S.No: 17	Exp. Name: ***Expression Trees***	Date:2025-10-23

Aim:

Write a C program that implements Expression Tree

Source Code:

expressiontree.c

```
#include <stdlib.h>
#include<stdio.h>
#include<malloc.h>
struct tree {
   char data;
   struct tree *left;
   struct tree *right;
};
typedef struct tree * ENODE;
ENODE stack[30];
int top = -1;
ENODE newnode(char ch) {
   ENODE temp;
   temp = (ENODE)malloc(sizeof(struct tree));
   temp->data = ch;
   temp->left = NULL;
   temp->right = NULL;
   return(temp);
}
void push(ENODE temp) {
   if(top>=98){
      printf("Stack Overflow");
      exit(1);
   }
   stack[++top] = temp;
}
ENODE pop() {
   if(top<0)
      return NULL;
   return stack[top--];
}
void inorder(ENODE t) {
   if(t!=NULL){
      inorder(t->left);
      printf("%c", t->data);
      inorder(t->right);
   }

}
void preorder(ENODE t){
   if(t!=NULL){
      printf("%c", t->data);
      preorder(t->left);
      inorder(t->right);
   }
}
```

```
void postorder(ENODE t) {
   if(t!=NULL){
      postorder(t->left);
      postorder(t->right);
      printf("%c", t->data);
   }

}
int isOperator(char ch){
   return (ch == '+' || ch == '-' || ch == '*' || ch == '/');
}
/*
void main() {
   char postfix_exp[20];
   ENODE temp;
   int j,i;
   printf("Enter a postfix expression : ");
   scanf("%s",postfix_exp);
   printf("Inorder Traversal of expression tree : ");
   inorder(temp);
   printf("\n");
   printf("Preorder Traversal of expression tree : ");
   preorder(temp);
   printf("\n");
   printf("Postorder Traversal of expression tree : ");
   postorder(temp);
   printf("\n");
}
*/
void main(){
   char postfix_exp[20];
   ENODE temp;
   int j, i;
   printf("Enter a postfix expression : ");
   scanf("%s", postfix_exp);
   for(i = 0; postfix_exp[i]!='\0'; i++){
      char ch = postfix_exp[i];
      temp = newnode(ch);
      if(isOperator(ch)){
         ENODE right = pop();
         ENODE left = pop();
         temp -> right = right;
         temp ->left = left;
      }
      push(temp);
   }
   printf("Inorder Traversal of expression tree : ");
   inorder(temp);
   printf("\n");
   printf("Preorder Traversal of expression tree : ");
   preorder(temp);
   printf("\n");
   printf("Postorder Traversal of expression tree : ");
   postorder(temp);
   printf("\n");
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter a postfix expression : 234*-
Inorder Traversal of expression tree : 2-3*4
Preorder Traversal of expression tree : -23*4
Postorder Traversal of expression tree : 234*-

Test Case - 2
User Output
Enter a postfix expression : 1258++*
Inorder Traversal of expression tree : 1*2+5+8
Preorder Traversal of expression tree : *12+5+8
Postorder Traversal of expression tree : 1258++*

Test Case - 3
User Output
Enter a postfix expression : 234*-56**
Inorder Traversal of expression tree : 2-3*4*5*6
Preorder Traversal of expression tree : *-23*45*6
Postorder Traversal of expression tree : 234*-56**

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