Total No. of Questions :8] [Total No. of Printed Pages :2

90

Roll No ....

MCA-304
M.C.A. III Semester
Examination, December 2017
Theory of Computation

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Design finite automata for the given Regular Expression. $(a+b)*ba$
   b) Differentiate between Mealy and Moore Machine.

2. a) Prove by principle of induction:
$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$
   b) State Myhill-Nerode theorem.

3. a) Explain the closure properties of Regular languages.
   b) Find the Regular Expression corresponding to the automata.

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MCA-304 PTO

[2]
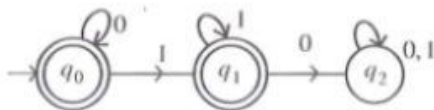
4. a) Define Left Must and right must derivations. Explain it with example.
   b) Convert the following grammar into GNF
      $S \rightarrow ab|aS|aaS$

5. a) Construct npda that accept the language
      $L = a^n b^m \mid n <= m <= 3n$ on $\Sigma = \{a, b\}$
   b) Find a CFG that Generates the language accepted by PDA. $M = (\{q_0, q_1\}, \{a, b\}, \{A, Z\}, \delta, q_0, Z, \{q_1\})$ with transitions:
      $\delta(q_0, a, Z) = (q_0, AZ)$
      $\delta(q_0, b, A) = (q_0, AA)$
      $\delta(q_0, a, A) = (q_0, \in)$

6. a) Construct a Turing machine to compute the function $F(w) = w^R$, where $w \in (0, 1)^+$
   b) What is halting problem of Turing machines and what is its significance?

7. a) Find the context sensitive Grammar for the following language: $a^n b^n c^n \mid n \geq 1$
   b) State post correspondence problem. Explain it with the help of an example.

8. Write short notes on any three of the following:
   a) Linear Bounded Automata
   b) Recursive enumerable set
   c) Complexity theory
   d) Chomosky Normal Form
   e) 2DFA

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