

**Department :** Computer Engineering

**Class :** SE

**Subject :** Data Structure Lab

**Name:** Kartiki Uday Khare.

**Roll no:** 21494

**Batch:** H4

## Assignment No : 10

- **Problem Statement:**

Implement C++ program for expression conversion as infix to postfix and its evaluation using stack based on given conditions: 1. Operands and operator, both must be single character. 2. Input Postfix expression must be in a desired format. 3. Only '+', '-', '\*', and '/' operators are expected.

- **Code:**

```
#include <iostream>
#define max 100
using namespace std;

template<class T>
class Stack //Creating Stack
{
    public:
        T arr[max];
        int top;
        Stack();
        void push(T val);
        void pop();
        T peep();
        bool isempty();
        void display();
        int pr(T op);
};

template<class T>
Stack<T>::Stack()
{
    top=-1;
}

template<class T>
void Stack<T>::push(T val)
{
    if (top==max-1)
        cout<<"\nStack is Full\n";
```

```

    arr[++top]=val;
}

template<class T>
void Stack<T>::pop()
{
    if(top!=-1)
        top--;
}

template<class T>
T Stack<T>::peek()
{
    if(top!=-1)
        return arr[top];
}

template<class T>
bool Stack<T>::isempty()
{
    if(top==-1)
        return true;
    else
        return false;
}

template<class T>
void Stack<T>::display()
{
    if (top!=-1)
    {
        cout<<"\nElements of Stack are:\n";
        int x=top;
        while(x!=-1)
        {
            cout<<arr[x]<<" ";
            x--;
        }
    }
}

template<class T>
int Stack<T>::pr(T op)
{
    switch(op)
    {
        case '+':
        case '-':return 1;
        case '*':
        case '/':return 2;
        case '^':return 3;
    }
    return 0;
}

int main()
{

```

```

Stack<int>s;

string ptx,a;
char op;
int flag=0;
cout<<"Enter Infix Expression:"<<endl;
cin>>a;
int i,ans,oper1,oper2;
ans=0;
//bool ans=s.isempty();
for(i=0;i<a.length();i++)
{
    if(s.isempty() && (a[i]=='(' || a[i]=='{' || a[i]=='[' || a[i]=='<'))
        s.push(a[i]);
    else if((s.peep()=='(' && a[i]==')') || (s.peep()=='{' && a[i]=='}') || (s.peep()=='[' && a[i]==']')
|| (s.peep()=='<' && a[i]== '>'))
        s.pop();
    else
        continue;
}
if(s.isempty())
    flag=1;
else{
    flag=0;
    cout<<"Please Enter a Valid Expression";
}
//Conversion:
if(flag==1)
{
    for(i=0;i<a.length();i++)
    {
        op=a[i];
        if( op>='0' && op<='9' )
            ptx+=op;
        else if(op=='+' || op=='-' || op=='/' || op=='*' || op=='^')
        {
            while( s.pr(s.arr[s.top])>=s.pr(op) )
            {
                ptx+=s.peep();
                s.pop();
            }
            s.push(op);
        }
        else if(op=='(')
            s.push(op);
        else if(op==')')
        {
            while(s.arr[s.top]!='(')
            {
                ptx+=s.peep();
                s.pop();
            }
            s.pop();
        }
    }
}
while(!s.isempty()){
    ptx+=s.peep();
}

```

```

        s.pop();
    }
    cout<<"\nPostfix Expression is:"<<pstx<<"\n\n";

//Evaluation of Postfix

for(i=0;i<pstx.length();i++)
{
    op=pstx[i];
    if(op>='0' && op<='9')
        s.push(op);
    else if(op=='+' || op=='-' || op=='/' || op=='*')
    {
        oper1=s.peep();
        s.pop();
        oper2=s.peep();
        s.pop();
        switch(op)
        {
            case '+': ans=oper2+oper1;
                       s.push(ans);
                       break;
            case '-': ans=oper2-oper1;
                       s.push(ans);
                       break;
            case '*': ans=oper2*oper1;
                       s.push(ans);
                       break;
            case '/': ans=oper2/oper1;
                       s.push(ans);
                       break;
        }
    }
}
cout<<"Evaluation of Postfix Expression is:"<<s.peep();

}
return 0;
}

```

- **Output:**

```
"C:\Users\KARTIKI\OneDrive\Desktop\STUDY MATERIAL\Engg\Infix-Postfix-Evaluate(DSL)\bin\Debug\Infix-Postfix-Evaluate(DSL).exe" —
Enter Infix Expression:
1+2
Postfix Expression is:12+
Evaluation of Postfix Expression is:99
Process returned 0 (0x0)   execution time : 3.606 s
Press any key to continue.
```