



**S. B. JAIN INSTITUTE OF TECHNOLOGY,
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Practical No. 3

AIM: Develop and design a program to find out FIRST () and FOLLOW () of all the Non-Terminals of the given context free grammar.

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AIM: Develop and design a program to find out FIRST () and FOLLOW () of all the Non-Terminals of the given context free grammar.

OBJECTIVE / EXPECTED LEARNING OUTCOME:

The objectives and expected learning outcome of this practical are:

- To summarize the significance of calculation of FIRST () and FOLLOW () of CFG.
- To build a program for calculation of FIRST () and FOLLOW () of CFG.

HARDWARE AND SOFTWARE REQUIREMENTS:

Hardware Requirement:

- Processor: Dual Core
- RAM: 1GB
- Hard Disk Drive: > 80 GB

THEORY:

1) Need of FIRST () and FOLLOW () in predictive parser

2) Definition of FIRST () and FOLLOW ()

3) Example to demonstrate the computation of FIRST () and FOLLOW ()

4) Applications of FIRST () and FOLLOW ()

ALGORITHM / PROCEDURE:

CODE:

```

#include <stdio.h>
#include <string.h>
#include <stdbool.h>

// Check for FIRST/FIRST conflicts
bool hasFirstFirstConflict(char firstA[][10], int n) {
    for (int i = 0; i < n; i++)
        for (int j = i + 1; j < n; j++)
            if (strcmp(firstA[i], firstA[j]) == 0)
                return true;
    return false;
}

// Check for FIRST/FOLLOW conflicts
bool hasFirstFollowConflict(char firstA[][10], int n, char followA[]) {
    for (int i = 0; i < n; i++)
        if (strchr(followA, firstA[i][0]))
            return true;
    return false;
}

int main() {
    int n;
    printf("Enter the number of productions for A: ");
    scanf("%d", &n);

    char firstA[n][10], followS[10], followA[10];
    printf("Enter the FIRST set elements for A:\n");
    for (int i = 0; i < n; i++) {
        printf("FIRST(A%d): ", i + 1);
        scanf("%s", firstA[i]);
    }

```

```

    printf("Enter the FOLLOW set for S: ");
    scanf("%s", followS);
    printf("Enter the FOLLOW set for A: ");
    scanf("%s", followA);

    printf("\nFIRST(A): { ");
    for (int i = 0; i < n; i++)
        printf("%s%s", firstA[i], (i == n - 1) ? " " : ", ");
    printf("\nFOLLOW(S): { %s } \nFOLLOW(A): { %s } \n", followS, followA);

    if (hasFirstFirstConflict(firstA, n))
        printf("FIRST/FIRST conflict detected! Grammar is not LL(1).\n");
    else if (hasFirstFollowConflict(firstA, n, followA))
        printf("FIRST/FOLLOW conflict detected! Grammar is not LL(1).\n");
    else
        printf("The grammar is LL(1).\n");

    return 0;
}

```

OUTPUT:

```
csc15@linux-p2-1272il:~/CS22130$ cc Practical3.c
csc15@linux-p2-1272il:~/CS22130$ ./a.out
Enter the number of productions for A: 2
Enter the FIRST set elements for A:
FIRST(A1): c
FIRST(A2): ε
Enter the FOLLOW set for S: $
Enter the FOLLOW set for A: b

FIRST(A): { c, ε }
FOLLOW(S): { $ }
FOLLOW(A): { b }
The grammar is LL(1).
csc15@linux-p2-1272il:~/CS22130$
```

CONCLUSION:

DISCUSSION AND VIVA VOCE:

- Q1: What is the significance to calculate FIRST () and FOLLOW () of CFG?
- Q2: What is the output of FIRST () and FOLLOW () function?
- Q3: Can we calculate FIRST () and FOLLOW () for left recursive CFG?
- Q4: Is it necessary to calculate FIRST () and FOLLOW () of CFG for parsing technique?
- Q5: In which type of Parser FIRST () and FOLLOW () is used?

REFERENCE:

- <http://www.indiastudychannel.com/resources/150257-Compiler-Design-Lab-Programs-B-Tech-Computer.aspx>
- Book: Compiler Design by O.G. Kakde, Laxmi Publications, 2006