**Lab Assignment No. 3(B)**

**Problem Statement : Construct an expression tree from the given prefix expression eg. +--a\*bc/def and traverse it using post order traversal(non recursive) and then delete the entire tree.**

**Code:**

// BEGINNING OF CODE

#include<iostream>

#include<string.h>

using namespace std;

struct node{

char data;

node \*left;

node \*right;

};

class tree{

char prefix[50];

public:

node \*top;

void expression(char []);

void display(node \*);

void deletion(node \*node);

};

class stack1{

public:

node \*data[30];

int top;

stack1(){

top=-1;

}

int empty(){

if(top==-1){

return 1;

}

return 0;

}

void push(node \*p){

data[++top]=p;

}

node \*pop(){

return(data[top--]);

}

};

void tree::expression(char prefix[]){

char c;

stack1 s;

node \*t1,\*t2;

int len,i;

len=strlen(prefix);

for(i=len-1;i>=0;i--){

top = new node;

top->left=NULL;

top->right=NULL;

if(isalpha(prefix[i])){

top->data=prefix[i];

s.push(top);

}else if(prefix[i]=='+'||prefix[i]=='-'||prefix[i]=='\*'||prefix[i]=='/'){

t2 = s.pop();

t1=s.pop();

top->data=prefix[i];

top->left = t2;

top->right=t1;

s.push(top);

}

}

top = s.pop();

}

void tree::display(node \*top){

stack1 s1,s2;

node \*T = top;

s1.push(T);

while(!s1.empty()){

T = s1.pop();

s2.push(T);

if(T->left!=NULL){

s1.push(T->left);

}

if(T->right!=NULL){

s1.push(T->right);

}

}

while(!s2.empty()){

top = s2.pop();

cout<<top->data;

}

cout<<endl;

}

void tree::deletion(node \*node){

if(node==NULL){

return;

}

deletion(node->left);

deletion(node->right);

cout<<"Deleting node: "<<node->data<<endl;

free(node);

}

int main(){

tree t;

char exp1[20];

int ch;

do{

cout<<"1 -> Enter prefix expression"<<endl;

cout<<"2 -> Display postfix Expression"<<endl;

cout<<"3 -> Deletion"<<endl;

cout<<"4 -> Exit"<<endl;

cout<<"Choose an option (1-4):\t";

cin>>ch;

switch(ch){

case 1:

cout<<"Enter the expression (eg.: +--a\*bc/def):\t";

cin>>exp1;

t.expression(exp1);

break;

case 2:

t.display(t.top);

break;

case 3:

t.deletion(t.top);

break;

case 4:

cout<<"\n// END OF CODE\n"<<endl;

break;

default:

cout<<"Choose a valid option (1-4).";

break;

}

}while(ch!=4);

}

// END OF CODE