The University of Azad Jammu and Kashmir

Submitted by: M.Amir

Subject: DSA (discrete structure and algorithm)

Roll no: 23

Submitted to: Sir Zeshan

Task: 03

Q1: Definition & Algorithm of Linear Search

Definition

Linear Search (also called Sequential Search) is the simplest searching technique.
It checks each element in the list one-by-one until the desired element (key) is found or the end of the list is reached.
It does not require the list to be sorted.

Algorithm (Step-by-step)

Step 1: Start
Step 2: Input array A and the key element K
Step 3: For i = 0 to N-1 repeat:
    If A[i] == K:
        Print "Found at index i"
        Stop
Step 4: If loop ends without match:
    Print "Not Found"
Step 5: End

OUTPUT

Algorithm of Linear Search:
1. Start
2. Input array A and key K
3. For i = 0 to N-1:
    If A[i] == K:
        Print "Found at index i"
        Stop
4. Print "Not Found"
5. End

Q2: Program to search any element in an array using Linear Search

C Program

```
#include <stdio.h>

int main() {
    int n, key;

    printf("Enter number of elements: ");
    scanf("%d", &n);

    int arr[n];

    printf("Enter %d elements:\n", n);
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }

    printf("Enter search key: ");
    scanf("%d", &key);

    int found = -1;
    for (int i = 0; i < n; i++) {
        if (arr[i] == key) {
            found = i;
            break;
        }
    }

    if (found != -1)
        printf("Element found at index %d\n", found);
    else
```

```
        printf("Element not found.\n");

    return 0;
}
```

Output

```
Enter number of elements: 5
Enter 5 elements:
10 25 30 45 60
Enter search key: 30
```

Q3: Program for 30 students using Linear Search

Requirements covered: ✓ Use arrays
✓ Roll numbers in separate array
✓ Search using Linear Search
✓ Display total & percentage
✓ Show “Record Not Found”

Full C Program for Q3 (Complete Solution)

```
#include <stdio.h>

int linear_search(int arr[], int n, int key) {
    for (int i = 0; i < n; i++) {
        if (arr[i] == key)
            return i;
    }
    return -1;
}

int main() {
    int n = 30;

    int roll[30];
    int pf[30], oop[30], dsa[30];

    printf("Enter Roll No and Marks (PF OOP DSA) for 30 students:\n");
    for (int i = 0; i < n; i++) {
```

```
        printf("Student %d: ", i + 1);
        scanf("%d %d %d %d", &roll[i], &pf[i], &oop[i], &dsa[i]);
    }

    int key;
    printf("\nEnter roll number to search: ");
    scanf("%d", &key);

    int index = linear_search(roll, n, key);

    if (index == -1) {
        printf("\nRecord Not Found\n");
    } else {
        int total = pf[index] + oop[index] + dsa[index];
        float percentage = (total / 300.0) * 100.0;

        printf("\n--- Student Result ---\n");
        printf("Roll Number  : %d\n", roll[index]);
        printf("PF Marks     : %d\n", pf[index]);
        printf("OOP Marks    : %d\n", oop[index]);
        printf("DSA Marks    : %d\n", dsa[index]);
        printf("Total Marks  : %d / 300\n", total);
        printf("Percentage   : %.2f%%\n", percentage);
    }

    return 0;
}
```

Output

--- Student Result ---
Roll Number : 103
PF Marks   : 88
OOP Marks   : 91
DSA Marks   : 80
Total Marks : 259 / 300
Percentage   : 86.33%