

11. Explain the block diagram of Turing Machine with its components specification, language and transition table.
12. Explain the Chomsky Classification of Languages with suitable example.
13. Write briefly about the applications of Automata.

MCA-302

December – Examination 2022
MCA (IIIrd Year) Examination
FORMAL LANGUAGE AND AUTOMATA
Paper : MCA-302

Time : 3 Hours]

[Maximum 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 Type 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 do you mean by Parser ?
- (ii) What are disjoint sets ? Give an example.

- (iii) Explain the terminal and non-terminal symbols of a grammar.
- (iv) Give a difference between empty set and null set.
- (v) What is Graph ? Give *one* example.
- (vi) List the properties of an Algorithm.
- (vii) What is multiple tracks Turing Machine ? Draw the model.
- (viii) Prove that $(p \wedge q) \rightarrow (p \vee q)$ proposition is a tautology.

Section-B **4×8=32**

(Short Answer Type Questions)

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

- 2. State and explain pumping lemma for context free languages.
- 3. Construct a NFA to accept strings of a's and b's having substring aba.
- 4. What do you mean by derivation tree ? Explain with a suitable example.

- 5. Write a CFG which generates strings having equal number of a's and b's. Also explain with example.
- 6. Construct a finite automata for the regular expression $10 + (0 + 11) 0^* 1$.
- 7. Distinguish between Mealy and Moore machine.
- 8. Construct a PDA, that accepts the language $L = \{0^n 1^n \mid n \geq 0\}$. Assume that at the start of computation the tape head is on the leftmost symbol of the input tape.
- 9. Consider the grammar : $E \rightarrow E + E \mid E * E \mid id$. Prove that the given grammar is ambiguous.

Section-C **2×16=32**

(Long Answer Type Questions)

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

- 10. Convert the following NFA to equivalent DFA (q0 is the starting state and q2 is final state) :

