System Software (CS306)

Assignment - 10

U19CS012

1.) Write a Program for implementing a **Calculator** for computing the given **Expression** using semantic rules of the **YACC** tool and **LEX**.

Lex File (q1.l)

```
%{
#include<stdio.h>
#include "y.tab.h"
extern int yylval;
%}

%%
[0-9]+ { yylval=atoi(yytext); return NUMBER;}
[\t] ;
[\n] return 0;
. return yytext[0];
%%

int yywrap()
{
    return 1;
}
```

YACC File (q1.y)

```
%{
#include<stdio.h>
int flag=0;
%}

%token NUMBER
/* Left Associative */
%left '+' '-'
%left '*' '/' '%'
%left '(' ')'

%%

Expression: E{ printf("\nResult = %d\n", $$);return 0;};

E : E'+'E {$$=$1+$3;}
  | E'-'E {$$=$1-$3;}
  | E'*'E {$$=$1*$3;}
```

```
  | E'/'E {$$=$1/$3;}
  | E'%'E {$$=$1%$3;}
  | '('E')' {$$=$2;}
  | NUMBER {$$=$1;};

%%

//driver code
void main()
{
    printf("\nEnter Expression:\n");

    yyparse();

    if(flag==0)
        printf("\nArithematic Expression is Valid\n\n");
}

void yyerror()
{
    printf("\nArithematic Expression is Invalid\n\n");
    flag=1;
}
```

Output

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ yacc -d q1.y
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ lex q1.l
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ gcc lex.yy.c y.tab.c -w
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ ./a.out

Enter Expression:
(2*3+4)%6

Result = 4

Arithematic Expression is Valid
```

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ yacc -d q1.y
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ lex q1.l
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ gcc lex.yy.c y.tab.c -w
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SSLAB10/q1$ ./a.out

Enter Expression:
(2*3+4/2+(3*2))/7

Result = 2

Arithematic Expression is Valid
```

2.) Write a **YACC** program to recognize Validity of a Nested 'IF' control statement and display levels of nesting in the nested if.

Lex File

```
%{
#include "y.tab.h"
%}

%%

"if" {return IF;}

[sS][0-9]* {return S;}

"<"|">"|"=="|"<="|">="|"!=" {return RELOP;}

[0-9]+ {return NUMBER;}

[a-z][a-zA-Z0-9_]* {return ID;}

\n {return NL;}

. {return yytext[0];}

%%
```

YACC File

```
%{
#include<stdio.h>
#include<stdlib.h>
int count=0;
%}

%token IF RELOP S NUMBER ID NL

%%
stmt: if_stmt NL {printf("No. of Nested IF Statements = %d\n",count); exit(0);}

;
if_stmt : IF'('cond')''{'if_stmt'}' {count++;}
        | S
;
cond: x RELOP x
;
x : ID | NUMBER
;
```

```
%%

int yyerror(char *msg)
{
    printf("The Statement is Invalid\n");
    exit(0);
}

void main()
{
    printf("Enter the Statement : \n");

    yyparse();
}
```

Output

Note: Only IF Statements along with **Right Parenthesis** Needs to be entered.

For Statement, use '**s**'.

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SS_LAB10$ cd q2/
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SS_LAB10/q2$ yacc -d q2.y
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SS_LAB10/q2$ lex q2.l
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SS_LAB10/q2$ cc y.tab.c lex.yy.c -ll
```

```
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SS_LAB10/q2$ ./a.out
Enter the Statement :
if(x>y){s}
No. of Nested IF Statements = 1
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SS_LAB10/q2$ ./a.out
Enter the Statement :
if(x>y){if(y>z){s}}
No. of Nested IF Statements = 2
bhagya@LAPTOP-1723NVO9:/mnt/c/Users/Admin/Desktop/SS_LAB10/q2$ ./a.out
Enter the Statement :
if(x>y){if(y>z){if(z>w){s}}}
No. of Nested IF Statements = 3
```

SUBMITTED BY: U19CS012

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