

10. Determine DFA from a given NFA :

$M = (\{q^0, q^1\}, \{0, 1\}, \{\delta, q^0, q^1\})$  where is given by  
 $\delta(q^0, 0) = \{q^0, q^1\}$ ,  $\delta(q^0, 1) = \{q^1\}$ ,  $\delta(q^1, 0) = \{q^1\}$ ,  $\delta(q^1, 1) = \{q^0, q^1\}$

11. Construct a Turing Machine that performs unay multiplication.

(Example :  $111 \times 11 = 111111$ )

12. Analyze the limitations of Automata for Type 3, Type 2, Type 0 language.

13. Define PDA. Construct a PDA equivalent to the language  $L = \{a^n b^m a^{n+m}\}$ .

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## MCA-302

June – Examination 2020

### MCA (III 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 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 Automata ?
- (ii) Give one difference between Mealy and Moore Machine.

- (iii) List any *two* importance of NP-complete problems.
- (iv) Suppose  $U = \{a, b, c, d, e, f\}$ ;  $A = \{a, b, c, d\}$ ; and  $B = \{b, d, f\}$  then find  $A \cap B$  and  $A \cup B$ .
- (v) Give the definition of Tree. Give an example.
- (vi) Prove that  $p \wedge \sim p$  is a Tautology and  $p \vee \sim p$  is a fallacy.
- (vii) State De-Morgan's Law.
- (viii) What is Derivation Trees ? Give one example.

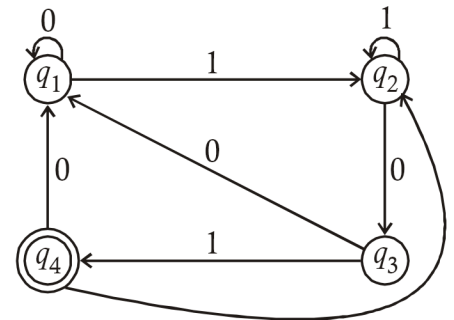
**Section-B** **4×8=32**

**(Short Answer Type Questions)**

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

- 2. Explain the various types of functions with suitable examples.
- 3. Give the formal definition of the Turing Machine. And explain the model of Turing Machine.
- 4. Prove that a language L is accepted by some NDFFA if and only if L is accepted by some DFA.

- 5. Prove that  $L = \{a^i b^i \mid i \geq 0\}$  is not regular.
- 6. Explain the principle of Induction with a suitable example.
- 7. Write a short note on the Application of Automata in AI.
- 8. Convert the following Finite Automata to corresponding Regular Expression :



- 9. Write a short note on the Halting problem of the Turing Machine.

**Section-C** **2×16=32**

**(Long Answer Type Questions)**

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