8. Construct a TM for L = $\{a^u b^u c^u \mid u \geq 1\}$. Give the graphical representation for the obtained TM.

9. What do you mean by natural language processing? How NLP is related to formal language and automation discussed in detail.

MCA–302

December – Examination 2021

MCA (IInd Year/MCA IIIrd Year) Examination

Formal Language and Automata
Paper : MCA-302

Time : 1½ Hours]   [*Maximum Marks : 80*

Note :– The question paper is divided into two Sections A and B. Write answers as per the given instructions.

Section–A   4×4=16

(Very Short Answer Type Questions)

Note :– Answer any *four* 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 4 marks.

1. (i) What is the mathematical model of finite automata ?

(ii) State De-Morgan's Law.

(iii) Show that $p \vee \sim p$ is a Tautology.

(iv) What are sets ? Give an example.

(v) State the Pumping Lemma.

(vi) What do you mean by NP-hard problem ?

(vii) Define context free grammar with a suitable example.

(viii) Give the definition of non-deterministic finite automata.

Section–B   **4×16=64**

(Short Answer Type Questions)

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

2. Define PDA. Explain the language accepted by PDA.

3. Construct NFA for regular expression $V = (01 + 10)$.

4. Explain the basic model of finite automata with necessary diagrams.

5. Explain the graphical representation of DFA with a suitable example.

6. If set A = {1, 2, 3} and relation defined on A as :

(i) R1 = {(1, 1), (2, 2), (3, 3), (1, 2), (1, 3), (2, 3)}

(ii) R2 = {(1, 1), (2, 2), (3, 3)}

(iii) R3 = {(1, 1), (2, 3), (3, 1), (3, 2) (1, 3), (3, 3)}

(iv) R4 = {(1, 3), (3, 1), (2, 3), (3, 2)}

Check whether following the relations are :

(a) Reflexive

(b) Symmetric

(c) Transitive

7. Write short notes on the following :

(a) Mealy Machine

(b) Moore Machine