

# Rajalakshmi Engineering College

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 4\_COD\_Question 1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Imagine a bustling coffee shop, where customers are placing their orders for their favorite coffee drinks. The cafe owner Sheeren wants to efficiently manage the queue of coffee orders using a digital system. She needs a program to handle this queue of orders.

You are tasked with creating a program that implements a queue for coffee orders. Each character in the queue represents a customer's coffee order, with 'L' indicating a latte, 'E' indicating an espresso, 'M' indicating a macchiato, 'O' indicating an iced coffee, and 'N' indicating a nabob.

Customers can place orders and enjoy their delicious coffee drinks.

##### *Input Format*

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the coffee order into the queue. If the choice is 1, the following input is a space-separated character ('L', 'E', 'M', 'O', 'N').

Choice 2: Dequeue a coffee order from the queue.

Choice 3: Display the orders in the queue.

Choice 4: Exit the program.

### ***Output Format***

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given order into the queue and display "Order for [order] is enqueued." where [order] is the coffee order that is inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue more orders."

If the choice is 2:

1. Dequeue a character from the queue and display "Dequeued Order: " followed by the corresponding order that is dequeued.
2. If the queue is empty without any orders, print "No orders in the queue."

If the choice is 3:

1. The output prints "Orders in the queue are: " followed by the space-separated orders present in the queue.
2. If there are no orders in the queue, print "Queue is empty. No orders available."

If the choice is 4:

1. Exit the program and print "Exiting program"

If any other choice is entered, the output prints "Invalid option."

Refer to the sample output for the exact text and format.

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

Input: 1 L

1 E

1 M

1 O

1 N

1 O

3

2

3

4

Output: Order for L is enqueued.

Order for E is enqueued.

Order for M is enqueued.

Order for O is enqueued.

Order for N is enqueued.

Queue is full. Cannot enqueue more orders.

Orders in the queue are: L E M O N

Dequeued Order: L

Orders in the queue are: E M O N

Exiting program

### ***Answer***

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

```
#define MAX_SIZE 5
```

```
char orders[MAX_SIZE];
```

```
int front = -1;
```

```
int rear = -1;
```

```
void initializeQueue() {
```

```
    front = -1;
```

```
    rear = -1;
```

```
}
```

```
int isFull() {
```

```

    return rear == MAX_SIZE - 1;
}

int isEmpty() {
    return front == -1 || front > rear;
}

int enqueue(char order) {
    if (isFull()) {
        printf("Queue is full. Cannot enqueue more orders.\n");
        return 0;
    }
    if (front == -1) {
        front = 0;
    }
    orders[++rear] = order;
    printf("Order for %c is enqueued.\n", order);
    return 1;
}

void dequeue() {
    if (isEmpty()) {
        printf("No orders in the queue.\n");
    } else {
        printf("Dequeued Order: %c\n", orders[front]);
        front++;
    }
}

void display() {
    if (isEmpty()) {
        printf("Queue is empty. No orders available.\n");
    } else {
        printf("Orders in the queue are: ");
        for (int i = front; i <= rear; i++) {
            printf("%c ", orders[i]);
        }
        printf("\n");
    }
}

int main() {
    char order;

```

```
int option;
initializeQueue();
while (1) {
    if (scanf("%d", &option) != 1) {
        break;
    }
    switch (option) {
        case 1:
            if (scanf(" %c", &order) != 1) {
                break;
            }
            if (enqueue(order)) {
            }
            break;
        case 2:
            dequeue();
            break;
        case 3:
            display();
            break;
        case 4:
            printf("Exiting program");
            return 0;
        default:
            printf("Invalid option.\n");
            break;
    }
}
return 0;
}
```

**Status :** Correct

**Marks :** 10/10

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 4\_COD\_Question 2

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

In a bustling IT department, staff regularly submit helpdesk tickets to request technical assistance. Managing these tickets efficiently is vital for providing quality support.

Your task is to develop a program that uses an array-based queue to handle and prioritize helpdesk tickets based on their unique IDs.

Implement a program that provides the following functionalities:

Enqueue Helpdesk Ticket: Add a new helpdesk ticket to the end of the queue. Provide a positive integer representing the ticket ID for the new ticket. Dequeue Helpdesk Ticket: Remove and process the next helpdesk ticket from the front of the queue. The program will display the ticket ID of the processed ticket. Display Queue: Display the ticket IDs of all the

helpdesk tickets currently in the queue.

### ***Input Format***

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the ticket ID into the queue. If the choice is 1, the following input is a space-separated integer, representing the ticket ID to be enqueued into the queue.

Choice 2: Dequeue a ticket from the queue.

Choice 3: Display the ticket IDs in the queue.

Choice 4: Exit the program.

### ***Output Format***

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given ticket ID into the queue and display "Helpdesk Ticket ID [id] is enqueued." where [id] is the ticket ID that is inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue."

If the choice is 2:

1. Dequeue a ticket ID from the queue and display "Dequeued Helpdesk Ticket ID: " followed by the corresponding ID that is dequeued.
2. If the queue is empty without any elements, print "Queue is empty."

If the choice is 3:

1. The output prints "Helpdesk Ticket IDs in the queue are: " followed by the space-separated ticket IDs present in the queue.
2. If there are no elements in the queue, print "Queue is empty."

If the choice is 4:

1. Exit the program and print "Exiting the program"

If any other choice is entered, print "Invalid option."

Refer to the sample output for formatting specifications.

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

Input: 1 101

1 202

1 203

1 204

1 205

1 206

3

2

3

4

Output: Helpdesk Ticket ID 101 is enqueued.

Helpdesk Ticket ID 202 is enqueued.

Helpdesk Ticket ID 203 is enqueued.

Helpdesk Ticket ID 204 is enqueued.

Helpdesk Ticket ID 205 is enqueued.

Queue is full. Cannot enqueue.

Helpdesk Ticket IDs in the queue are: 101 202 203 204 205

Dequeued Helpdesk Ticket ID: 101

Helpdesk Ticket IDs in the queue are: 202 203 204 205

Exiting the program

### ***Answer***

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

```
#define MAX_SIZE 5
```

```
int ticketIDs[MAX_SIZE];
```

```
int front = -1;
```

```
int rear = -1;
```

```
int lastDequeued;
```

```
void initializeQueue() {
```

```
    front = -1;
```

```
    rear = -1;
```

```
}
```



```

int isFull() {
    return rear == MAX_SIZE - 1;
}

int isEmpty() {
    return front == -1 || front > rear;
}

void enqueue(int ticketID) {
    if (isFull()) {
        printf("Queue is full. Cannot enqueue.\n");
        return;
    }
    if (front == -1) {
        front = 0;
    }
    ticketIDs[++rear] = ticketID;
    printf("Help desk Ticket ID %d is enqueued.\n", ticketID);
}

int dequeue() {
    if (isEmpty()) {
        return 0;
    }
    lastDequeued = ticketIDs[front++];
    return 1;
}

void display() {
    if (isEmpty()) {
        printf("Queue is empty.\n");
        return;
    }
    printf("Help desk Ticket IDs in the queue are: ");
    for (int i = front; i <= rear; i++) {
        printf("%d ", ticketIDs[i]);
    }
    printf("\n");
}

int main() {
    int ticketID;

```

```

int option;
initializeQueue();
while (1) {
    if (scanf("%d", &option) == EOF) {
        break;
    }
    switch (option) {
        case 1:
            if (scanf("%d", &ticketID) == EOF) {
                break;
            }
            enqueue(ticketID);
            break;
        case 2:
            if (dequeue()) {
                printf("Dequeued Helpdesk Ticket ID: %d\n", lastDequeued);
            } else {
                printf("Queue is empty.\n");
            }
            break;
        case 3:
            display();
            break;
        case 4:
            printf("Exiting the program\n");
            return 0;
        default:
            printf("Invalid option.\n");
            break;
    }
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

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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 == max - 1) {
```

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

```
    }
```

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

```
        front = 0;
```

```
    }
```

```
    rear++;
```

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

```
    return 1; // Successfully inserted
```

```
}
```

```
// Function to delete an element from the queue
```

```
void delq() {
```

```
    if (front == -1 || front > rear) {
```

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

```
        return;
```

```
    }
```

```
    printf("Deleted number is: %d\n", queue[front]);
```

```
    front++;
```

```
    if (front > rear) {
```

```
        front = rear = -1; // Reset the queue when empty
```

```
    }
```

```
}
```

```
// Function to display the elements of the queue
```

```
void display() {
```

```

    if (front == -1 || front > rear) {
        printf("Queue is empty.\n");
        return;
    }
    printf("Elements in the queue are: ");
    for (int i = front; i <= rear; i++) {
        printf("%d ", queue[i]);
    }
    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

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 4\_MCQ\_Updated

Attempt : 1  
Total Mark : 20  
Marks Obtained : 18

#### Section 1 : MCQ

1. What is the functionality of the following piece of code?

```
public void function(Object item)
{
    Node temp=new Node(item,trail);
    if(isEmpty())
    {
        head.setNext(temp);
        temp.setNext(trail);
    }
    else
    {
        Node cur=head.getNext();
        while(cur.getNext()!=trail)
        {
            cur=cur.getNext();
        }
    }
}
```



```
    }  
    cur.setNext(temp);  
  }  
  size++;  
}
```

**Answer**

Insert at the rear end of the dequeue

**Status : Correct**

**Marks : 1/1**

2. The process of accessing data stored in a serial access memory is similar to manipulating data on a

**Answer**

Queue

**Status : Correct**

**Marks : 1/1**

3. In linked list implementation of a queue, the important condition for a queue to be empty is?

**Answer**

FRONT is null

**Status : Correct**

**Marks : 1/1**

4. Insertion and deletion operation in the queue is known as

**Answer**

Enqueue and Dequeue

**Status : Correct**

**Marks : 1/1**

5. Which of the following properties is associated with a queue?

**Answer**

First In First Out

**Status :** Correct

**Marks :** 1/1

6. In what order will they be removed If the elements "A", "B", "C" and "D" are placed in a queue and are deleted one at a time

**Answer**

ABCD

**Status :** Correct

**Marks :** 1/1

7. After performing this set of operations, what does the final list look to contain?

```
InsertFront(10);  
InsertFront(20);  
InsertRear(30);  
DeleteFront();  
InsertRear(40);  
InsertRear(10);  
DeleteRear();  
InsertRear(15);  
display();
```

**Answer**

10 30 40 15

**Status :** Correct

**Marks :** 1/1

8. A normal queue, if implemented using an array of size MAX\_SIZE, gets full when

**Answer**

Rear = MAX\_SIZE - 1

**Status :** Correct

**Marks :** 1/1

9. What does the front pointer in a linked list implementation of a queue contain?

**Answer**

The address of the first element

**Status : Correct**

**Marks : 1/1**

10. Which of the following can be used to delete an element from the front end of the queue?

**Answer**

None of these

**Status : Wrong**

**Marks : 0/1**

11. What are the applications of dequeue?

**Answer**

All the mentioned options

**Status : Correct**

**Marks : 1/1**

12. When new data has to be inserted into a stack or queue, but there is no available space. This is known as

**Answer**

overflow

**Status : Correct**

**Marks : 1/1**

13. What will the output of the following code?

```
#include <stdio.h>
#include <stdlib.h>
typedef struct {
    int* arr;
```

```

    int front;
    int rear;
    int size;
} Queue;
Queue* createQueue() {
    Queue* queue = (Queue*)malloc(sizeof(Queue));
    queue->arr = (int*)malloc(5 * sizeof(int));
    queue->front = 0;
    queue->rear = -1;
    queue->size = 0;
    return queue;
}
int main() {
    Queue* queue = createQueue();
    printf("%d", queue->size);
    return 0;
}

```

**Answer**

0

**Status : Correct**

**Marks : 1/1**

14. The essential condition that is checked before insertion in a queue is?

**Answer**

Overflow

**Status : Correct**

**Marks : 1/1**

15. In a linked list implementation of a queue, front and rear pointers are tracked. Which of these pointers will change during an insertion into a non-empty queue?

**Answer**

Only rear pointer

**Status : Correct**

**Marks : 1/1**

16. Which one of the following is an application of Queue Data Structure?

**Answer**

All of the mentioned options

**Status : Correct**

**Marks : 1/1**

17. What will be the output of the following code?

```
#include <stdio.h>
#include <stdlib.h>
#define MAX_SIZE 5
typedef struct {
    int* arr;
    int front;
    int rear;
    int size;
} Queue;
Queue* createQueue() {
    Queue* queue = (Queue*)malloc(sizeof(Queue));
    queue->arr = (int*)malloc(MAX_SIZE * sizeof(int));
    queue->front = -1;
    queue->rear = -1;
    queue->size = 0;
    return queue;
}
int isEmpty(Queue* queue) {
    return (queue->size == 0);
}
int main() {
    Queue* queue = createQueue();
    printf("Is the queue empty? %d", isEmpty(queue));
    return 0;
}
```

**Answer**

Runtime Error

**Status : Wrong**

**Marks : 0/1**

18. Which operations are performed when deleting an element from an array-based queue?

**Answer**

Dequeue

**Status : Correct**

**Marks : 1/1**

19. Front and rear pointers are tracked in the linked list implementation of a queue. Which of these pointers will change during an insertion into the EMPTY queue?

**Answer**

Both front and rear pointer

**Status : Correct**

**Marks : 1/1**

20. What will be the output of the following code?

```
#include <stdio.h>
#define MAX_SIZE 5
typedef struct {
    int arr[MAX_SIZE];
    int front;
    int rear;
    int size;
} Queue;

void enqueue(Queue* queue, int data) {
    if (queue->size == MAX_SIZE) {
        return;
    }
    queue->rear = (queue->rear + 1) % MAX_SIZE;
    queue->arr[queue->rear] = data;
    queue->size++;
}

int dequeue(Queue* queue) {
    if (queue->size == 0) {
```

```

        return -1;
    }
    int data = queue->arr[queue->front];
    queue->front = (queue->front + 1) % MAX_SIZE;
    queue->size--;
    return data;
}
int main() {
    Queue queue;
    queue.front = 0;
    queue.rear = -1;
    queue.size = 0;
    enqueue(&queue, 1);
    enqueue(&queue, 2);
    enqueue(&queue, 3);
    printf("%d ", dequeue(&queue));
    printf("%d ", dequeue(&queue));
    enqueue(&queue, 4);
    enqueue(&queue, 5);
    printf("%d ", dequeue(&queue));
    printf("%d ", dequeue(&queue));
    return 0;
}

```

**Answer**

1 2 3 4

**Status :** Correct

**Marks :** 1/1