

MCA-302

December - Examination 2018

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 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 upto 30 words. Each question carries 2 marks.

- 1) (i) What is the Power Set of set $X = \{1, 2, 3\}$?
- (ii) What do you mean by Hypothesis?
- (iii) Define Kleene Star.
- (iv) What is Class P?
- (v) List the properties of an Algorithm.
- (vi) Which languages are accepted by Push down Automata?
- (vii) Give two examples of Regular Expression.
- (viii) What do you mean by Lemma?

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) If Set $A = \{1, 2, 3\}$ and Relation defined on A as

(i) $R_1 = \{(1, 1) (2, 2) (3, 3), (1, 2) (1, 3) (2, 3)\}$

(ii) $R_2 = \{(1, 1) (2, 2) (3, 3)\}$

(iii) $R_3 = \{(1, 1) (2, 3) (3, 1), (3, 2) (1, 3) (3, 3)\}$

Check whether the following Relation are (a) Reflexive
(b) symmetric (c) transitive.

3) Explain the basic model of finite automata with suitable example.

4) Write a CFG which generates strings having equal number of a's and b's. Also explain with example.

5) Discuss some NP-Complete Problems.

6) Discuss the difference between Top-Down Parser and Bottom-Up Parser with example.

7) Write short note on multiple tracks Turing Machine.

8) Discuss the application of automata in NLSP? Explain with example.

9) Construct a finite automaton for the regular expression $(a + b)^*abb$.

Section - C**2 × 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) Explain the Closure Properties of Languages with suitable example. Also discuss the relationship between Languages and Automata.
- 11) Optimize the CFG given below by reducing the grammar, S is start symbol.

$$S \rightarrow A \mid 0C1$$

$$A \rightarrow B \mid 01 \mid 10$$

$$C \rightarrow \epsilon \mid CD$$

- 12) Design a Pushdown Automata that accepts the language generated by the grammar with production (S is the starting symbol):

$$S \rightarrow aSa$$

$$S \rightarrow bSb$$

$$S \rightarrow \epsilon$$

- 13) Explain the Model of Turing Machine with suitable examples.
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