Date

EXPERIMENT - 5

15/04/23 FIRST() AND FOLLOW() COMPUTING IN GIVEN GRAMMAR

DO: 1 Hour: 9:45 to 11:30 am FACULTY:

TP-0071A

AIM: To write a program to implement lexical analysis using C/C++.

ALGORITHM:

FIRST()

To find the first() of grammar symbol, we have to apply following set of rules.

- If x is a terminal

  FIRST(x) is {x}

- If x is a non-terminal, $x \rightarrow a\alpha$

  then add 'a' to first(x).

  if $x \rightarrow \varepsilon$, then add null to FIRST(x).

- If $x \rightarrow YZ$, then if $x \rightarrow \varepsilon$, then add null to FIRST(x).

  FIRST(Y = ε, then FIRST(x) = {FIRST(Y) - ε} $\cup$ {FIRST(Z)}

- If $x \rightarrow YZ$ then if FIRST(x) = Y, then FIRST(Y) = terminal but null then FIRST(x) = FIRST(Y) - terminals

output:

S = AbCd

A = ef

C = gf

A = a

E = h

FIRST (S) = FIRST (A)

= FIRST (C) ∪ FIRST (A)

= {g, a}

FOLLOW (S) = $

FIRST (A) = FIRST {c} ∪ {a}

= {g, a}

FOLLOW (A) = {b}

FIRST (C) = {g}

FOLLOW (C) = {d, f}

FIRST (E) = {h}

FOLLOW (E) = FOLLOW (C)

= {d, f}

o/p

8/

15/2/23

FOLLOW()

To find follow() of a grammer symbol, we have to apply following rules.

- $ is a follow of 'S' (Start symbol)
- If $A \to \alpha B \beta$, $\beta \neq \varepsilon$, first(β) = follow(B)
- If $A \to \alpha B$ or $A \to \alpha B \beta$ where first(β) = ε, then everything in FOLLOW(A) is a follow(B)

PROGRAM:

```
#include<stdio.h>
#include<math.h>
#include<string.h>
int n,m=0,p,i=0,j=0;
char a[10][10],f[10];
void follow(char c);
void first(char c);
int main(){
int i,z;
char c,ch;
printf("Enter no of productions : \n");
scanf("%d",&n);
printf("Enter the productions : \n");
for(i=0;i<n;i++)
scanf("%s%c",a[i],&ch);
do{
m=0;
printf("Enter elements whose first &follow is to be found:");
```

$E \rightarrow TE'$

$E' \rightarrow +TE' \mid \varepsilon$

$T \rightarrow FT'$

$T' \rightarrow *FT' \mid \varepsilon$

$F \rightarrow (E) \mid id$

$FIRST(F) = FIRST(T)$

$= FIRST(F)$

$= \{(, id\}$

$FIRST(E') = \{+, \varepsilon\}$

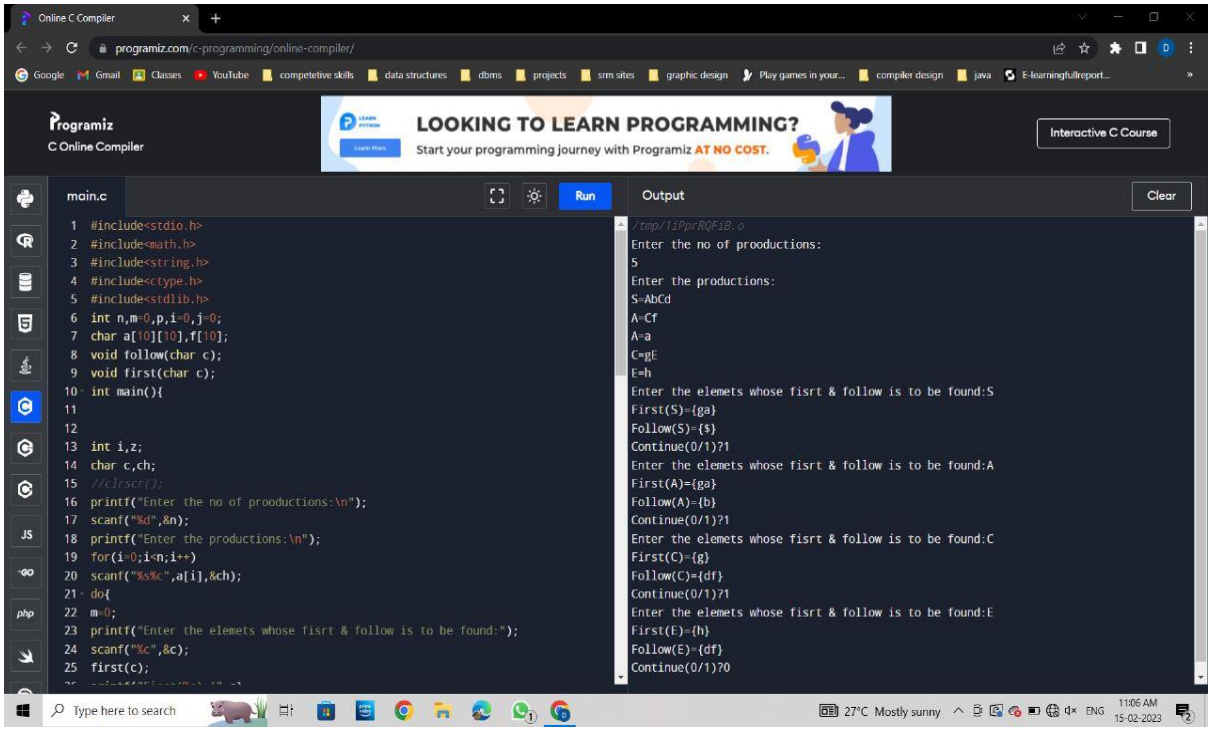
$FIRST(F) = \{(, id\}$

$FIRST(T) = \{(, id\}$

$FIRST(T') = \{*, \varepsilon\}$

```
scanf("%c", &c);
first(c);
printf("First(%c) = {", c);
for(i=0; i<m; i++)
printf("%c", f[i]);
printf("}\n");
strcpy(f, " ");

m=0;
follow(c);
printf("Follow(%c) = {", c);
for(i=0; i<m; i++)
printf("Continue (0/1)? ");
scanf("%d %c", &z, &ch);
} while(z==1);
    return(0);
}
void first(char c){
int k;
if(!isupper(c))
f[m++]=c;
for(k=0; k<n; k++)
{ if(a[k][0]==c) {
if(a[k][2]=='$')
follow(a[k][0]);
else if(islower(a[k][2]))
f[m++]=a[k][2];
else first(a[k][2]); }}}
```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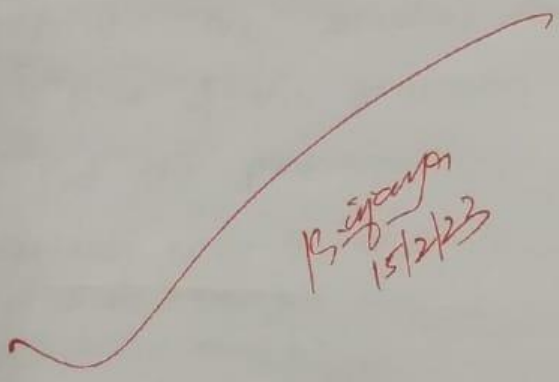
main.c
Run
Output
Clear
#include<stdio.h>
#include<math.h>
#include<string.h>
#include<ctype.h>
#include<stdlib.h>
int n,m=0,p,i=0,j=0;
char a[10][10],f[10];
void follow(char c);
void first(char c);
int main(){
int i,z;
char c,ch;
//clrscr();
printf("Enter the no of prooductions:\n");
scanf("%d",&n);
printf("Enter the productions:\n");
for(i=0;i<n;i++)
scanf("%s%c",a[i],&ch);
do{
m=0;
printf("Enter the elemets whose fisrt & follow is to be found:");
scanf("%c",&c);
first(c);
/tmp/1iPprRQf1B.o
Enter the no of prooductions:
5
Enter the productions:
S=AbCd
A=Cf
A=a
C=gE
E=h
Enter the elemets whose fisrt & follow is to be found:S
First(S)={ga}
Follow(S)={$}
Continue(0/1)?1
Enter the elemets whose fisrt & follow is to be found:A
First(A)={ga}
Follow(A)={b}
Continue(0/1)?1
Enter the elemets whose fisrt & follow is to be found:C
First(C)={g}
Follow(C)={df}
Continue(0/1)?1
Enter the elemets whose fisrt & follow is to be found:E
First(E)={h}
Follow(E)={df}
Continue(0/1)?0
Type here to search
27°C Mostly sunny
ENG
11:06 AM
15-02-2023

```
void follow (char c)
{ if (a[0][0] == c)
f [m++] = '$';
for (i=0; i<n; i++)
{ for (j= 2 ; j< strlen (a [i]); j++)
{ if (a[i] [j] == c)
{
if (a[i] [j+1]!='\0')
first (a[i] [j+1]);
if(a [i][j+1] == '\0' && c!= a[i][0])
follow [a [i][0]);
}
}
```



RESULT: Hence first() and follow() confirmation is executed successfully by running the above c program in the compiler.