

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE
BRANCH: CSE

SEMESTER: V
SESSION : MO/2018

SUBJECT : CS5101-FORMAL LANGUAGES AND AUTOMATA THEORY

TIME: 1.5 HOURS

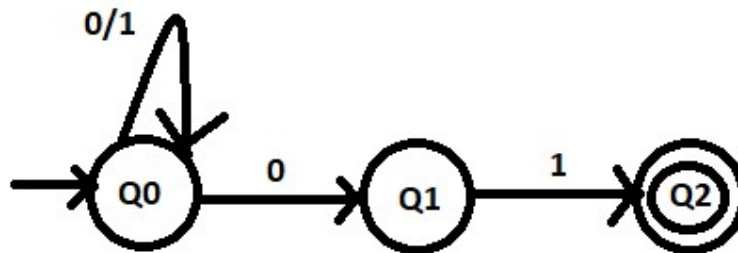
FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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- Q1 (a) Explain role of transition function in Finite Automata (FA)? How does it effect the functioning of FA? [2]
(b) Design a DFA to recognize string ends with 010 or 012 over $\Sigma = \{0,1,2\}$ [3]

- Q2 (a) Write the Epsilon NFA for the regular expression $ab(a+b)^*$. [2]
(b) Convert following NFA into its equivalent DFA: [3]



- Q3 (a) Design a DFA to recognize strings that contain 11 as substring over $\Sigma = \{0,1\}$ [2]
(b) From the DFA designed for Q3 a, derive the corresponding regular expression. [3]

- Q4 (a) The length of the shortest string NOT in the language (over $\Sigma = \{a,b\}$) of the following Regular Expression $a^*b^*(ba)^*a^*$ is [2]
(b) Find a Regular Expression for the set $\{a^n b^m \mid (n+m) \text{ is even}\}$. [3]

- Q5 (a) Can a DFA be designed for recognizing language $abaa^n : n \geq 1$. [2]
(b) Justify properly your answer for Q5 a. [3]

- Q6 (a) Explain Chomsky Hierarchy, in details. [2]
(b) Construct Minimal DFA's for the following language: [3]
 $L = \{ a^l b^m c^n \mid l, m, n \geq 1 \}$