**Code No: CT1508** **R14**

## II B. Tech I Semester Regular Examinations, November 2015

# FORMAL LANGUAGES AND AUTOMATA THEORY

**(Computer Science and Engineering)**

**Time: 3 Hours** **Max. Marks: 60**

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**Note:** All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **Part-B.** All Questions carry equal Marks.

## PART-A

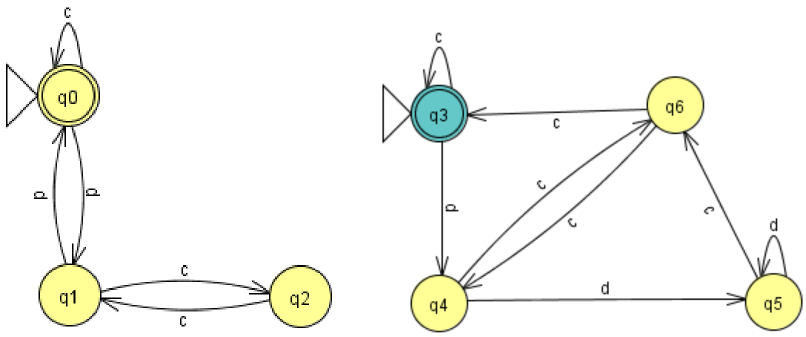
**6 × 2 = 12M**

1. Draw the Finite state machine for accepting the languages Ɛ and Ø.
2. Differentiate Mealy and Moore machines?
3. Design CFG for odd palindromes?
4. Define DCFL and DPDA?
5. Discuss Church's Hypothesis?
6. Give examples for NP Complete and NP hard problems?

## PART – B

**4 × 12 = 48 M**

1. a) Find the equivalence between $M_1$ & $M_2$ as shown in Fig. 1 (a) & Fig. 1(b) respectively. (6M)




(a) (b)

Fig. 1

b) Describe the words $w$ in the language L accepted by the automaton in Fig.2. (6M)

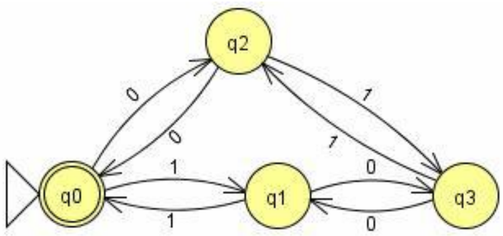



Fig. 2

2. a) Construct the minimum state automaton equivalent to the transition diagram given in Fig. 3. (7M)

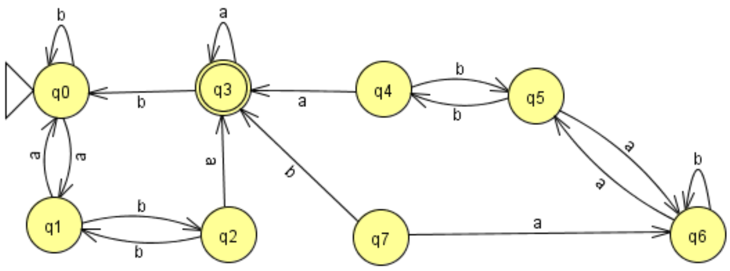



Fig. 3

b) Give Mealy and Moore machines for the following process:
For input from $(0+1)^*$, if the input ends in 101, output A; If the input ends in 110 output B; otherwise output C. (5M)

3. a) Construct NFA with $\varepsilon$-moves for the regular expression $10+(0+11)0^*1$ (6M)

b) What is pumping lemma for regular sets? Show that the language $L = \{ a^n b^n c^n \mid n>=1 \}$ is not regular. (6M)

4. a) Let G be the grammar
$S \rightarrow aB \mid bA$
$A \rightarrow a \mid aS \mid bAA$
$B \rightarrow b \mid bS \mid aBB$.
For the string aaabbabbba find a
i. Left most derivation
ii. Right most derivation
iii. Parse Tree (7M)

b) Discuss Chomsky hierarchy of Languages (5M)

5. a) Convert the following grammar in to GNF?
$S \rightarrow XA \mid BB$
$B \rightarrow b \mid SB$
$X \rightarrow b$ (6M)

b) Design PDA for $L=\{wcw^r \mid w \in (0+1)^* \}$ (6M)

6. a) Design TM for multiplication of two numbers? (6M)

b) Discuss in details about Turing Reducibility (6M)

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