

**MCA-302**  
**December – Examination 2020**  
**MCA (III Year) Examination**  
**Formal Language and Automata**  
**Paper : MCA-302**

*Time : 2 Hours ]*

*[ Maximum Marks : 80*

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*Note :-* The question paper is divided into two Sections A and B. Write answers as per 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) Give the formal definition of Finite Automata.
- (ii) Name the languages recognized by the Turing Machine.

- (iii) According to Chomsky, name the different types of Grammar.
- (iv) Give an example of Reflexive Relation.
- (v) What do you mean by Parser ?
- (vi) What do you mean by NP-complete problem ?
- (vii) A and B be two sets containing 2 and 4 elements respectively. What can be the minimum number of elements in  $(A \cup B)$  ?
- (viii) What is Graph ? Give *one* example.

**Section-B** **4×16=64**

**(Short Answer Type Questions)**

**Note** :- Answer any *four* questions. Each answer should not exceed **200** words. Each question carries 16 marks.

- 2. Show that every graph with two or more nodes contains two nodes that have equal degrees.
- 3. Differentiate between Deterministic and Non-deterministic finite automata with a suitable example.

- 4. State Pumping Lemma. Explain using a suitable example.
- 5. Give the formal definition of context-free grammar. Explain with some examples.
- 6. Distinguish between Mealy and Moore Machine.
- 7. Write a short note on the Application of Automata in NLSP.
- 8. Consider the following CFG G :

$$S \rightarrow SS \mid T$$

$$T \rightarrow aTb \mid ab$$

Describe  $L(G)$  and show that G is ambiguous. Give an unambiguous grammar H where  $L(H) = L(G)$  and sketch a proof that H is unambiguous.

- 9. What do you mean by Derivation Tree ? Explain with a suitable example.