

Indian Institute of Technology, Kharagpur
Department of Computer Science and Engineering

CS39003 COMPILERS LABORATORY Autumn 2022-23

Date: 27-Oct-2022

Duration: 45 mins (4pm-4:45pm)

Lab Quiz 2
Full marks: 20

Answer all the questions

1 Consider the following lexical grammar

token:

keyword | *identifier* | *constant* | *punctuator*

keyword: one of

int real

identifier:

identifier-nondigit | *identifier identifier-nondigit* | *identifier digit*

identifier-nondigit: one of

_ a b c d e f g h i j k l m n o p q r s t u v w x y z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

digit: one of

0 1 2 3 4 5 6 7 8 9

constant:

non-zero-constant | **0**

non-zero-constant:

nonzero-digit | *non-zero-constant digit*

nonzero-digit: one of

1 2 3 4 5 6 7 8 9

sign: one of

+ -

punctuator: one of

= ;

and the corresponding Flex specification as coded below:

```
%{ /* C Declarations and Definitions */
%}
INT      "int"
ID       [a-z][a-z0-9]*
REAL     "real"
PUNC     [;]
CONST    [1-9][0-9]*
WS       [ \t\n]
%%
{INT}    { printf("<KEYWORD, int>\n"); /* Keyword Rule */ }
{ID}     { printf("<ID, %s>\n", yytext); /* Identifier Rule */ }
{REAL}   { printf("<KEYWORD, real>\n"); /* Keyword Rule */ }
"="      { printf("<ASSIGNMENT>\n"); /* Punctuator Rule */ }
{PUNC}   { printf("<SEMICOLON>\n"); /* Punctuator Rule */ }
{CONST}  { printf("<CONSTANT, %s>\n", yytext); /* Constant Rule */ }
```

```
{WS}      /* White-space Rule */;  
\n|.      /* Ignore Rule */;  
%%
```

(a) Write the output of the Flex specification for the following input: [5]

```
int id1;  
real id2;  
id1 = 12;  
id2 = 0;
```

(b) Is the output correct according to the lexical grammar? If not, explain the problem(s) and accordingly correct the Flex specification. [5]

2 (a) Elaborate with a Bison code snippet how the ambiguity of a programmable calculator grammar (with ambiguous grammar consisting of all usual unary and binary operators with their usual meaning) can be handled. [9]

(b) To achieve it, is there any change required at the Flex specifications compared to a simple calculator grammar? [1]
