CHRIST
(DEEMED TO BE UNIVERSITY)
DELHI-NCR, INDIA

Data Structure and Algorithm (MCA 271)

Lab Practical –

BY

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SUBMITTED TO

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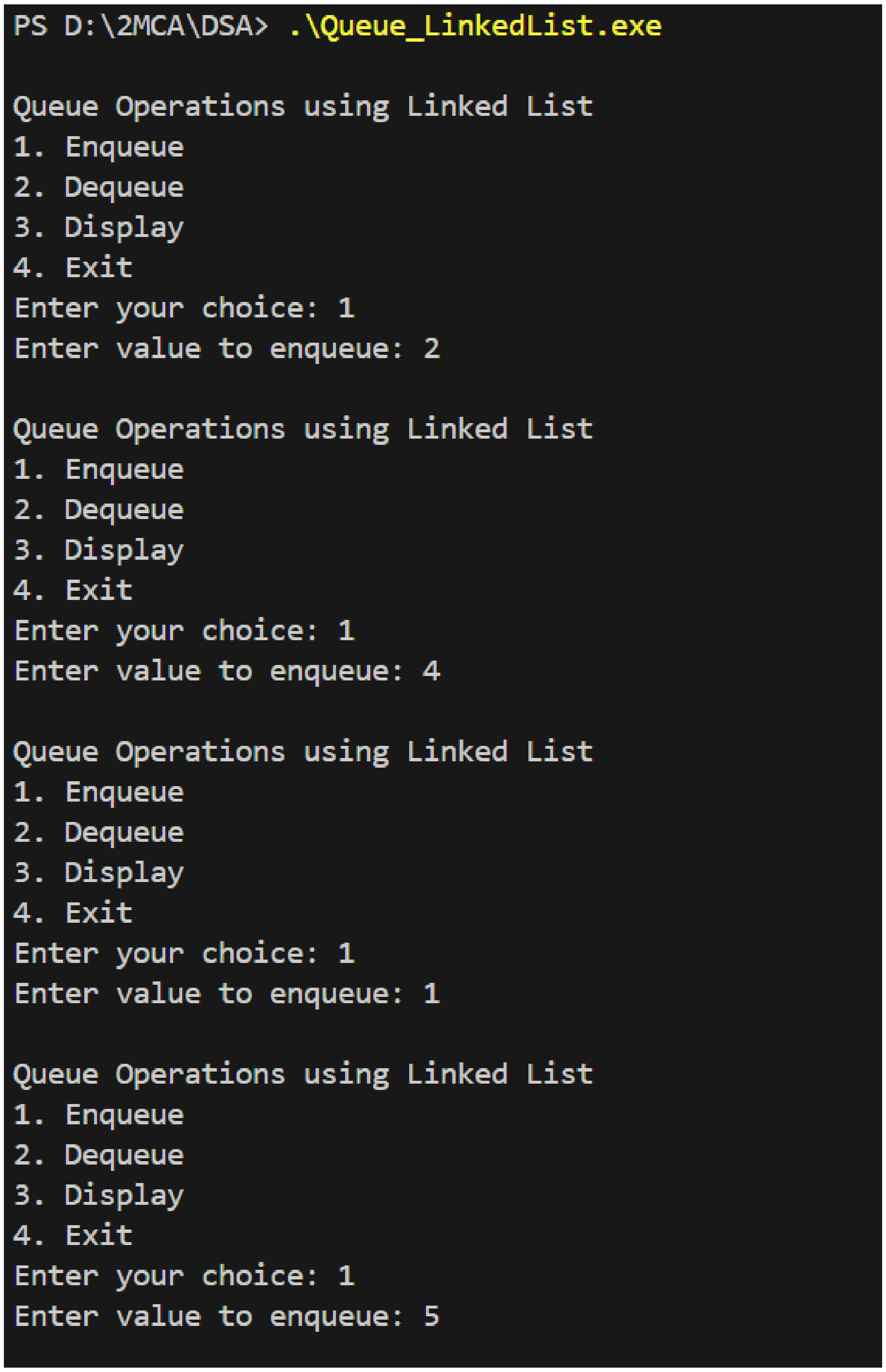
Program Description:

Code of the program

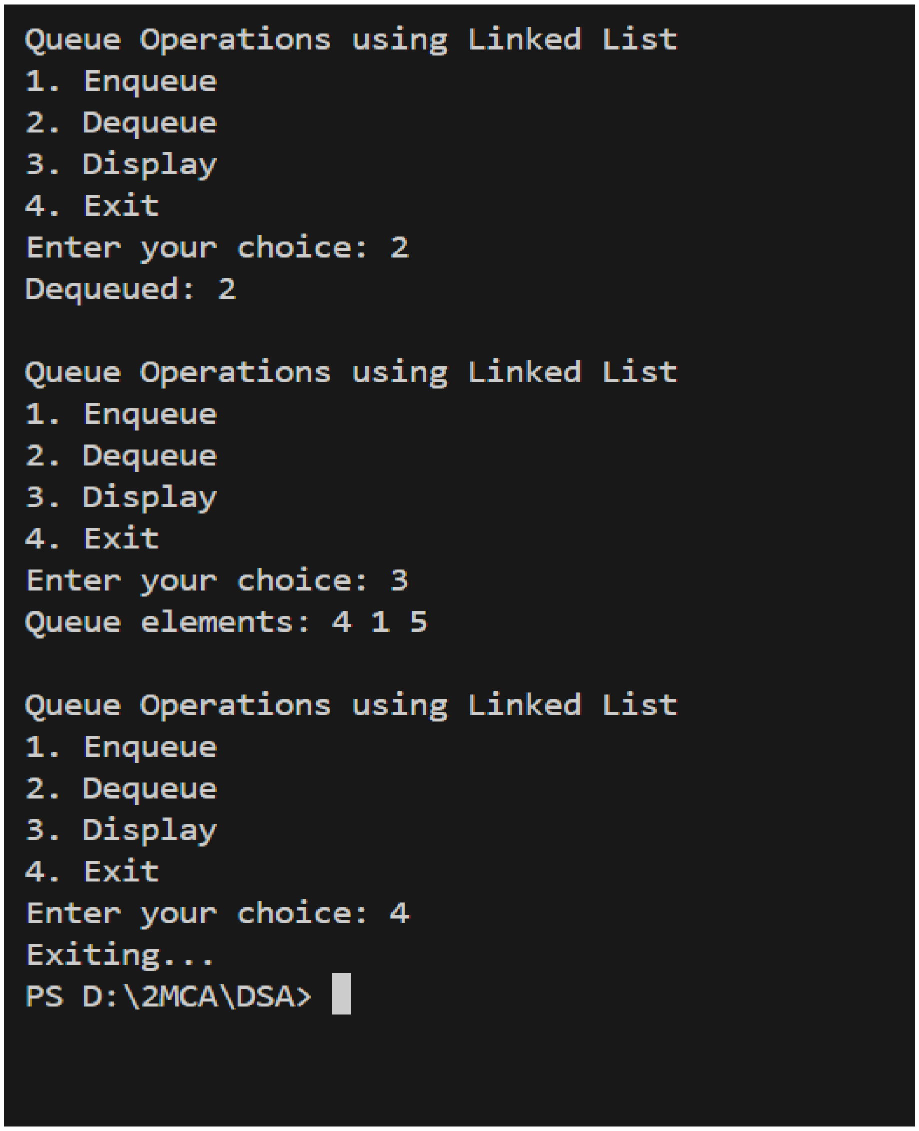
Output: - Paste the o/p of the program.

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

// Node structure for the linked list
struct Node {
    int data;
    struct Node* next;
};

// Queue structure
struct Queue {
    struct Node* front;
    struct Node* rear;
};

// Function to create a new node
struct Node* createNode(int data) {
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = data;
    newNode->next = NULL;
    return newNode;
}

// Function to initialize the queue
struct Queue* createQueue() {
    struct Queue* queue = (struct Queue*)malloc(sizeof(struct Queue));
    queue->front = queue->rear = NULL;
    return queue;
}

// Function to check if the queue is empty
int isEmpty(struct Queue* queue) {
    return queue->front == NULL;
}

// Function to add an item to the queue
void enqueue(struct Queue* queue, int data) {
    struct Node* newNode = createNode(data);
    if (queue->rear == NULL) {
        queue->front = queue->rear = newNode;
        return;
    }
    queue->rear->next = newNode;
    queue->rear = newNode;
}

// Function to remove an item from the queue
int dequeue(struct Queue* queue) {
    if (isEmpty(queue)) {
        printf("Queue is empty!\n");
        return -1; // Indicate that the queue is empty
    }
    struct Node* temp = queue->front;
    int data = temp->data;
    queue->front = queue->front->next;
    if (queue->front == NULL) {
        queue->rear = NULL;
    }
    free(temp);
    return data;
}

// Function to display the queue
void display(struct Queue* queue) {
    if (isEmpty(queue)) {
        printf("Queue is empty!\n");
        return;
    }
    struct Node* temp = queue->front;
    printf("Queue elements: ");
    while (temp != NULL) {
        printf("%d ", temp->data);
        temp = temp->next;
    }
    printf("\n");
}

// Main function to demonstrate queue operations
int main() {
    struct Queue* queue = createQueue();
    int choice, value;
    do {
        printf("\nQueue Operations using Linked List\n");
        printf("1. Enqueue\n");
        printf("2. Dequeue\n");
        printf("3. Display\n");
        printf("4. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice) {
            case 1:
                printf("Enter value to enqueue: ");
                scanf("%d", &value);
                enqueue(queue, value);
                break;
            case 2:
                value = dequeue(queue);
                if (value != -1) {
                    printf("Dequeued: %d\n", value);
                }
                break;
            case 3:
                display(queue);
                break;
            case 4:
                printf("Exiting...\n");
                break;
            default:
                printf("Invalid choice! Please try again.\n");
        }
    } while (choice != 4);

    // Free the allocated memory
    while (!isEmpty(queue)) {
        dequeue(queue);
    }
    free(queue);

    return 0;
}
```

OUTPUT : --



```
PS D:\2MCA\DSA> .\Queue_LinkedList.exe

Queue Operations using Linked List
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 2

Queue Operations using Linked List
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 4

Queue Operations using Linked List
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 1

Queue Operations using Linked List
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter value to enqueue: 5
```



```
Queue Operations using Linked List
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 2
Dequeued: 2

Queue Operations using Linked List
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 3
Queue elements: 4 1 5

Queue Operations using Linked List
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 4
Exiting...
PS D:\2MCA\DSA>
```