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BICS-010

B.Tech. – VIEP – COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

00255

December, 2014

BICS-010 : FORMAL LANGUAGES AND AUTOMATA

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions.*

1. Solve the following problems :

(a) Design a DFA machine that accepts the language divisible by 5 over the input alphabets $\Sigma = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$. *5*

(b) Design a DFA for the set of all strings over 0's and 1's such that it contains at least one 0 and exactly two 1's. *5*

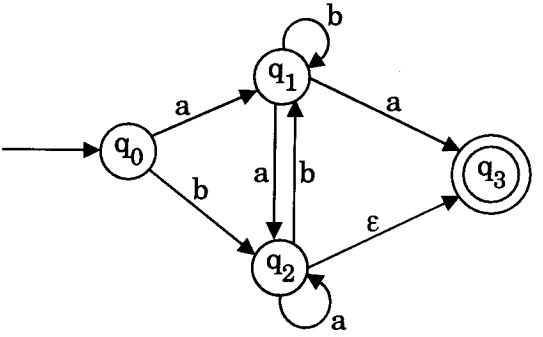
2. Prove that the following language is not a CFL by pumping lemma : *10*

$$L = \{WW : W \in \{0, 1\}^*\}$$

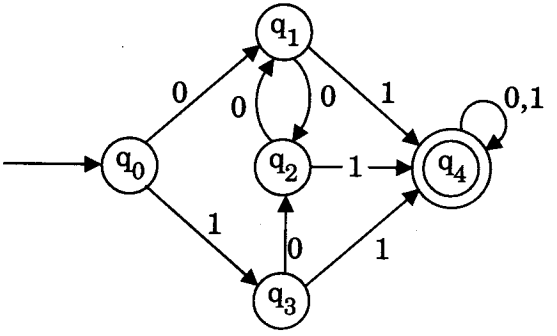
3. Convert the following Moore machine into Mealy machine. *10*

State/Σ	0	1	Output
A (Start)	A	B	0
B	A	C	0
C	A	C	1

4. Convert the following Finite Automata (FA) to Regular Language. *10*



5. Minimize the following Finite Automata (FA). *10*



6. For the following grammar : *10*

$S \rightarrow aaB \quad A \rightarrow aBb/\varepsilon \quad B \rightarrow Aa$

construct derivation tree for the string aaaaba and also show whether the above grammar is ambiguous or not.

7. Construct Deterministic Push Down Automata (DPDA) for $L = \{W \subset W^R : W \in \{a, b\}^*\}$. *10*

8. Design a Turing Machine for

$$L = \{a^n b^n c^n \mid n > 0\}.$$ *10*

9. Explain various types of Turing Machines and languages of Turing Machines. *10*

10. Write short notes on any ***two*** of the following : *2×5=10*

    (a) Reducibility

    (b) Chomsky Hierarchy

    (c) Myhill-Nerode Theorem