Assignment 5 :

CODE:

```
#include <iostream>
#include <stack>
using namespace std;
struct TreeNode {
 char data;
 TreeNode* left;
 TreeNode* right;
};
TreeNode* newNode(char data) {
 TreeNode* node = new TreeNode;
 node->data = data;
 node->left = node->right = NULL;
 return node;
}
TreeNode* constructExpressionTree(string prefix) {
 stack<TreeNode*> s;
 for (int i = prefix.length() - 1; i >= 0; i--) {
 char c = prefix[i];
 if (isdigit(c) || isalpha(c)) {
 TreeNode* node = newNode(c);
 s.push(node);
 }
 else {
 TreeNode* node = newNode(c);
 node->left = s.top();
 s.pop();
 node->right = s.top();
 s.pop();
 s.push(node);
 }
 }
 return s.top();
}
void postorderTraversal(TreeNode* root) {
 stack<TreeNode*> s;
 TreeNode* lastNodeVisited = NULL;
 while (!s.empty() || root != NULL) {
 if (root != NULL) {
 s.push(root);
 root = root->left;
 }
 else {
 TreeNode* peekNode = s.top();
 if (peekNode->right != NULL && lastNodeVisited != peekNode-
>right) root = peekNode->right;
```

```
 else {
 cout << peekNode->data << " ";
 lastNodeVisited = peekNode;
 s.pop();
 }
 }
 }
}
void deleteTree(TreeNode* root) {
 if (root == NULL) return;
 deleteTree(root->left);
 deleteTree(root->right);
 delete root;
}
int main() {
 int choice;
 string prefix;
 TreeNode* root = NULL;
 do {
 cout << "Menu" << endl;
 cout << "1. Enter prefix expression" << endl;
 cout << "2. Postorder traversal" << endl;
 cout << "3. Delete tree" << endl;
 cout << "4. Exit" << endl;
 cout << "Enter your choice: ";
 cin >> choice;
 switch (choice) {
 case 1:
 cout << "Enter prefix expression: ";
 cin.ignore();
 getline(cin, prefix);
 root = constructExpressionTree(prefix);
 break;
 case 2:
 if (root == NULL) cout << "Tree not constructed yet" <<
endl;
 else {
 cout << "Postorder traversal of expression tree: ";
postorderTraversal(root);
cout << endl;
 }
 break;
 case 3:
 if (root == NULL) cout << "Tree not constructed yet" <<
endl;
 else {
 deleteTree(root);
 root = NULL;
```

```
 cout << "Tree deleted" << endl;
 }
 break;
 case 4:
 cout << "Exiting program" << endl;
 break;
 default:
 cout << "Invalid choice" << endl;
 break;
 }
 cout << endl;
 } while (choice != 4);
 return 0;
}
```

Output:

```
Menu
1. Enter prefix expression
2. Postorder traversal
3. Delete tree
4. Exit
Enter your choice: 1
Enter prefix expression: +--a*bc/def
Menu
1. Enter prefix expression
2. Postorder traversal
3. Delete tree
4. Exit
Enter your choice: 2
Postorder traversal of expression tree: a b c * - d e / - f +
Menu
1. Enter prefix expression
2. Postorder traversal
3. Delete tree
4. Exit
Enter your choice: 3
Tree deleted
Menu
1. Enter prefix expression
2. Postorder traversal
3. Delete tree
4. Exit
Enter your choice: 3
Tree not constructed yet
Menu
1. Enter prefix expression
2. Postorder traversal
3. Delete tree
4. Exit
```

Enter your choice: 4
Exiting program
*/