Python CODE

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class infix_to_prefix:
    precedence = {'^': 5, '*': 4, '/': 4, '+': 3, '-': 3, '(': 2, ')': 1}
    items = []
    size = -1

    def init(self):
        self.items = []
        self.size = -1

    def push(self, value):
        self.items.append(value)
        self.size += 1

    def pop(self):
        if self.isempty():
            return 0
        else:
            self.size -= 1
            return self.items.pop()

    def isempty(self):
        if(self.size == -1):
            return True
        else:
            return False

    def seek(self):
        if self.isempty():
            return False
        else:
            return self.items[self.size]

    def is0perand(self, i):
        if i.isalpha() or i in '1234567890':
            return True
        else:
            return False
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def reverse(self, expr):
    rev = ""
    for i in expr:
        if i == '(':
            i = ')'
        elif i == ')':
            i = '('
        rev = i+rev
    return rev

def infixtoprefix(self, expr):
    prefix = ""
    print('\nPrefix expression after every iteration is:')
    for i in expr:
        if(len(expr) % 2 == 0):
            print("Incorrect infix expr")
            return False
        elif(self.is0perand(i)):
            prefix += i
        elif(i in '+-*/^'):
            while(len(self.items) and self.precedence[i] < self.precedence[self.seek()]):
                prefix += self.pop()
            self.push(i)
        elif i == '(':
            self.push(i)
        elif i == ')':
            o = self.pop()
            while o != '(':
                prefix += o
                o = self.pop()
        print(prefix)
        # end of for
    while len(self.items):
        if(self.seek() == '('):
            self.pop()
        else:
            prefix += self.pop()
            print(prefix)
    return prefix
```

```
class infix_to_postfix:
    precedence = {'^': 5, '*': 4, '/': 4, '+': 3, '-': 3, '(': 2, ')': 1}
    items = []
    size = -1

    def init(self):
        self.items = []
        self.size = -1

    def push(self, value):
        self.items.append(value)
        self.size += 1

    def pop(self):
        if self.isempty():
            return 0
        else:
            self.size -= 1
            return self.items.pop()

    def isempty(self):
        if(self.size == -1):
            return True
        else:
            return False

    def seek(self):
        if self.isempty():
            return False
        else:
            return self.items[self.size]

    def isOperand(self, i):
        if i in 'ABCDEFGHIJKLMNOPQRSTUVWXYZ':
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            return True
        else:
            return False

    def infixtopostfix(self, expr):
        postfix = ""
        print('\nPostfix expression after every iteration is:')
        for i in expr:
            if(len(expr) % 2 == 0):
                print("Incorrect infix expr")
                return False
            elif(self.isOperand(i)):
                postfix += i
            elif(i in '+-*/^'):
                while(len(self.items) and self.precedence[i] <= self.precedence[self.seek()]):
                    postfix += self.pop()
                self.push(i)
            elif i == '(':
                self.push(i)
            elif i == ')':
                o = self.pop()
                while o != '(':
                    postfix += o
                    o = self.pop()
            print(postfix)
            # end of for
        while len(self.items):
            if(self.seek() == '('):
                self.pop()
            else:
                postfix += self.pop()
        return postfix

OPERATORS = set(['+', '-', '*', '/', '(', ')'])
def generate3AC(pos):
            print("\n\n--- THREE ADDRESS CODE GENERATION --- ")
            exp_stack = []
            t = 1

            for i in pos:
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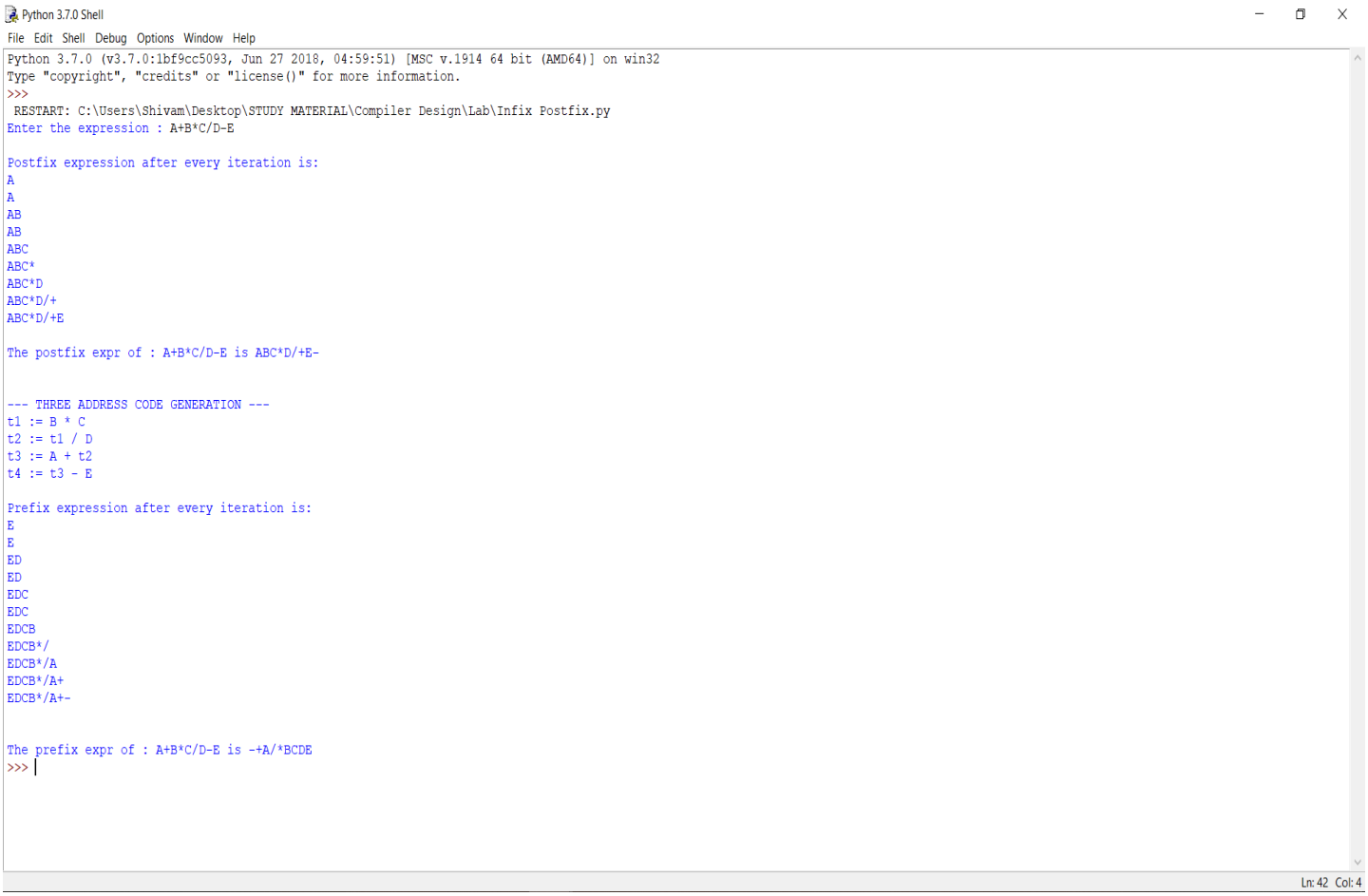
                if i not in OPERATORS:
                        exp_stack.append(i)
                else:
                        print(f't{t} := {exp_stack[-2]} {i} {exp_stack[-1]}')
                        exp_stack=exp_stack[:-2]
                        exp_stack.append(f't{t}')
                        t+=1

s = infix_to_postfix()
expr = input('Enter the expression : ')
result = s.infixtopostfix(expr)
if (result != False):
   print("\nThe postfix expr of :", expr, "is", result)
   generate3AC(result)


k = infix_to_prefix()
rev = ""
rev = k.reverse(expr)
result = k.infixtoprefix(rev)
if (result != False):

   prefix = k.reverse(result)
   print("\n\nThe prefix expr of :", expr, "is", prefix)
```

IMPLEMENTATION



RESULT

Code was successfully implemented and the output was verified.