LAB EXP 8 : LEADING AND TRAILING

EX. NO. 8
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AIM : A program to implement Leading and Trailing

ALGORITHM :

1. For Leading, check for the first non-terminal.
2. If found, print it.
3. Look for next production for the same non-terminal.
4. If not found, recursively call the procedure for the single non-terminal present before the comma or End Of Production String.
5. Include it's results in the result of this non-terminal.
6. For trailing, we compute same as leading but we start from the end of the production to the beginning.
7. Stop

CODE :

```
#include<iostream.h>
#include<conio.h>
#include<stdio.h>
#include<string.h>
#include<stdlib.h>
int vars,terms,i,j,k,m,rep,count,temp=-1; char
var[10],term[10],lead[10][10],trail[10][10];
struct grammar
{ int prodno;
        char lhs,rhs[20][20];
```

```
}gram[50];
void get()
{ cout<<"\n---------- LEADING AND TRAILING ----------\n";
        cout<<"\nEnter the no. of variables : "; cin>>vars;
        cout<<"\nEnter the variables : \n";
        for(i=0;i<vars;i++)
        { cin>>gram[i].lhs;
                var[i]=gram[i].lhs;
        }
        cout<<"\nEnter the no. of terminals : ";
        cin>>terms;
        cout<<"\nEnter the terminals : ";
        for(j=0;j<terms;j++)
        cin>>term[j];
        cout<<"\n---------- PRODUCTION DETAILS ----------\n";
        for(i=0;i<vars;i++)
        { cout<<"\nEnter the no. of production of "<<gram[i].lhs<<":";
                cin>>gram[i].prodno; for(j=0;j<gram[i].prodno;j++)
                { cout<<gram[i].lhs<<"->";
                        cin>>gram[i].rhs[j];
                }
        } }
void leading()
{
for(i=0;i<vars
;i++)
        { for(j=0;j<gram[i].prodno;j++)
                { for(k=0;k<terms;k++)
                        { if(gram[i].rhs[j][0]==term[k])
                                lead[i][k]=1;
```

```
                        else
                        { if(gram[i].rhs[j][1]==term[k])
                                lead[i][k]=1;
                        }
                }
        }
        for(rep=0;rep<vars;rep++)
        { for(i=0;i<vars;i++)
                { for(j=0;j<gram[i].prodno;j++)
                        { for(m=1;m<vars;m++)
                                { if(gram[i].rhs[j][0]==var[m])
                                        { temp=m; goto
                                                out;
                                        }
                                }
                                out:
                                for(k=0;k<terms;k++)
                                { if(lead[temp][k]==1)
                                        lead[i][k]=1;
                                }
                        }
                }
        }
}
void trailing()
{ for(i=0;i<vars;i++)
        { for(j=0;j<gram[i].prodno;j++)
                { count=0;
```

```
                while(gram[i].rhs[j][count]!='\x0')
                        count++;
                for(k=0;k<terms;k++)
                { if(gram[i].rhs[j][count-1]==term[k])
                        trail[i][k]=1;
                        else
                        { if(gram[i].rhs[j][count-2]==term[k])
                                trail[i][k]=1;
                        }
                }
        }
    }
    for(rep=0;rep<vars;rep++)
    { for(i=0;i<vars;i++)
        { for(j=0;j<gram[i].prodno;j++)
            { count=0;
                while(gram[i].rhs[j][count]!='\x0')
                        count++;
                for(m=1;m<vars;m++)
                { if(gram[i].rhs[j][count-1]==var[m])
                        temp=m;
                }
                for(k=0;k<terms;k++)
                {
                        if(trail[temp][k]==1)
                                trail[i][k]=1;
                }
            }
        }
    } }
void display()
```

```
{ for(i=0;i<vars;i++)
        { cout<<"\nLEADING("<<gram[i].lhs<<") = ";
                for(j=0;j<terms;j++)
                {
                        if(lead[i][j]==1)
                                cout<<term[j]<<",";
                } }
        cout<<endl;
        for(i=0;i<vars;i++)
        { cout<<"\nTRAILING("<<gram[i].lhs<<") = ";
                for(j=0;j<terms;j++)
                {
                        if(trail[i][j]==1)
                                cout<<term[j]<<",";
                }
        } }
void main()
{
        clrscr();
        get();
        leading();
        trailing();
        display();
        getch();
}
```

OUTPUT :

```
------------- LEADING AND TRAILING ---------------

Enter the no. of variables : 3

Enter the variables :
E
T
F

Enter the no. of terminals : 5

Enter the terminals : )
(
*
+
i

------------- PRODUCTION DETAILS -----------------

Enter the no. of production of E:2
E->E+T
E->T

Enter the no. of production of T:2
T->T*F
T->F

Enter the no. of production of F:2
F->(E)
F->i

LEADING(E) = (,*,+,i,
LEADING(T) = (,*,i,
LEADING(F) = (,i,

TRAILING(E) = ),*,+,i,
TRAILING(T) = ),*,i,
TRAILING(F) = ),i,
```

RESULT :

The program was successfully compiled and run.