INFIX TO PREFIX CONVERSION

Exp. No.:
AIM:

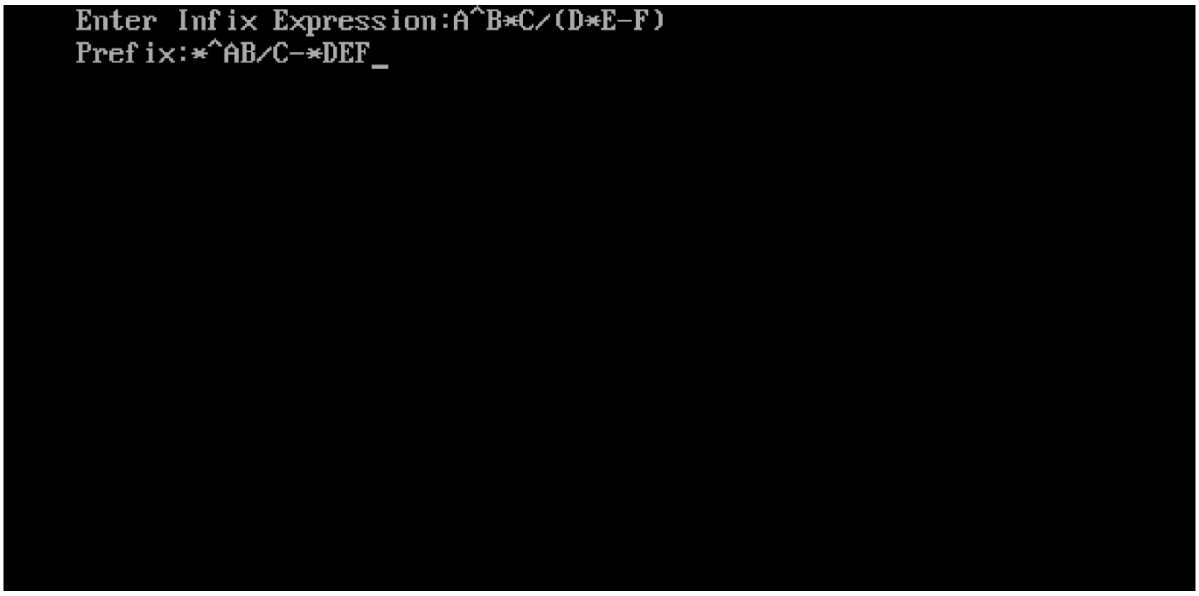
ALGORITHM:

PROGRAM:

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <conio.h>

#define arrSize 100

struct node
{
   unsigned int size;
   int top;
   char *arr;
};
typedef struct node Stack;

Stack *createStack(unsigned int size)
{
   Stack *stack = (Stack *)malloc(sizeof(Stack));
   stack->size = size;
   stack->top = -1;
   stack->arr = (char *)malloc(size * sizeof(char));
   return stack;
}

void push(Stack *stack, char elem)
{
   stack->top++;
   stack->arr[stack->top] = elem;
}

char pop(Stack *stack)
{
   char temp;
   if (stack->top == -1)
   {
      return '\0';
```

```
    }
    else
    {
        temp = stack->arr[stack->top];
        stack->top--;
        return temp;
    }
}

int precedence(char ch)
{
    if (ch == '^')
    {
        return 3;
    }
    else if (ch == '*' || ch == '/')
    {
        return 2;
    }
    else if (ch == '+' || ch == '-')
    {
        return 1;
    }
    else
    {
        return 0;
    }
}

int operator(char ch)
{
    if (ch == '(' || ch == ')' || ch == '[' || ch == ']' || ch == '{' || ch == '}')
    {
        return 2;
    }
    else if (ch == '+' || ch == '-' || ch == '*' || ch == '/' || ch == '^')
    {
        return 1;
    }
    else
    {
        return 0;
    }
}

void reverse(char arr[], char rev[], unsigned int size)
{
    Stack *stack;
    char temp, abc[arrSize];
    int i, pos = 0;
    stack = createStack(size);
    for (i = 0; i < size && arr[i] != '\0'; i++)
    {
        push(stack, arr[i]);
    }
    while (stack->top != -1)
    {
        temp = pop(stack);
        if (temp == '(' || temp == '[' || temp == '{')
        {
            rev[pos] = ')';
        }
        else if (temp == ')' || temp == ']' || temp == '}')
        {
            rev[pos] = '(';
        }
        else
        {
            rev[pos] = temp;
        }
        pos++;
    }
}

int getSize(char arr[])
{
    int i = 0;
    while (arr[i] != '\0')
    {
        i++;
    }
    return i;
}

char * infixToPrefix(char infix[], unsigned int size)
{
    Stack *stack;
    char temp, temp2, rev[arrSize], revExp[arrSize], *prefix;
    int i, pos = 0;
    prefix = (char *)calloc(size, sizeof(char));
    stack = createStack(size);
    reverse(infix, rev, size);
    for (i = 0; i < size; i++)
    {
        temp = rev[i];
        if (operator(temp) == 2)
        {
            if (temp == '(' || temp == '[' || temp == '{')
            {
                push(stack, temp);
            }
            else
            {
                while (stack->top != -1 && (stack->arr[stack->top] != ')' || stack->arr[stack-
>top] != ']' || stack->arr[stack->top] != '}'))
                {
                    temp2 = pop(stack);
                    if (operator(temp2) == 1)
                    {
                        revExp[pos] = temp2;
                        pos++;
                    }
                }
                pop(stack);
            }
        }
        else if (operator(temp) == 1)
        {
            if (precedence(temp) > precedence(stack->arr[stack->top]))
            {
                push(stack, temp);
            }
            else
            {
                while (stack->top != -1 && precedence(temp) <= precedence(stack->arr[stack-
>top]))
                {
                    temp2 = pop(stack);
                    revExp[pos] = temp2;
                    pos++;
                }
                push(stack, temp);
            }
        }
        else
        {
            revExp[pos] = temp;
            pos++;
        }
    }
    while (stack->top != -1)
    {
        revExp[pos] = pop(stack);
        pos++;
    }
    reverse(revExp, prefix, size);
    return prefix;
}

int main()
{
    char infix[arrSize], *prefix;
    int size;
    printf("Enter Infix Expression:");
    gets(infix);
    size = getSize(infix);
    prefix = infixToPrefix(infix, size);
    printf("Prefix:");
    puts(prefix);
    getch();
    clrscr();
    return 0;
}
```

OUTPUT:



```
Enter Infix Expression:A^B*C/(D*E-F)
Prefix:*^AB/C-*DEF_
```

RESULT: