ICOM 4036 Assignment 16 (and 17 and 18 and 19)

Objectives:
Develop a simple lexical and syntax analyzer

This assignment is designed based on the problem exercises of Pages 186 and 187 of textbook.

Part A)
Extend the state diagram of Slide 389 to also recognize both of the following features:
  I) In addition to recognizing integer literals, recognizes floating point literals of C-based programming languages.
  II) Comments of the C-based programming languages, those that begin with /* and end with */

Draw the new state diagram here:

State Diagram:
Part B)
Write and test the code to implement the state diagram of Part A. Your code here:

Lexical Analyzer:
Part C)

Assume a very simple language that is based on the following grammar

\[
\begin{align*}
\text{<program>} & \rightarrow \{\text{<comment>} \mid \text{<expr>}\} \\
\text{<expr>} & \rightarrow \text{<term>} \{(+ \mid -) \text{<term>}\} \\
\text{<term>} & \rightarrow \text{<factor>} \{(\ast \mid /) \text{<factor>}\} \\
\text{<factor>} & \rightarrow \text{id} \mid \text{int\_constant} \mid \text{float\_constant} \mid (\text{<expr>} )
\end{align*}
\]

In particular, each program in this simple language is any combination of zero or more comments or simple expressions. Assume comments follow the form specified in Part A.

Write a recursive-descent parsing subprogram that parses the language generated by the above grammar. Your parser is required to accept an input which is a file containing an arbitrary program, and prints “error” if a syntax error is detected; otherwise, prints “accept”.

Syntax Analayzer:
Important NOTES:

- **Note 1.** Your submission must follow the above templates provided for each part.
- **Note 2.** It is extremely important that you develop **YOUR OWN CODE** and explain the results **IN YOUR OWN WORDS.** Answers that are very similar to those of other students or other resources are not accepted and can seriously and negatively impact your grade.
- **Note 3 (Marking scheme).** This assignment has 400 marks and for every part that you do not provide the answer or the provided answer is incorrect you will lose 200 marks. This means—for instance—if you provide correct answers for 1 part and leave the remaining 2 parts blank (or incorrect answers), **you will get nothing (no bonus point)!**
- **Note 4:** Make a copy of your answers for your own reference, as assignments will not be returned to you.
- **Note 5:** For this assignment, your submission must be typed (not handwritten).

This assignment has only 1 stage with the following deadline:

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Hand in your answers in the beginning of class on Tuesday, April 27.

IMPORTANT NOTE: ALL students have to hand in this assignment. This means even if you do not want to get any bonus point for this assignment, you **STILL** need to hand in to me a blank paper that you have your full name on it.

**Deadline: Tuesday, April 27, in class (either at 12:30PM in S205 or at 5:00PM in S204).**

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**** Note the deadlines (dates and times) are firm. Please plan ahead. ****