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

B.Tech. IN COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

December, 2011

BICS-010 : FORMAL LANGUAGES AND AUTOMATA

01292

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt 5 questions out of 7 questions. Question No. 7 is* ***compulsory****. Each question* ***carry equal*** *marks.*

1. (a) Construct the grammar for following language : 7

(i) $L = \{wcw^r \mid w \in \{a, b\}^*\}$

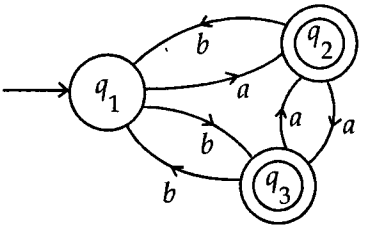
(ii) $L = \{w \mid w \in \{a, b\}^*$ and $n_a(w) = n_b(w)\}$

(b) Construct the DFA for following language 7

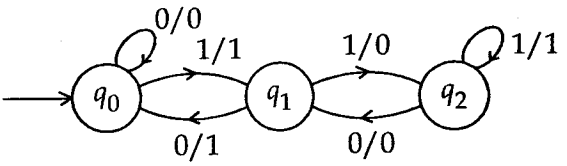
(i) The set of all string over {0, 1} that begins and end with same symbol.

(ii) The set of all string over {0, 1} in which no 0 is followed immediately by 1.

2. (a) Find the language accepted by following automata. 7



(b) Differentiate between Melay and Moore Machine. Construct the Moore Machine from following Melay Machine 7



3. (a) Prove NFA = DFA 7

(b) Prove by using pumping lemma that $L = \{a^p \mid p$ is prime number$\}$ is not regular. 7

4. (a) Reduce the following grammar : 7

$S \rightarrow a \mid AB \mid D$

$A \rightarrow a \mid aA$

$B \rightarrow bB \mid aB$

$C \rightarrow dC \mid d$

(b) Construct a PDA for the language 7

$L = \{ww^R \mid w \in \{a, b\}^*\}$

5. (a) Define Turing machine mathematically. Construct Turing machine for the language $L = \{a^n b^n c^n \mid n \geq 1\}$. 7

(b) Prove that a language is recursively enumerable if and only if its complement is recursively enumerable. 7

6. (a) Prove that halting problem of Turing machine is undecidable. 7

(b) Show that sum function : $f(m, n) = m + n$ is primitive recursive. 7

7. Write short note on following. Attempt ***any four*** : 14

(a) Post correspondence problem

(b) Chomsky hierarchy of language

(c) Myhill - Nerode theorem

(d) Church thesis

(e) CYK algorithm