No. of Printed Pages : 3 **BICS-010**

00301

B.Tech. COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

December, 2013

BICS-010 : FORMAL LANGUAGES AND AUTOMATA

Time : 3 hours *Maximum Marks : 70*

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

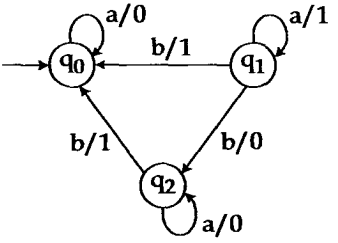
1. (a) Design a finite automata to accept the language L over {a,b} such that $L=\{a^n b^m \mid n,m \geq 1 \text{ and } n+m \text{ is even}\}$ 5

   (b) Design a DFA over {0,1} to accept all string ending in 01 or 10. 5

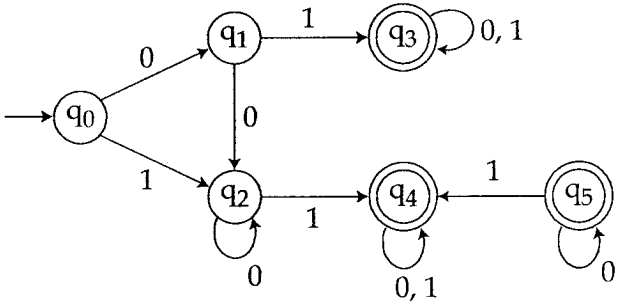
2. (a) Using pumping lemma prove that the language $L=\{\omega \mid \omega$ is a palindrome over {0, 1}} is not regular. 5

   (b) Design a DFA for the regular expression $|^*(10)^*|^*$. 5

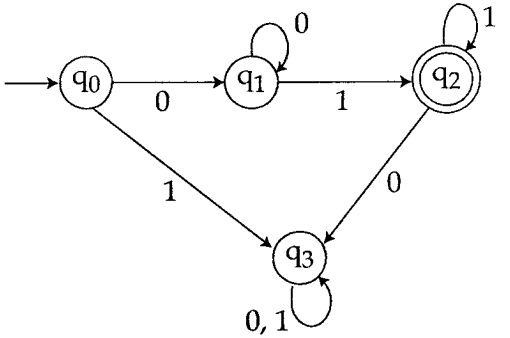
3. (a) Differentiate between Moore and Mealy machine and convert the given following Mealy machine into Moore machine 5



(b) Construct a minimum state automaton equivalent to the given transition diagram. 5



4. (a) Find the regular expression for given transition diagram. 5



(b) Construct a DFA with reduced state equivalent to the regular expression $r = 10 + (00 + 1)0^*10$ 5

5. (a) What is pumping lemma for Regular expression ? Show that the set $L = \{a^{n^2} \mid n \geq 0\}$ is not regular. 5

(b) What is context free grammar ? Construct context free grammar (CFG) that generates language $L = \{WCW^R \mid W \epsilon (a, b)^*\}$ **2+3**

6. (a) Differentiate between Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) and convert the given CFG. **5**

$S \rightarrow aSa$

$S \rightarrow SSa$

$S \rightarrow a$

into Chomsky Normal Form (CNF).

(b) Show that language $L = \{0^n 1^n 2^n \mid n \geq 1\}$ is not context free language. **5**

7. (a) Differentiate between deterministic CFL and deterministic PDA with suitable example. **5**

(b) Prove that NDFA = DFA **5**

8. Design a push down automata (PDA) which recognize the string of the type $\{0^n 1^{2n+1} \mid n \geq 0\}$. **10**

9. Design a Turing machine which convert '111' to '011'. **10**

10. Write short notes on **any two** of the following : **10**

(a) Recursive and recursively enumerable languages

(b) Universal Turing machine

(c) Church Thesis.