

Aim:

Write a program to implement queue using **linked lists**.

Sample Input and Output:

```
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 1
Enter element : 57
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 1
Enter element : 87
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 5
Queue size : 2
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 3
Elements in the queue : 57 87
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 2
Deleted value = 57
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 2
Deleted value = 87
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 5
Queue size : 0
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit
Enter your option : 6
```

Source Code:

QUsingLL.c

```
#include <conio.h>
#include <stdio.h>
struct queue
{
    int data;
    struct queue *next;
};
typedef struct queue *Q;
Q front = NULL, rear = NULL;
void enqueue(int element)
{
    Q temp = NULL;
    temp = (Q)malloc(sizeof(struct queue));
    if(temp == NULL)
```

```
{
    printf("Queue is overflow.\n");
}
else
{
    temp -> data = element;
    temp -> next = NULL;
    if(front == NULL)
    {
        front = temp;
    }
    else
    {
        rear -> next = temp;
    }
    rear = temp;
    printf("Successfully inserted.\n");
}
}

void dequeue()
{
    Q temp = NULL;
    if(front == NULL)
    {
        printf("Queue is underflow.\n");
    }
    else
    {
        temp = front;
        if (front == rear)
        {
            front = rear = NULL;
        }
        else
        {
            front = front -> next;
        }
        printf("Deleted value = %d\n", temp -> data);
        free(temp);
    }
}

void display()
{
    if(front == NULL)
    {
        printf("Queue is empty.\n");
    }
    else
    {
        Q temp = front;
        printf("Elements in the queue : ");
        while(temp != NULL)
        {
            printf("%d ", temp -> data);
            temp = temp -> next;
        }
    }
}
```

```

        printf("\n");
    }
}
void size()
{
    int count =0;
    if(front == NULL)
    {
        printf("Queue size : 0\n");
    }
    else
    {
        Q temp = front;
        while(temp != NULL)
        {
            temp = temp -> next;
            count = count + 1;
        }
        printf("Queue size : %d\n",count);
    }
}
void isEmpty()
{
    if(front == NULL )
    {
        printf("Queue is empty.\n");
    }
    else
    {
        printf("Queue is not empty.\n");
    }
}
int main()
{
    int op, x;
    while(1)
    {
        printf("1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit\n");
        printf("Enter your option : ");
        scanf("%d",&op);
        switch(op)
        {
            case 1:
                printf("Enter element : ");
                scanf("%d",&x);
                enqueue(x);
                break;
            case 2:
                dequeue();
                break;
            case 3:
                display();
                break;
            case 4:
                isEmpty();
                break;

```

```

        case 5:
        size();
        break;
        case 6: exit(0);
    }
}
}

```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 2
Enter your option : 2
Queue is underflow. 3
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 3
Enter your option : 3
Queue is empty. 4
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 4
Enter your option : 4
Queue is empty. 5
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 5
Enter your option : 5
Queue size : 0 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 44
Successfully inserted. 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 55
Successfully inserted. 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 66
Successfully inserted. 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 67
Successfully inserted. 3
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 3
Enter your option : 3
Elements in the queue : 44 55 66 67 2
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 2
Enter your option : 2
Deleted value = 44 2
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 2
Enter your option : 2
Deleted value = 55 5
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 5
Enter your option : 5
Queue size : 2 4

1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 4
Enter your option : 4
Queue is not empty. 6
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 6
Enter your option : 6

Test Case - 2
User Output
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 23
Successfully inserted. 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 234
Successfully inserted. 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 45
Successfully inserted. 1
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 1
Enter your option : 1
Enter element : 456
Successfully inserted. 2
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 2
Enter your option : 2
Deleted value = 23 3
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 3
Enter your option : 3
Elements in the queue : 234 45 456 2
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 2
Enter your option : 2
Deleted value = 234 3
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 3
Enter your option : 3
Elements in the queue : 45 456 4
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 4
Enter your option : 4
Queue is not empty. 5
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 5
Enter your option : 5
Queue size : 2 3
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 3
Enter your option : 3
Elements in the queue : 45 456 6
1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit 6
Enter your option : 6