

## Data Structures (UCS301) Assignment

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1.) #include <iostream>

using namespace std;

#define SIZE 5

class Queue {
    int arr[SIZE], front, rear;
public:
Queue() { front = rear = -1; }

bool isEmpty() { return front == -1; } bool
isFull() { return rear == SIZE - 1; }

void enqueue(int x) {
if (isFull()) cout << "Queue Full\n"; else {
if (front == -1) front = 0; arr[++rear] = x;
}
}

void dequeue() {
if (isEmpty()) cout << "Queue Empty\n"; else {
cout << "Deleted: " << arr[front] << endl; if (front
== rear) front = rear = -1; else front++;
}
}

void display() {
if (isEmpty()) cout << "Queue Empty\n"; else {
for (int i = front; i <= rear; i++) cout << arr[i] << " "; cout << endl;
}
}
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void peek() {
if (!isEmpty()) cout << "Front: " << arr[front] << endl; else cout
    << "Queue Empty\n";
}
};

int main() {
    Queue q;
int ch, val; do {
cout << "\n1.Enqueue 2.Dequeue 3.Display 4.Peek 5.Exit\n"; cin >>
    ch;
switch (ch) {
case 1: cin >> val; q.enqueue(val); break; case 2:
    q.dequeue(); break;
case 3: q.display(); break; case 4:
    q.peek(); break;
}
} while (ch != 5);
}

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2.)#include <iostream>

using namespace std;

#define SIZE 5

class CQueue {
    int arr[SIZE], front, rear;
public:
CQueue() { front = rear = -1; }

bool isEmpty() { return front == -1; }
bool isFull() { return (rear + 1) % SIZE == front; }

void enqueue(int x) {
if (isFull()) cout << "Queue Full\n"; else {
if (front == -1) front = 0; rear = (rear +
    1) % SIZE; arr[rear] = x;
}
}

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void dequeue() {
    if (isEmpty()) cout << "Queue Empty\n";
    else {
        cout << "Deleted: " << arr[front] << endl;
        if (front == rear) front = rear = -1; else
            front = (front + 1) % SIZE;
    }
}

void display() {
    if (isEmpty()) cout << "Queue Empty\n";
    else {
        int i = front;
        while (true) {
            cout << arr[i] << " ";
            if (i == rear) break;
            i = (i + 1) % SIZE;
        }
        cout << endl;
    }
}

void peek() {
    if (!isEmpty()) cout << "Front: " << arr[front] << endl;
    else cout << "Queue Empty\n";
}
};

int main() {
    CQueue q;
    int ch,
    val; do {
        cout << "\n1.Enqueue 2.Dequeue 3.Display 4.Peek 5.Exit\n";
        cin >> ch;
        switch (ch) {
            case 1: cin >> val; q.enqueue(val); break;
            case 2: q.dequeue(); break;
            case 3: q.display(); break;
            case 4: q.peek(); break;
        }
    } while (ch != 5);
}

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3.)#include <iostream>

#include <queue>
using namespace std;

int main() {
queue<int> q;
int arr[] = {4,7,11,20,5,9};
for (int x : arr) q.push(x);

int n = q.size();
queue<int> first;
for (int i = 0; i < n/2; i++) {
    first.push(q.front());
    q.pop();
}

while (!first.empty()) {
    q.push(first.front()); first.pop();
q.push(q.front()); q.pop();
}

while (!q.empty()) {
cout << q.front() << " "; q.pop();
}
}
```

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4.)#include <iostream>

#include <queue>
using namespace std;

int main() {
string s;
cout << "Enter string: "; cin
    >> s;

queue<char> q;
int freq[256] = {0};

for (char c : s) {
    freq[c]++;
    q.push(c);
}
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        while (!q.empty() && freq[q.front()] > 1)
            q.pop();

if (q.empty()) cout << -1 << " ";
else
    cout << q.front() << " ";
}
}

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5.(a) #include <iostream>

#include <queue>
using namespace std;

class Stack {
    queue<int> q1, q2;
public:
    void push(int x) {
        q2.push(x);
        while (!q1.empty()) {
            q2.push(q1.front()); q1.pop();
        }
    swap(q1, q2);
    }

void pop() {
if (!q1.empty()) q1.pop();
}

void top() {
if (!q1.empty()) cout << "Top: " << q1.front() << endl;
}
};

int main() {
    Stack s;
s.push(10); s.push(20); s.push(30);
    s.top();
s.pop();
s.top();
}

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5(b) #include <iostream>

#include <queue>
using namespace std;

class Stack {
    queue<int> q;
public:
    void push(int x) {
        q.push(x);
        for (int i = 0; i < q.size()-1; i++) {
            q.push(q.front());
            q.pop();
        }
    }

    void pop() {
        if (!q.empty()) q.pop();
    }

    void top() {
        if (!q.empty()) cout << "Top: " << q.front() << endl;
    }
};

int main() {
    Stack s;
    s.push(5); s.push(10); s.push(15);
    s.top();
    s.pop();
    s.top();
}
```