Assignment 1 (CLA 1)

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1. **Write a program in C to calculate of gradation of student marks considering the following scenario. Obtained marks < 40 → Fail, Obtained marks < 50 → 'D' grade, Obtained marks < 60 → 'C' grade, Obtained marks < 70 → 'B' grade, Obtained marks < 80 → 'A' grade, Obtained marks < 90 → 'A+' grade, Obtained marks <= 100 → 'O' grade.**

```c
#include <stdio.h>
int main()
{
    int marks;
    printf("Enter the marks: ");
    scanf("%d", &marks);
    if (marks < 40)
    {
        printf("Fail");
    }
    else if (marks < 50)
    {
        printf("D grade");
    }
    else if (marks < 60)
    {
        printf("C grade");
    }
```

```
    else if (marks < 70)
    {
        printf("B grade");
    }
    else if (marks < 80)
    {
        printf("A grade");
    }
    else if (marks < 90)
    {
        printf("A+ grade");
    }
    else if (marks <= 100)
    {
        printf("O grade");
    }
    else
    {
        printf("Invalid marks");
    }
    return 0;
}
```

2. Design the CFG for the above program.

1. Prog -> Stmts $
2. Stmts -> Stmt Stmts
3. Stmts -> ε
4. Stmt -> Decl
5. Stmt -> Input
6. Stmt -> Output
7. Stmt -> If_Else

8. Decl -> Datatype Varlist ;
9. Datatype -> int
10. Varlist -> Var
11. Var -> id
12. Input -> read Var ;
13. Output -> printf (String) ;
14. If_Else -> if Condition then Stmts Else_if
15. Else_if -> elseif Condition then Stmts Else_if
16. Else_if -> ε
17. Condition -> Var ROp Var
18. ROp -> ==
19. ROp -> !=
20. ROp -> >
21. ROp -> <
22. ROp -> <=
23. ROp -> >=
24. String -> "O Grade"
25. String -> "A+ Grade"
26. String -> "A Grade"
27. String -> "B Grade"
28. String -> "C Grade"
29. String -> "D Grade"
30. String -> "Fail"
31. Num -> [0-9]
32. Digit -> [0-9]

3. Design an LL(1) parsing table using the above grammar.

PREDICT(Prog) = {int, read, printf, if, ε}
PREDICT(Stmts) = {int, read, printf, if, ε}

PREDICT(Stmt) = {int, read, printf, if}
PREDICT(Decl) = {int}
PREDICT(Datatype) = {int}
PREDICT(Varlist) = {id}
PREDICT(Var) = {id}
PREDICT(Input) = {read}
PREDICT(Output) = {printf}
PREDICT(String) = {"O Grade", "A+ Grade", "A Grade", "B Grade", "C Grade", "D Grade", "Fail"}
PREDICT(If_Else) = {if, then}
PREDICT(Else_if) = {elseif, int, read, printf, if, $, else, then}
PREDICT(Condition) = {id}
PREDICT(ROp) = {==, !=, >, <, <=, >=}
PREDICT(Num) = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
PREDICT(Digit) = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}

	int	read	printf	if	elseif	else	then	id	==	!=	>	<	<=	>=	0-9	ε
Prog	1	1	1	1												1
Stmts	2	2	2	2												2
Stmt	4	5	6	7												
Decl	8															
Datatype	9															
Varlist								10								

Var								11								
Input		12														
Ouput			13													
String																
If_Else				14			15									
Else_If		15	15	15	15	15	15									16
Condition								17								
ROp									18	19	20	21	22	23		
Num															31	
Digit															32	