Experiment-1

Student Name: Sagen Hansda
UID: 23BCS12396
Branch: B.E-C.S.E
Section/Group: 23KRG-1A
Semester: 5th
Date of Performance: 25/08/2025
Subject Name: DAA
Subject Code: 23CSH-301

1. **Aim:** Analyze if the stack is empty or full, and if elements are present, return the top element in the stack using templates. Also, perform push and pop operations on the stack.

2. **Objective:** To understand stacks.

3. **Input/Apparatus Used:** Stack are implemented using templates.

4. **Procedure:**
   Step1: Create stack.
   Step2: Check underflow and overflow condition.
   Step3: Increment top to store element in stack.
   Step4: Decrement top after removing element form stack. Step5: Check is stack empty or not.

5. **Code:**

```
#include <bits/stdc++.h>
using namespace std;

template <class T>
class Stack {
   private:
    int top;
    int capacity;
    T* arr;

   public:
```

```
    Stack(int size) {
        capacity = size;
        arr = new T[capacity];
        top = -1;
    }
    ~Stack() { delete[] arr; }
    void push(T value) {
        if (isFull()) {
            cout << "Stack Overflow!\n";
        } else {
            arr[++top] = value;
        }
    }
    void pop() {
        if (isEmpty()) {
            cout << "Stack Underflow!\n";
        } else {
            top--;
        }
    }
    T peek() {
        if (isEmpty()) {
            cout << "Stack is empty.\n";
            return T();
        }
        return arr[top];
    }
    bool isEmpty() { return top == -1; }
    bool isFull() { return top == capacity - 1; }
};

int main() {
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    Stack<int> s(5);
    s.push(10);
    s.push(20);
    s.push(30);
    cout << "Top: " << s.peek() << endl;
    s.pop();
    cout << "Top after pop: " << s.peek() << endl;
```

```
    s.push(40);
    s.push(50);
    s.push(60);
    s.push(70);
    while (!s.isEmpty()) {
        cout << "Popping: " << s.peek() << endl;
        s.pop();
    }
    s.pop();
    return 0;
}
```

6. Output:

```
C:\Users\sagen\OneDrive\Desktop\cpp\Sem5\DAA_23BCS12396_KRG_1A\Experiment1>Experiment1
Top: 30
Top after pop: 20
Stack Overflow!
Popping: 60
Popping: 50
Popping: 40
Popping: 20
Popping: 10
Stack Underflow!
```