works by repeatedly Swapping the adjacent elements if they are in the Wrong Order. This Algorithm is not Suitable for large data Sets as its Average and Worst-Case time complexity is quite high.

PROGRAM :-

```
import java.util.Scanner;
Public class BubbleSort {
    Public Static void bubbleSort(int[] arr) {
        int n = arr.length;
        boolean Swapped;
        for(int i=0; i<n-1; i++) {
            Swapped = false;
```

```
        for (int j=0; j<= n-1-i; j++) {
            if (arr[j] > arr[j+1]) {
                int temp = arr[j];
                arr[j] = arr[j+1];
                arr[j+1] = temp;
                Swapped = true;
            }
        }
        if (!Swapped) break;
    }
}
Public Static void printArray (int[] arr) {
    for (int i : arr) {
        System.out.print (i + " ");
    }
    System.out.println();
}
Public Static void main (String[] args) {
    Scanner Scanner = new Scanner (System.in);
    System.out.print ("Enter the no. of elements :");
```

```
        int n = Scanner.nextInt();
        int[] arr = new int[n];
        System.out.println("Enter the elements:");
        for (int i=0; i<n; i++) {
            arr[i] = Scanner.nextInt();
        }
        System.out.println("Original array:");
        PrintArray(arr);
        bubbleSort(arr);
        System.out.println("Sorted array:");
        PrintArray(arr);
        Scanner.close();
    }
}
```

RESULT :-

INPUT : Enter the no. of elements : 4

Enter the elements : 6 3 0 5

OUTPUT : 0 3 5 6

ROLL NUMBER :

3.2 Selection Sort :-

AIM :- Write a Program to Sort the given list of elements using Selection Sort.

PROGRAM :-

```
import java.util.Scanner;
Public class SelectionSort {
  Public Static void SelectionSort(int[] arr) {
    int n = arr.length;
    for (int i=0; i<n-1; i++) {
      int minIdx = i;
      for (int j=i+1; j<n; j++) {
        if (arr[j] < arr[minIdx]) {
          minIdx = j;
        }
      }
      int temp = arr[minIdx];
      arr[minIdx] = arr[i];
      arr[i] = temp;
    }
}
```

```
Public Static void printArray (int[] arr) {
    for (int i : arr) {
        System.out.print (i + " ");
    }
    System.out.println();
}
Public Static void main (String[] args) {
    Scanner Scanner = new Scanner (System.in);
    System.out.print ("Enter the no. of elements : ");
    int n = Scanner.nextInt();
    int[] arr = new int[n];
    System.out.println ("Enter the elements : ");
    for (int i=0; i<n; i++) {
        arr[i] = Scanner.nextInt();
    }
    System.out.println ("Original array : ");
    PrintArray (arr);
    SelectionSort (arr);
    System.out.println ("Sorted array : ");
```

```
        Print Array (arr);
        Scanner.close();
    }
}
```

RESULT :-

INPUT : Enter the no. of elements : 5

Enter the elements : 64 25 12 22 11

OUTPUT : Original array : 64 25 12 22 11

Sorted array : 11 12 22 25 64.

3.3 Insertion Sort :-

AIM :- Write a Program to Sort the given list of elements using : Insertion Sort. :

PROGRAM :-

```
import java.util.Scanner;
Public class InsertionSort {
    Public Static void InsertionSort(int[] arr) {
        int n = arr.length;
        for (int i=1; i<n; i++) {
```

```
        int key = arr[i];
        int j = i - 1;
        while ( j >= 0 && arr[j] > key ) {
            arr[j+1] = arr[j];
            j = j - 1;
        }
        arr[j+1] = key;
    }
}

Public Static void printArray (int[] arr) {
    for ( int i : arr ) {
        System.out.print (i + " ");
    }
    System.out.println();
}

Public Static void main (String[] args) {
    Scanner Scanner = new Scanner (System.in);
    System.out.print ("Enter the no. of Elements :");
    int n = Scanner.nextInt();
    int[] arr = new int[n];
    System.out.print ("Enter the elements :");
```

```
        for ( int i=0; i<n; i++)  {
            arr[i] = Scanner.nextInt();
        }
        System.out.println("Original array:");
        PrintArray(arr);
        insertionSort(arr);
        System.out.println("Sorted array:");
        PrintArray(arr);
        Scanner.close();
    }
}
```

RESULT :-

INPUT : Enter the no. of elements : 8

Enter the elements : 4 3 2 10 12 1 5 6

OUTPUT : Original array :

4 3 2 10 12 1 5 6

Sorted array :

1 2 3 4 5 6 10 12

ROLL NUMBER :

VIVA VOCE :-

1) What is Sorting ?

A) Sorting is the process of arranging elements (like numbers or words) in a specific order, typically in ascending or descending order. It helps in organizing data for easier searching, analyzing, and processing.

2) What is Bubble Sort ?

A) It is the simplest sorting Algorithm that works by repeatedly swapping the adjacent elements if they are in wrong order.

Example :- (5 1 4 2 8)

First Pass :

5 1 4 2 8 (5 > 1)

1 5 4 2 8 (5 > 4)

1 4 5 2 8 (5 > 2)

1 4 2 5 8 (8 > 5)

Second pass :

1 4 2 5 8

1 4 2 5 8 (4 > 2)

1 2 4 5 8

1 2 4 5 8

1 2 4 5 8.

Third pass :

1 2 4 5 8

1 2 4 5 8

1 2 4 5 8

1 2 4 5 8

1 2 4 5 8

3) What is Selection Sort ?

4) It is a Comparison-based Sorting algorithm that works by iteratively Selecting the Smallest (or largest) element from the unsorted portion of the list & placing it into the correct position in the Sorted Portion. This Process

is repeated until the entire list is sorted.

Example :-

20	12	10	15	2

20 12 10 15 2

20 12 10 15 2

20 12 10 15 2

20 12 10 15 2

2	12	10	15	20

2 12 10 15 20

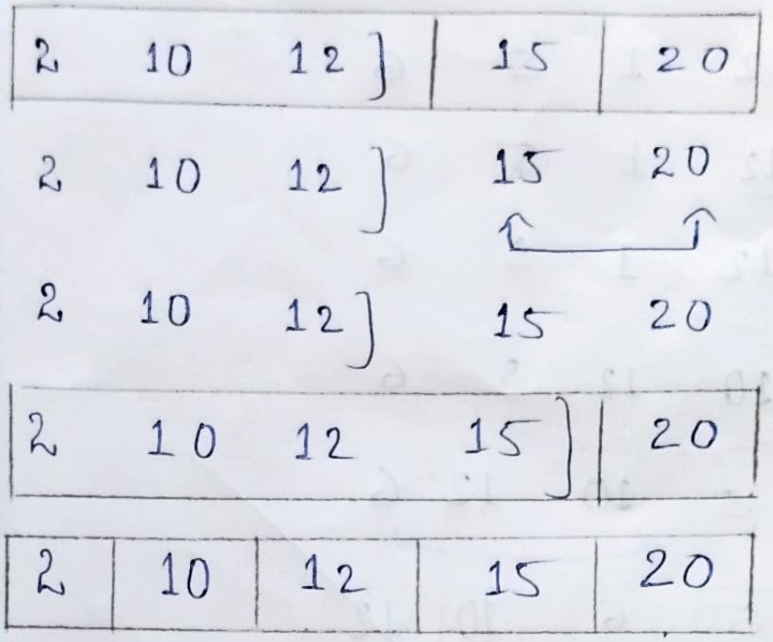
2 12 10 15 20

2 12 10 15 20

2 10	12	15	20

2 10 12 15 20

2 10 12 15 20



4) What is Insertion Sort ?

A) It is a Simple Sorting algorithm that Works the way we Sort playing cards in our Hands. The array is Virtually Split into a Sorted and an unsorted part. Values from the unsorted part are picked and placed at the Correct position in the Sorted part.

Example :- 4 3 2 10 12 1 5 6

4 3 2 10 12 1 5 6

3 4 2 10 12 1 5 6

ROLL NUMBER :

2 3 4 10 12 1 5 6

2 3 4 10 12 1 5 6

2 3 4 10 12 1 5 6

1 2 3 4 10 12 5 6

1 2 3 4 5 10 12 6

1 2 3 4 5 6 10 12