SRN: _ _ _ _ _ _ _ _ _ _ _ _

PES University, Bangalore

(established under Karnataka Act No. 16 of 2013)

Assignment 1

B. Tech. 4th Semester, Feb. 2020

UE18CS254: Theory of Computation

All questions to be answered **Max. marks: 10**

Candidate Name: _____

1. (a) Consider a finite automaton for a language over the symbol set $\Sigma = \{a, b\}$. One of the automaton's state has a single outgoing transition, which is on the symbol a. The automaton: (1½)

   A. must be a DFA B. must be an NFA C. could be either NFA or DFA D. depends upon other states

   (b) Briefly justify your choice above. (1½)

2. Show that for every finite automaton, there exists another finite automaton that accepts the same language but has only one final state. (2)

3. In your answer, use only the standard (not extended) syntax for regular expressions, except for '?' which you may use. Write down the smallest regular expression you can for each of the following languages (each language is over the symbol set $\Sigma = \{a, b\}$):

   (a) even number of a's (1)

   (b) have atmost two a's (1)

   (c) a and b alternate (1)

4. Write the regular expression for a language whose strings are email addresses. The ID part (before the '@') can contain an arbitrary number (greater than zero) of only uppercase letters and numerals, but the domain part (after the '@') must contain only lowercase letters and should be composed of two parts (separated by '.' symbol) with latter part being only one of com, net or org, and each part having at least one symbol. You can use the extended regular expression syntax from section 4.9 of the textbook by Kavi Mahesh. (2)