MCA-302

June - 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 $8 \times 2 = 16$

(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 word. Each question carries 2 marks.

1) (i) Define Graph.

(ii) What is Transitive Relation?

(iii) What do you mean by Automata?

(iv) What is Class NP?

(v) List the applications of Formal Languages and Automata.

(vi) Context-sensitive Language is accepted by which automata?

(vii) Give one difference between Finite Automata and Push down Automata.

(viii) What are disjoint sets? Give an example.

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) Prove that $(p \wedge q) \rightarrow (p \vee q)$ proposition is a tautology.

3) Give the definition of Deterministic Finite Automata. Discuss the difference between DFA and NDFA.

4) Compare Moore and Mealy Machine.

5) Consider the grammar: $E \rightarrow E + E \mid E * E \mid id$. Prove that the given grammar is ambiguous.

6) What is parsing? Discuss Top-Down Parser and Bottom-Up Parser in brief.

7) Write short note on Halting Problem of Turing Machine.

8) How Turing Machine is used in computing complexity of an algorithm? Explain with example.

9) Prove using De-Morgen's Theorem:-

(i) $(A \cup B)' = A' \cap B'$

(ii) $(A \cap B)' = A' \cup B'$

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) Explain the Chomsky Classification of Languages with suitable example.

11) What is Pumping Lemma for Regular Sets? Discuss the applications of Pumping Lemma.

12) Construct a TM with one Tape, that accept the language $L = \{0^{2n}1^n \mid n>=0\}$. Assume that at the start of computation the tape head is one the leftmost symbol of the input tape.

13) Explain the Model of Pushdown Automata with suitable examples.