Department of Computer Science
(University of Delhi)

Roll No.....

MCA 3rd Semester
1st Minor Test (September 2018)

Subject Name: Automata Theory **Subject Code: MCA-304**
Max Marks: 15 **Time: 1:00 Hrs**

Ques1 Design CFG for the language L, where L= $\{a^n b^m c^k : k \neq n+m \mid n \geq 0, m \geq 0, k \geq 0\}$ **(2.5 marks)**

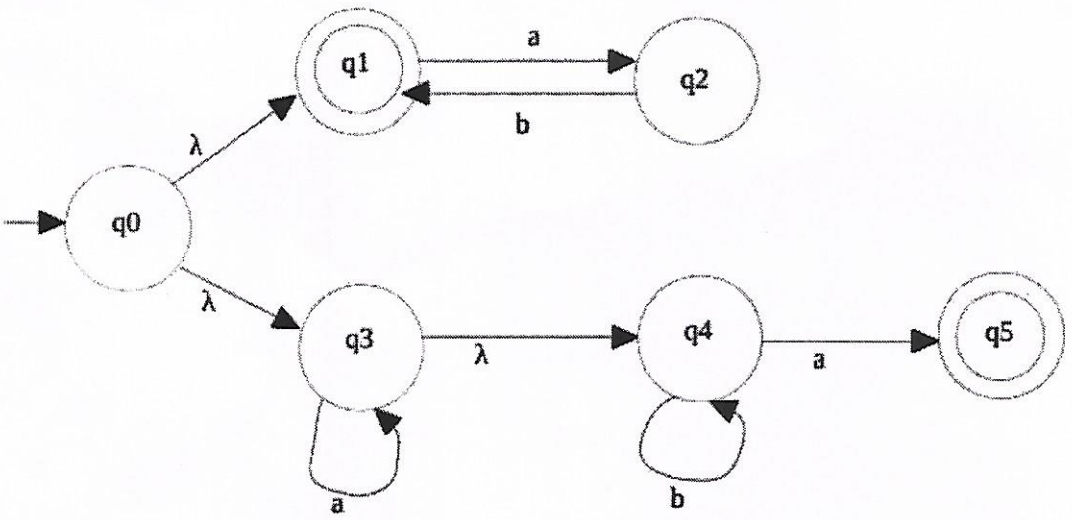
Ques 2 What is a DFA? Construct DFA for the language L over $\sum$, where $\sum=\{0,1\}^*$ and L= Set of all strings w, such that $(n_0(w) - n_1(w)) \bmod 4 > 1$ **(2.5 marks)**

Ques3 State and prove pumping lemma. **(2.5 marks)**

Ques 4 Find regular expression for the following language over $\sum$, where $\sum=\{a,b\}^*$ **(2.5 marks)**

a) Empty language
b) All strings in which all runs of a's have lengths that are multiple of 3
c) $L = \{w : n_a(w) \bmod 5 > 0\}$

Ques5 a) Convert the given NDFA with λ move to NDFA without λ move. **(2.5 marks)**



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b) Show that given grammar is ambiguous

$$S \rightarrow AB|aaB,$$
$$A \rightarrow a|Aa,$$
$$B \rightarrow b.$$

Ques6 **a)**Convert the given CFG to CNF **(2.5 marks)**

$$S \rightarrow aA|aBB,$$
$$A \rightarrow aaA|\lambda,$$
$$B \rightarrow bB|bbC,$$
$$C \rightarrow B.$$

b) Consider the following transition table and convert it into Moore machine.

Present State		**Next State**	
a = 0		**a = 1**	
State	**Output**	**State**	**Output**
-> q0	q3	q1	1
q1	q0	q3	0
q2	q2	q2	0
q3	q1	q0	1