11.In a class of Grade 3, Mathematics Teacher asked for the Acronym PEMDAS?. All of them are thinking for a while. A smart kid of the class Kishore of the class says it is Parentheses, Exponentiation, Multiplication, Division, Addition, Subtraction. Can you write a C Program to help the students to understand about the operator precedence parsing for an expression containing more than one operator, the order of evaluation depends on the order of operations

```
#include <stdio.h>

#include <stdlib.h>

#include <ctype.h>

#include <math.h>


int isOperator(char ch) {

   return (ch == '+' || ch == '-' || ch == '*' || ch == '/' || ch == '^');

}


int precedence(char op) {

   switch(op) {

      case '^':

         return 3;

      case '*':

      case '/':

         return 2;

      case '+':

      case '-':

         return 1;

      default:

         return 0;

   }

}
```

```
int applyOp(int a, int b, char op) {
    switch(op) {
        case '+':
            return a + b;
        case '-':
            return a - b;
        case '*':
            return a * b;
        case '/':
            if (b == 0) {
                printf("Error: Division by zero\n");
                exit(EXIT_FAILURE);
            }
            return a / b;
        case '^':
            return (int)pow(a, b);
        default:
            return 0;
    }
}

int evaluate(char *expr) {
    int i;
    int operandStack[100];
    int topOperand = -1;

    char operatorStack[100];
    int topOperator = -1;
```

```
for (i = 0; expr[i] != '\0'; i++) {
    if (expr[i] == ' ')
        continue;

    if (isdigit(expr[i])) {
        int operand = 0;
        while (isdigit(expr[i])) {
            operand = operand * 10 + (int)(expr[i] - '0');
            i++;
        }
        i--;
        operandStack[++topOperand] = operand;
    }
    else if (isOperator(expr[i])) {
        while (topOperator >= 0 && precedence(operatorStack[topOperator]) >= precedence(expr[i])) {
            int b = operandStack[topOperand--];
            int a = operandStack[topOperand--];
            char op = operatorStack[topOperator--];
            int result = applyOp(a, b, op);
            printf("%d %c %d = %d\n", a, op, b, result);
            operandStack[++topOperand] = result;
        }
        operatorStack[++topOperator] = expr[i];
    }
    else if (expr[i] == '(') {
        operatorStack[++topOperator] = expr[i];
    }
    else if (expr[i] == ')') {
        while (topOperator >= 0 && operatorStack[topOperator] != '(') {
```

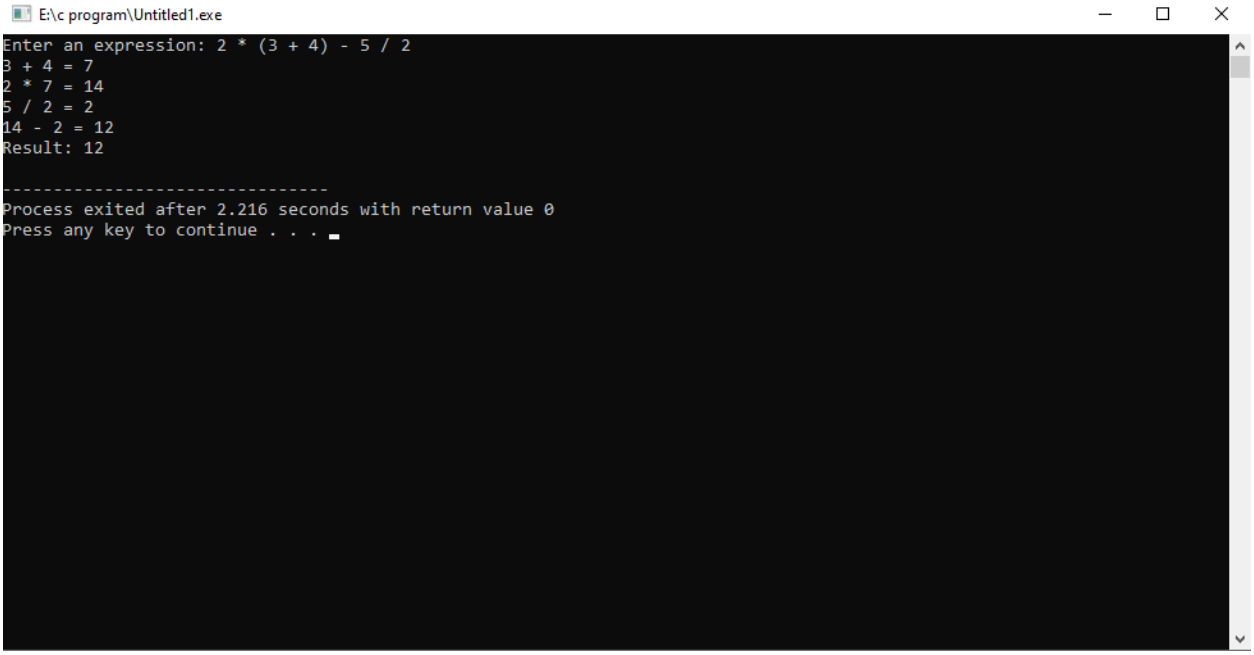
```
            int b = operandStack[topOperand--];
            int a = operandStack[topOperand--];
            char op = operatorStack[topOperator--];
            int result = applyOp(a, b, op);
            printf("%d %c %d = %d\n", a, op, b, result);
            operandStack[++topOperand] = result;
        }
        topOperator--;
    }
  }
  while (topOperator >= 0) {
    int b = operandStack[topOperand--];
    int a = operandStack[topOperand--];
    char op = operatorStack[topOperator--];
    int result = applyOp(a, b, op);
    printf("%d %c %d = %d\n", a, op, b, result);
    operandStack[++topOperand] = result;
  }
  return operandStack[topOperand];
}

int main() {
  char expr[100];
  printf("Enter an expression: ");
  fgets(expr, sizeof(expr), stdin);

  int result = evaluate(expr);
  printf("Result: %d\n", result);
```

```
    return 0;

}
```


E:\c program\Untitled1.exe
Enter an expression: 2 * (3 + 4) - 5 / 2
3 + 4 = 7
2 * 7 = 14
5 / 2 = 2
14 - 2 = 12
Result: 12

Process exited after 2.216 seconds with return value 0
Press any key to continue . . .