# MCA-302

## June - Examination 2019

## MCA III Year Examination

## Formal Language and Automata

## Paper - MCA-302

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

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

**Section - A** **8 × 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 up to 30 words. Each question carries 2 marks.

1. (i) What is Tree? Give an example.

   (ii) Show that p v ~ p is a Tautology?

   (iii) If L1 = {a, ab} and L2 = {b, ba} then what is the concatenation of L1 and L2?

   (iv) What is the use of Finite Control in Turing Machine?

   (v) What is Domain, Co-domain and Range of a function?

   (vi) Give two difference between DFA and NDFA.

(vii) Which symbol is used to represent final/accept state in NFA?

(viii) What do you mean by Polynomial-time reduction?

**Section - B** **4 × 8 = 32**

(Short Answer Questions)

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

2) Explain the difference between Deterministic Finite Automata and Non Deterministic Finite Automata with suitable example.

3) Consider the following finite automata, minimize the given Finite Automata. And represent it with transition table and state diagram.

| q | δ(q, 0) | δ(q, l) |
|---|---|---|
| a | b | c |
| b | a | d |
| c | e | f |
| d | e | f |
| e | e | f |
| f | f | f |

4) Construct the Finite automata for the regular expression (ab + a)* (aa + b).

5) Discuss the relationship between languages and Automata.

6) Discuss the difference between Mealy and Moore machine with example.

7) Write short note on Pumping Lemma.

8) Explain the Haling problem of turning machine.

9) What is set? Explain various types of operations on sets with suitable example.

**Section - C** **2 × 16 = 32**

(Long Answer Questions)

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

10. What is the significance of Automaton? Discuss various applications of formal language and automata.

11. Design a Turing Machine over {1, B} which can compute a concatenation function over $\Sigma = \{1\}$. If a pair of words {wl, w2} is the input then the output has to be wlw2.

12. When a Context Free Grammar (CFG) is said to be ambiguous? Explain with example. Also explain how to remove the ambiguity in the same example.

13. Explain the Model of Push down Automata with suitable examples.

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