B. COMPUTER SCIENCE AND ENGINEERING 4th YEAR 1st SEMESTER 2019 OLD
Formal Languages and Automata Theory (OLD)

Time: 3 hours   Full Marks: 100

Answer any *five* questions

1(a) State the Pumping lemma for Regular languages.

(b) Prove that $\{0^n 1^n \mid n \geq 1\}$ is not regular.
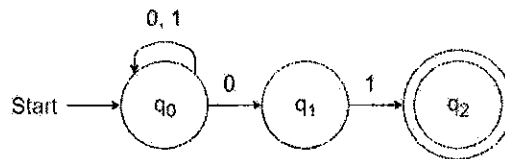
6+14

2(a) Give a Regular Expression (RE) defining all binary strings that do not contain three or more consecutive 1's.

(b) Prove that for every RE, there is an automaton that accepts the language defined by the RE.

10+10

3 (a) Give a DFA for $\Sigma = \{0,1,2\}$ that accepts any string with 001 as a substring.

(b) Give the language accepted by the following NFA.

Construct a DFA equivalent to the NFA, shown above .

6+(4+10)

4. Let L_1, L_2 be two languages accepted by DFA's. Prove that the following languages are also accepted by DFA's:

a) $L_1 \cup L_2$

b) $L_1 \cap L_2$

c) $L_1 - L_2$

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5. Develop grammars that accept the following languages. Also give the necessary proof for each grammar.

a) All strings over a,b that are not palindromes.

b) All strings over a,b that contain same number of a's and b's.

10+10

6. Prove that for every Non Deterministic Push Down Automata (NPDA) accepting some language L by empty stack, there is an equivalent NPDA accepting the same language L by final states.

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