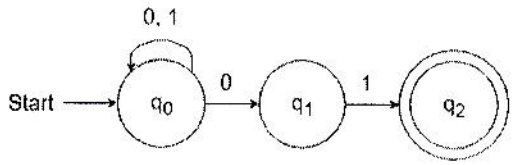
B.E COMPUTER SCIENCE AND ENGINEERING 4th YEAR 1st SEMESTER
SUPPLEMENTARY EXAMINATION 2018 (OLD)
Formal Languages and Automata Theory

Time: 3 hours Full Marks: 100

Answer any ***five*** questions

1 (a) Give a DFA for ∑={a,b,c} that accepts any string with aab as a substring.
(b) Give the language accepted by the following NFA.



Construct a DFA equivalent to the NFA, shown above .

6+(4+10)

2(a) State and prove the Pumping lemma for regular languages. Explain its significance.
(b) Show that $\{0^n 1^n \mid n \geq 1\}$ is not regular.

12 + 8

3(a) Develop a Regular Expression (RE) for 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

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.

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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