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MCA-18

June - Examination 2017

MCA IIIrd year Examination

Formal Language and Automata

Paper - MCA-18

Time : 3 Hours] **[Max. Marks :- 80**

Note: The question paper is divided into three sections A, B and C. Write answers as per given instructions.

Section - A $8 \times 2 = 16$

(Very Short Answer Questions)

Note: Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum upto 30 words. Each question carries 2 marks.

1) (i) Suppose L_1 = { a, ab } and L_2 = { b, ba } then what is concatenation of L_1 and L_2 (L_1 o L_2)?

(ii) What do you mean by 'Automata'?

(iii) What is Regular Language?

(iv) Is Regular Language is closed under concatenation operation? (Yes/No)

(v) Draw the Transition Diagram of the following Transition table:

	0	1
$\rightarrow q_0$	q_0	q_1
$* q_1$	q_1	q_1

(vi) Which Language is accepted by PDA?

(vii) What is the uses of Diagonalization methods?

(viii) When does two DFAs is said to be Isomorphic?

Section - B

$4 \times 8 = 32$

(Short Answer Questions)

Note: Answer **any four** questions. Each answer should not exceed 200 words. Each question carries 8 marks.

2) Write short note on Chomsky Hierarchy.

3) Explain the uses of finite automata with the help of example.

4) What is the use of Parse Tree? Prove that the following Grammar is ambigous:

$S \rightarrow aSa \mid bSb \mid a \mid b$

5) What is Regular Expression? Find the Regular Expression corresponding to the Language of all string over the alphabet { a, b } that contains no more than one occurence of the string.

6) What do you mean by Left recursion in parsing? Remove Left recursion from the following grammar

$S \rightarrow Sa \mid Sb \mid a$

7) Prove that the classes of CFLs is closed under the union (U) operation.

8) Find a reduced grammar equivalent to the grammar

$S \rightarrow aAa$

$A \rightarrow bBB$

$B \rightarrow ab$

$C \rightarrow aB$

9) Discuss the limitations of finite Automata with suitable example.

Section - C $2 \times 16 = 32$

(Long Answer Questions)

Note: Answer **any two** questions. You have to delimit your each answer maximum upto 500 words. Each question carries 16 marks.

10) What do you mean by 'Lemma'? Show that $L = \{ a^n b^n c^n \mid n \geq 1 \}$ is not context free using Pumping Lemma.

11) What do you mean by Grammar? Design CFG of the following:

(i) $L = \{ 0^n 1^n \mid n > 0 \}$

(ii) $L = \{ 0^n 1^{2n} \mid n > 0 \}$

12) Construct a deterministic PDA accepting

$L = \{ W C W^R \mid W \in \{ a, b \}^* \}$

13) Give the definition of NDFA (Non Deterministic Finite State Machine). Construct an NFA of the following Language

$L = a^* (ab + a + ba) (bb^*)$