Name : Parmesh Vala
Class : SY_IT
Roll no. : 63

Experiment No 4: Array Implementation of Double-ended Queue using Array for real-world application.

Code :

```
#include <stdio.h>
#define MAX 10

int deque[MAX];
int left = -1, right = -1;

void input_deque(void);
void output_deque(void);
void insert_left(void);
void insert_right(void);
void delete_left(void);
void delete_right(void);
void display(void);

int main() {
    int option;
    printf("\n *****MAIN MENU*****");
    printf("\n 1.Input restricted deque");
    printf("\n 2.Output restricted deque");
    printf("\n Enter your option : ");
    scanf("%d", &option);

    switch (option) {
        case 1:
            input_deque();
            break;
        case 2:
            output_deque();
            break;
    }
    return 0;
}

void input_deque() {
    int option;
    do {
        printf("\n INPUT RESTRICTED DEQUE");
        printf("\n 1.Insert at right");
        printf("\n 2.Delete from left");
        printf("\n 3.Delete from right");
        printf("\n 4.Display");
```

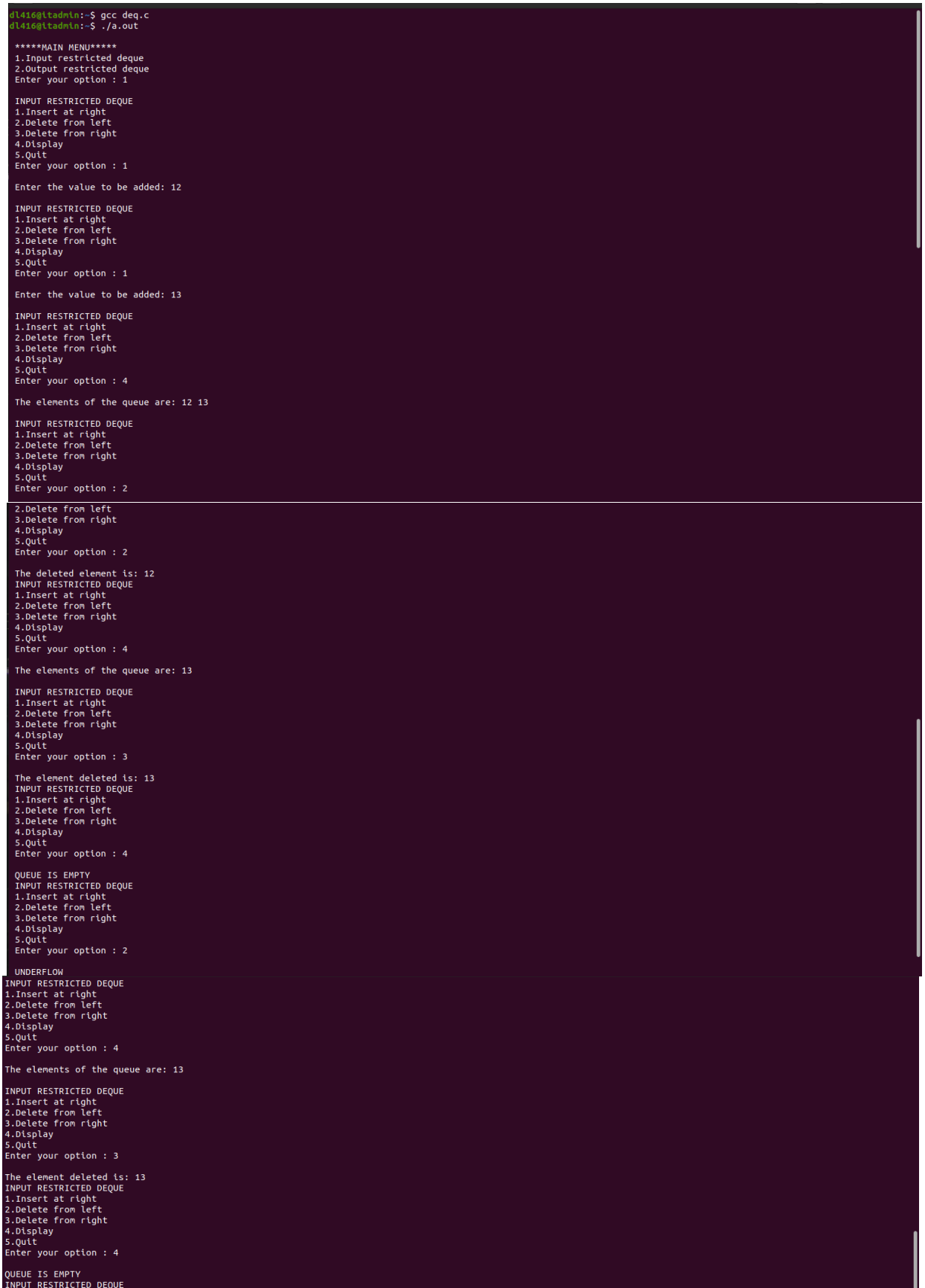
```
        printf("\n 5.Quit");
        printf("\n Enter your option : ");
        scanf("%d", &option);

        switch (option) {
            case 1:
                insert_right();
                break;
            case 2:
                delete_left();
                break;
            case 3:
                delete_right();
                break;
            case 4:
                display();
                break;
        }
    } while (option != 5);
}

void output_deque() {
    int option;
    do {
        printf("OUTPUT RESTRICTED DEQUE");
        printf("\n 1.Insert at right");
        printf("\n 2.Insert at left");
        printf("\n 3.Delete from left");
        printf("\n 4.Display");
        printf("\n 5.Quit");
        printf("\n Enter your option : ");
        scanf("%d", &option);

        switch (option) {
            case 1:
                insert_right();
                break;
            case 2:
                insert_left();
                break;
            case 3:
                delete_left();
                break;
            case 4:
                display();
                break;
        }
    } while (option != 5);
}
```

```
void insert_right() {
    int val;
    printf("\n Enter the value to be added: ");
    scanf("%d", &val);
    if ((left == 0 && right == MAX - 1) || (left == right + 1)) {
        printf("\n OVERFLOW");
        return;
    }
    if (left == -1) {
        /* If queue is initially empty */
        left = 0;
        right = 0;
    } else {
        if (right == MAX - 1) /* right is at the last position of queue */
            right = 0;
        else
            right = right + 1;
    }
    deque[right] = val;
}

void insert_left() {
    int val;
    printf("\n Enter the value to be added: ");
    scanf("%d", &val);
    if ((left == 0 && right == MAX - 1) || (left == right + 1)) {
        printf("\n Overflow");
        return;
    }

    if (left == -1) {
        /* If queue is initially empty */
        left = 0;
        right = 0;
    } else {
        if (left == 0)
            left = MAX - 1;
        else
            left = left - 1;
    }
    deque[left] = val;
}

void delete_left() {
    if (left == -1) {
        printf("\n UNDERFLOW");
        return;
    }
    printf("\n The deleted element is: %d", deque[left]);
    if (left == right) /* Queue has only one element */
```

```
    {
        left = -1;
        right = -1;
    } else {
        if (left == MAX - 1)
            left = 0;
        else
            left = left + 1;
    }
}

void delete_right() {
    if (left == -1) {
        printf("\n UNDERFLOW");
        return;
    }
    printf("\n The element deleted is: %d", deque[right]);
    if (left == right) /* Queue has only one element */
    {
        left = -1;
        right = -1;
    } else {
        if (right == 0)
            right = MAX - 1;
        else
            right = right - 1;
    }
}

void display() {
    int front = left, rear = right;
    if (front == -1) {
        printf("\n QUEUE IS EMPTY");
        return;
    }
    printf("\n The elements of the queue are: ");

    if (front <= rear) {
        while (front <= rear) {
            printf("%d ", deque[front]);
            front++;
        }
    } else {
        while (front <= MAX - 1) {
            printf("%d ", deque[front]);
            front++;
        }
        front = 0;
        while (front <= rear) {
            printf("%d ", deque[front]);
```

```
            front++;
        }
    }
    printf("\n");
}
```

INPUT RESTRICED DEQUE :



OUTPUT RESTRICTED DEQUE :