

# Rajalakshmi Engineering College

Name: Jhanani shree  
Email: 240701215@rajalakshmi.edu.in  
Roll no: 240701215  
Phone: 7373333511  
Branch: REC  
Department: I CSE AH  
Batch: 2028  
Degree: B.E - CSE

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 7\_COD\_Question 1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Ravi is building a basic hash table to manage student roll numbers for quick lookup. He decides to use Linear Probing to handle collisions.

Implement a hash table using linear probing where:

The hash function is:  $\text{index} = \text{roll\_number} \% \text{table\_size}$  On collision, check subsequent indexes (i+1, i+2, ...) until an empty slot is found.

You need to:

Insert a list of n student roll numbers into the hash table. Print the final state of the hash table. If a slot is empty, print -1.

##### ***Input Format***

The first line of the input contains two integers n and table\_size, where n is the

number of roll numbers to be inserted, and table\_size is the size of the hash table.

The second line contains n space-separated integers — the roll numbers to insert into the hash table.

### ***Output Format***

The output should print a single line with table\_size space-separated integers representing the final state of the hash table after all insertions.

If any slot remains unoccupied, it should be represented as -1.

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 4 7

50 700 76 85

Output: 700 50 85 -1 -1 -1 76

### ***Answer***

```
#include <stdio.h>
```

```
#define MAX 100
```

```
// Function to initialize the hash table
```

```
void initializeTable(int table[], int size) {
```

```
    for (int i = 0; i < size; i++) {
```

```
        table[i] = -1; // Initialize all slots to -1 indicating empty
```

```
    }
```

```
}
```

```
// Function to perform linear probing
```

```
int linearProbe(int table[], int size, int num) {
```

```
    int index = num % size;
```

```
    int originalIndex = index;
```

```
    while (table[index] != -1) {
```

```
        index = (index + 1) % size; // Move to the next index
```

```

    if (index == originalIndex) {
        // If we looped back to the original index, the table is full
        return -1;
    }
}
return index; // Return the empty slot index
}

// Function to insert values into the hash table
void insertIntoHashTable(int table[], int size, int arr[], int n) {
    for (int i = 0; i < n; i++) {
        int index = linearProbe(table, size, arr[i]);
        if (index != -1) {
            table[index] = arr[i]; // Insert the number at the found index
        } else {
            printf("Hash table is full, cannot insert %d\n", arr[i]);
        }
    }
}

// Function to print the hash table
void printTable(int table[], int size) {
    for (int i = 0; i < size; i++) {
        printf("%d ", table[i]);
    }
    printf("\n");
}

int main() {
    int n, table_size;
    scanf("%d %d", &n, &table_size);

    int arr[MAX];
    int table[MAX];

    for (int i = 0; i < n; i++)
        scanf("%d", &arr[i]);

    initializeTable(table, table_size);
    insertIntoHashTable(table, table_size, arr, n);
    printTable(table, table_size);
}

```

```
} return 0;
```

**Status :** Correct

**Marks :** 10/10