

# Rajalakshmi Engineering College

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 4\_COD\_Question 3

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Write a program to implement a queue using an array and pointers. The program should provide the following functionalities:

Insert an element into the queue. Delete an element from the queue. Display the elements in the queue.

The queue has a maximum capacity of 5 elements. If the queue is full and an insertion is attempted, a "Queue is full" message should be displayed. If the queue is empty and a deletion is attempted, a "Queue is empty" message should be displayed.

##### *Input Format*

Each line contains an integer representing the chosen option from 1 to 3.

Option 1: Insert an element into the queue followed by an integer representing the element to be inserted, separated by a space.

Option 2: Delete an element from the queue.

Option 3: Display the elements in the queue.

### **Output Format**

For option 1 (insertion):-

1. The program outputs: "<data> is inserted in the queue," if the data is successfully inserted.
2. "Queue is full." if the queue is already full and cannot accept more elements.

For option 2 (deletion):-

1. The program outputs: "Deleted number is: <data>" if an element is successfully deleted and returns the value of the deleted element.
2. "Queue is empty." if the queue is empty no elements can be deleted.

For option 3 (display):-

1. The program outputs: "Elements in the queue are: <element1> <element2> ... <elementN>" where <element1>, <element2>, ..., <elementN> represent the elements present in the queue.
2. "Queue is empty." if the queue is empty no elements can be displayed.

For invalid options, the program outputs: "Invalid option."

Refer to the sample output for the formatting specifications.

### **Sample Test Case**

Input: 1 10

3

5

Output: 10 is inserted in the queue.

Elements in the queue are: 10

Invalid option.

**Answer**

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

```
#include<stdlib.h>
```

```
#define MAX() 5
```

```
void insert(int* arr, int *top, int value) {
```

```
    if(*top + 1 == MAX()) {
```

```
        printf("Stack overflow");
```

```
        return;
```

```
    }
```

```
    *(arr + ++(*top)) = value;
```

```
}
```

```
int dequeue(int* arr, int* top) {
```

```
    int value = *arr;
```

```
    for(int i = 1; i <= *top; i++) {
```

```
        arr[i - 1] = arr[i];
```

```
    }
```

```
    --(*top);
```

```
    return value;
```

```
}
```

```
void display(int* arr, int top) {
```

```
    if(top == -1) {
```

```
        printf("Queue is empty.\n");
```

```
        return;
```

```
    }
```

```
    printf("Elements in the queue are: ");
```

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

```
        printf("%d ", arr[i]);
```

```
    }
```

```
    printf("\n");
```

```
}
```

```
int main() {
```

```
int arr[MAX()];  
int top = -1;
```

```
int n, m;
```

```
while(scanf("%d", &n) == 1) {
```

```
    switch(n) {
```

```
        case 1: {
```

```
            scanf("%d", &m);
```

```
            if(top == 4) {
```

```
                printf("Queue is full.\n");
```

```
            }
```

```
            else {
```

```
                insert(arr, &top, m);
```

```
                printf("%d is inserted in the queue.\n", m);
```

```
            }
```

```
            break;
```

```
        }
```

```
        case 2: {
```

```
            if(top == -1) {
```

```
                printf("Queue is empty.\n");
```

```
            }
```

```
            else {
```

```
                int ele = dequeue(arr, &top);
```

```
                printf("Deleted number is: %d\n", ele);
```

```
            }
```

```
            break;
```

```
        }
```

```
        case 3: {
```

```
            display(arr, top);
```

```
            break;
```

```
        }
```

```
    default:
```

```
        printf("Invalid option.\n");
```

```
        break;
```

```
    }  
}
```

**Status :** Correct

**Marks :** 10/10