

[Total No. of Questions - 9] [Total No. of Printed Pages - 2]  
(2123)

1514

**MCA 3rd Semester Examination**

**Theory of Computation**

**MCA-304**

**Time : 3 Hours**

**Max. Marks : 60**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D below and all the subparts of the questions in Section E.

**SECTION - A**

1. Explain the Equivalence of NFA and DFA. (12)
2. Design a Moore machine that counts how many times 001 occurs in a long input string. (12)

**SECTION - B**

3. Explain the applications of FA. (12)
4. Let  $L = \{0^n \mid n \geq 0\}$ . Show that L is not regular. (12)

**SECTION - C**

5. Find the grammar in GNF equivalent to the grammar:  
 $E \rightarrow E + T \mid T, T \rightarrow T^*F \mid F, F \rightarrow (E) \mid a$  (12)
6. Write note on Chomsky Hierarchy of Languages. (12)

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**[P.T.O.]**

**SECTION - D**

7. Write note on :
- (a) Halting problem
  - (b) Reducibility (12)
8. Define Turing Machine. Explain the variants of TM. (12)

**SECTION - E**

9. (a) Write the formal definition of DFA.
- (b) Define Regular Language.
  - (c) Define Recursive and recursive enumerable languages.
  - (d) Define Moore Machine. (4×3=12)