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BICS-010

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

Term-End Examination

00744

June, 2014

BICS-010 : FORMAL LANGUAGES AND AUTOMATA

Time : 3 hours *Maximum Marks : 70*

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

1. Design a DFA over $\Sigma = \{0, 1\}$ for the following language :

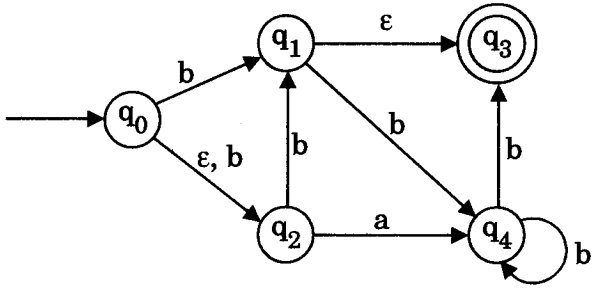
(a) The set of all strings of 0's and 1's that contain at least one occurrence of the sub-strings 00 and 11. *5*

(b) The set of all strings of 0's and 1's that contain even number of 0's or odd number of 1's. *5*

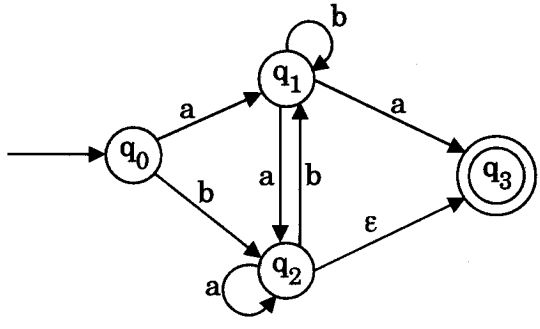
2. Prove that the following language is not Regular by Pumping Lemma :

$L = \{0^K 1^K 0^K$, for all $K >= 0\}$ *10*

3. Convert the following NFA – ε transition to DFA. *10*



4. Convert the following Finite Automata to Regular language. *10*



5. Minimize the states of the following machines : *10*

State/Σ	0	1
A (Start)	B	E
B	C	F
C (Final)	D	H
D	E	H
E	F	I
F (Final)	G	B
G	H	B
H	I	C
I (Final)	A	E

6. Simplify the following context free grammars : *10*

$S \rightarrow a / Xb / aYa$

$A \rightarrow aASb / a$

$X \rightarrow Y / \varepsilon$

$B \rightarrow bS$

$Y \rightarrow b / X$

7. Construct Deterministic Push Down Automata (DPDA) for $L = \{a^n b^{2n} : n >= 0\}$ *10*

8. Design a Turing Machine for the language $L = \{WW^R : W \in \{a, b\}^*\}$ *10*

9. Explain the following :

   (a) Halting Problem *5*

   (b) Variations of Turing Machine *5*

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

    (a) Undecidability

    (b) Chomsky Hierarchy

    (c) CYK Algorithm