**Code: 15A05404**

**R15**

B.Tech II Year II Semester (R15) Regular Examinations May/June 2017

**FORMAL LANGUAGES & AUTOMATA THEORY**

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define a DFA formally.
(b) Differentiate between a Moore machine and a mealy machine.
(c) What are various forms in which we can represent regular languages?
(d) Construct a DFA that accepts strings which does not contain a substring of 110.
(e) State and prove ARDEN's theorem.
(f) When do we say a CFG is in Greibach Normal Form?
(g) Compare and contrast DPDA and NPDA.
(h) State the properties of LR grammars.
(i) Write short notes on Linear Bounded Automata.
(j) List the closure properties of Recursively Enumerable Languages.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

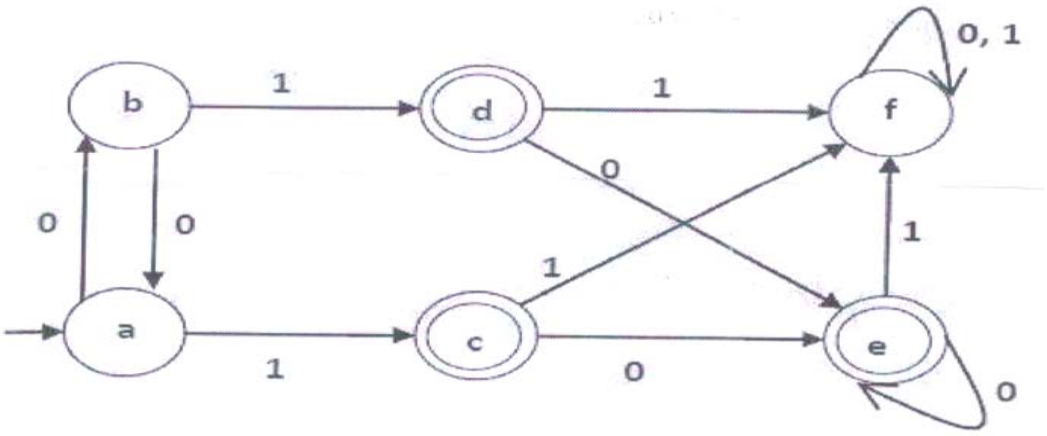
**UNIT – I**

2 Convert the following mealy machine into its equivalent Moore machine.

| From state | i/p | To state | o/p | i/p | To state | o/p |
|---|---|---|---|---|---|---|
| $Q_0$ | 0 | $Q_1$ | N | 1 | $Q_3$ | N |
| $Q_1$ | 0 | $Q_2$ | N | 1 | $Q_3$ | N |
| $Q_2$ | 0 | $Q_2$ | Y | 1 | $Q_3$ | N |
| $Q_3$ | 0 | $Q_1$ | N | 1 | $Q_4$ | N |
| $Q_4$ | 0 | $Q_1$ | N | 1 | $Q_4$ | Y |

**OR**

3 Minimize the following automata.




**UNIT – II**

4 Prove that the language $0^p \mid$ p is a prime number is not regular.

**OR**

5 (a) Explain how equivalence between two FA is verified with an example.
(b) What are the applications of regular expressions and finite automaton?



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**UNIT – III**

6 Convert the following grammar into Greibach Normal form:
$A_1 \rightarrow A_2A_3;\ A_2 \rightarrow A_3A_1 \mid b;\ A_3 \rightarrow A_1A_2 \mid a;$

**OR**

7 Explain the closure properties of Context Free languages.

**UNIT – IV**

8 Construct a PDA that recognizes balanced parentheses.

**OR**

9 Construct a PDA that recognizes strings of type $a^ib^jc^{i+j}$.

**UNIT – V**

10 Construct a Turing machine which carries out proper subtraction (a-b=0, if a<b).

**OR**

11 (a) Explain Chomsky Hierarchy of languages.
(b) Explain any four variations of Turing machines.

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