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TCET
DEPARTMENT OF COMPUTER APPLICATIONS
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education
Under Autonomy - CBCGS-HME 2025
University of Mumbai

**Practical no. 2**

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**Sec - B**

**Aim:** To implement a menu-driven program in C to perform basic Queue operations including Enqueue, Dequeue, and display using an array.

## TOOLS/SOFTWARE REQUIRED:

1.C compiler
2.A text editor

## THEORY:

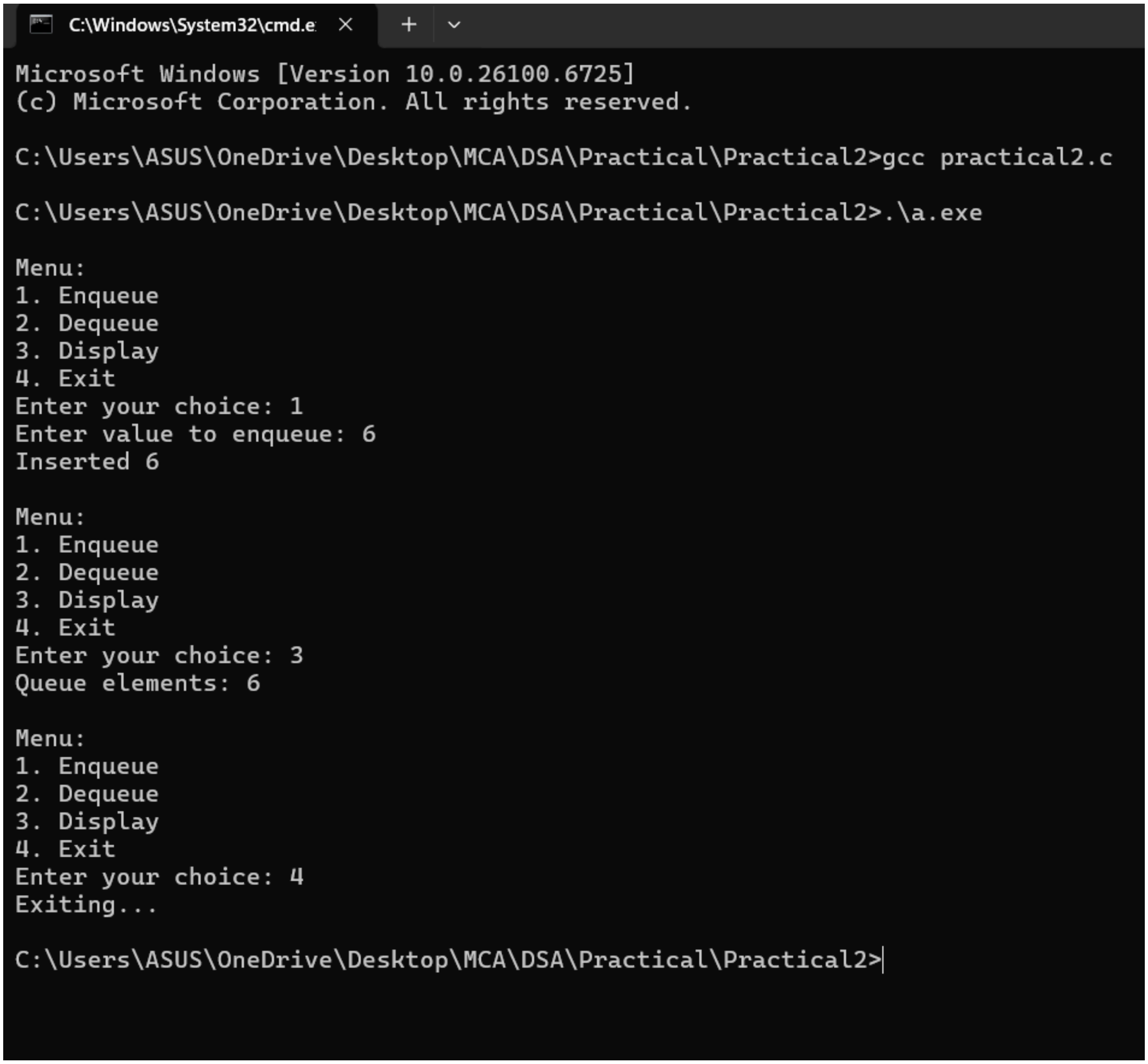
Queue: A linear data structure following FIFO (First In First Out) principle.

- Types of Queues: Simple Queue, Circular Queue, Priority Queue, Deque.
- Main Operations: Enqueue (insert), Dequeue (remove), Display.
- Applications: CPU scheduling, IO Buffers, Printer queue, Task scheduling.
- Overflow Condition: When the queue is full and no more elements can be added.
- Underflow Condition: When the queue is empty and no elements can be removed.

## CODES:

```
#include <stdio.h>

#define MAX 5

int queue[MAX], front = -1, rear = -1;

int isFull() {

    return rear == MAX - 1;

}

int isEmpty() {

    return front == -1 || front > rear;

}

void enqueue(int value) {

    if (isFull()) {

        printf("Queue Overflow\n");

    } else {

        if (front == -1) front = 0;

        queue[++rear] = value;
        printf("Inserted %d\n", value);
    }
}
void dequeue() {
    if (isEmpty()) {
        printf("Queue Underflow\n");
    } else {
        printf("Deleted %d\n", queue[front++]);
        if (front > rear) front = rear = -1;  // Reset queue when empty
    }
}
void display() {
    if (isEmpty()) {
        printf("Queue is Empty\n");
    } else {
        printf("Queue elements: ");
        for (int i = front; i <= rear; i++) {
            printf("%d ", queue[i]);
        }
        printf("\n");
    }
}
int main() {
    int choice, value;
    while (1) {
        printf("\nMenu:\n1. Enqueue\n2. Dequeue\n3. Display\n4. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);
        switch (choice) {
            case 1:
                printf("Enter value to enqueue: ");
                scanf("%d", &value);
                enqueue(value);
                break;
            case 2:
                dequeue();
                break;
            case 3:
                display();
                break;
            case 4:
                printf("Exiting...\n");
                return 0;
            default:
                printf("Invalid choice\n");
        }
    }
    return 0;
}
```

**RESULT:**



```
Microsoft Windows [Version 10.0.26100.6725]
(c) Microsoft Corporation. All rights reserved.

C:\Users\ASUS\OneDrive\Desktop\MCA\DSA\Practical\Practical2>gcc practical2.c

C:\Users\ASUS\OneDrive\Desktop\MCA\DSA\Practical\Practical2>.\a.exe

Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 6
Inserted 6

Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 3
Queue elements: 6

Menu:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 4
Exiting...

C:\Users\ASUS\OneDrive\Desktop\MCA\DSA\Practical\Practical2>
```

**CONCLUSION:**

The program successfully implements basic Queue operations using an array. It handles overflow and underflow conditions properly and provides a menu for user interaction. Queue is a fundamental data structure useful in many computing scenarios such as scheduling and buffering.

**VIVA QUESTIONS:**

1. What is a Queue and how does it work?
   A queue is a linear data structure that follows FIFO (First In First Out) where

elements are inserted at the rear and deleted from the front.

2. What are the types of Queues?
   Types include Simple Queue, Circular Queue, Priority Queue, and Deque (Double-ended Queue).

3. What are the main operations performed on a Queue?
   The main operations are Enqueue (insert), Dequeue (remove), and Display.

4. What are some real-life applications of Queue?
   Queues are used in CPU scheduling, printer task management, IO buffers, and customer service systems.

5. How do you detect Queue overflow and underflow conditions?
   Overflow occurs when the queue is full and no more elements can be added; underflow occurs when the queue is empty and removal is attempted.

**For Faculty use only**

| Correction parameter | Formative Assessment (40%) | Timely completion of Practical (40%) | Attendance Learning attitude (20%) | Total |
|---|---|---|---|---|
| Marks Obtained | | | | |