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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
```

```
int queue[max];
```

```
int front = -1, rear = -1;
```

```
int insertq(int *data) {
```

```
    if ((rear + 1) % max == front) {
```

```
        return 0; // Queue is full
```

```
    }
```

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

```
        front = rear = 0;
```

```
    } else {
```

```
        rear = (rear + 1) % max;
```

```
    }
```

```
    queue[rear] = *data;
```

```
    return 1;
```

```
}
```

```
int delq() {
```

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

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

```
        return -1;
```

```
    }
```

```
    int data = queue[front];
```

```
    if (front == rear) {
```

```
        front = rear = -1;
```

```
    } else {
```

```
        front = (front + 1) % max;
```

```
    }
```

```
    printf("Deleted number is: %d\n", data);  
    return data;  
}
```

```
void display() {  
    if (front == -1) {  
        printf("Queue is empty.\n");  
        return;  
    }  
  
    printf("Elements in the queue are:");  
    int i = front;  
    while (1) {  
        printf(" %d", queue[i]);  
        if (i == rear) break;  
        i = (i + 1) % max;  
    }  
    printf("\n");  
}
```

```
int main()  
{  
    int data, reply, option;  
    while (1)  
    {  
        if (scanf("%d", &option) != 1)  
            break;  
        switch (option)  
        {  
            case 1:  
                if (scanf("%d", &data) != 1)  
                    break;  
                reply = insertq(&data);  
                if (reply == 0)  
                    printf("Queue is full.\n");  
                else  
                    printf("%d is inserted in the queue.\n", data);  
                break;  
            case 2:  
                delq(); // Called without arguments  
                break;  
            case 3:
```

```
        display();  
        break;  
    default:  
        printf("Invalid option.\n");  
        break;  
    }  
}  
return 0;  
}
```

Status : Correct

Marks : 10/10