

EXP NO: 06

DATE:

**EVALUATE THE EXPRESSION THAT TAKES DIGITS, *,
+ USING LEX AND YACC**

AIM:

To design and implement a **LEX and YACC program** that evaluates arithmetic expressions containing **digits, +, and *** while following operator precedence rules.

ALGORITHM:

- Using the flex tool, create lex and yacc files.
- In the definition section of the lex file, declare the required header files along with an external integer variable yylval.
- In the rule section, if the regex pertains to digit convert it into integer and store yylval. Return the number.
- In the user definition section, define the function yywrap()
- In the definition section of the yacc file, declare the required header files along with the flag variables set to zero. Then define a token as number along with left as '+', '-',
, 'or', '*', '/', '%' or '(')'
- In the rules section, create an arithmetic expression as E. Print the result and return zero.
- Define the following:
 - E: E '+' E (add)
 - E: E '-' E (sub)
 - E: E '*' E (mul)
 - E: E '/' E (div)
- o If it is a single number return the number.
- In driver code, get the input through yyparse(); which is also called as main function.
- Declare yyerror() to handle invalid expressions and exceptions.
- Build lex and yacc files and compile.

PROGRAM:

Digits.l

```
%{  
#include "digits.tab.h"  
extern int yylval;  
%}  
  
%%  
  
[0-9]+ { yylval = atoi(yytext); return NUMBER; }  
[ \t\n] ; // Skip whitespace  
. { return yytext[0]; }
```

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%%

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

Digits.y

```
%{  
#include <stdio.h>  
#include <stdlib.h>  
int yylex();  
void yyerror(char *msg); // Declared as void to match definition  
%}
```

```
%token NUMBER  
%left '+' '-'  
%left '*' '/'
```

%%

```
S: E {  
    printf("Result = %d\n", $1);  
    return 0;  
};
```

```
E: E '+' E { $$ = $1 + $3; }  
  | E '-' E { $$ = $1 - $3; }  
  | E '*' E { $$ = $1 * $3; }  
  | E '/' E {  
      if ($3 == 0) {  
          printf("Error: Division by zero\n");  
          exit(1);  
      }  
      $$ = $1 / $3;  
  }  
  | '(' E ')' { $$ = $2; }  
  | NUMBER { $$ = $1; }  
;
```

%%

```
int main() {  
    printf("Enter an arithmetic expression:\n");  
    yyparse();  
    return 0;  
}
```

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```
void yyerror(char *msg) {  
    printf("Syntax Error: %s\n", msg);  
}
```

OUTPUT :

```
lex expr.l  
yacc -d expr.y  
gcc lex.yy.c y.tab.c -o expr_eval  
./expr_eval  
Enter an arithmetic expression: 3 + 5 * 2  
Result: 13
```

RESULT:

Thus the above program to evaluate the expression that takes digits, *, + using lex and yacc has been implemented and executed successfully based on the precedence.