Experiment No 5

Problem Statement:

Construct an expression tree from the given prefix expression eg. +--a*bc/def and traverse it using postordertraversal(non recursive) and then delete the entire tree.

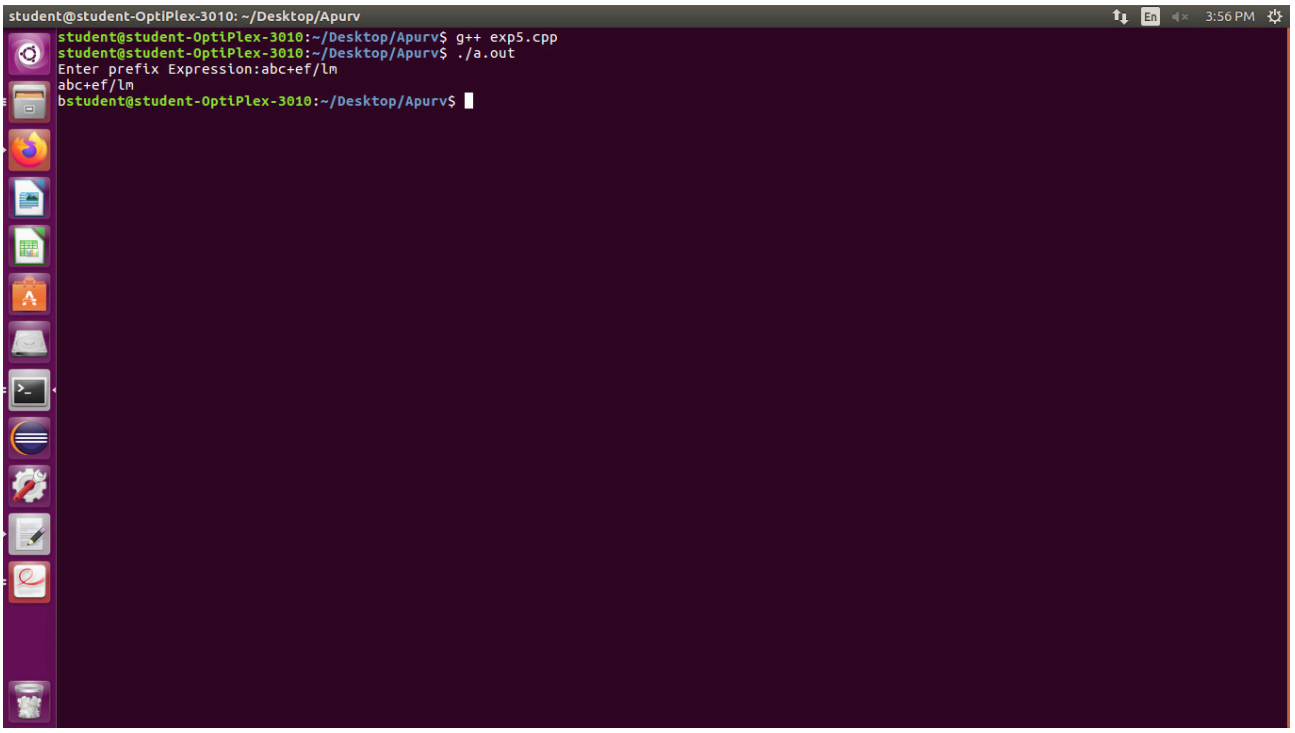
Code:

```
#include<iostream>
using namespace std;
#include<string.h>
struct node
{
char data;
node *left;
node *right;
};
class tree
{
char prefix[20];
public: node *top;
void expression(char []);
void display(node *);
void non_rec_postorder(node *);
void del(node *);
};
class stack1
{
node *data[30];
int top;
public:
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* root)
{
if(root!=NULL)
{
cout<<root->data;
display(root->left);
display(root->right);
}
}
void tree :: non_rec_postorder(node *top)
{
stack1 s1,s2;
node *T=top;
cout<<"\n";
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;
}
}
}
void tree::del(node* node)
{
stack1 s;
if(node == NULL)
return;
del(node->left);
del(node->right);
cout<<"Deleting node: "<<node->data;
delete(node);
}
int main()
{
char expr[20];
tree t;
cout<<"Enter prefix Expression";
cin>>expr;
cout<<expr;
t.expression(expr);
t.non_rec_postorder(t.top);
}
```

Output


student@student-OptiPlex-3010: ~/Desktop/Apurv
En
3:56 PM
student@student-OptiPlex-3010:~/Desktop/Apurv$ g++ exp5.cpp
student@student-OptiPlex-3010:~/Desktop/Apurv$ ./a.out
Enter prefix Expression:abc+ef/lm
abc+ef/lm
bstudent@student-OptiPlex-3010:~/Desktop/Apurv$