Code No: 54055 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year II Semester Examinations, December-2014/January-2015
FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Define the following terms:
i) Deterministic Finite Automata
ii) Non-Deterministic Finite Automata.
b) Design a Deterministic Finite Automata which accepts set of all strings containing odd number of 0's and odd number 1's.

2.a) Convert the following figure 1a Non-Deterministic Finite Automata to Deterministic Finite Automata.

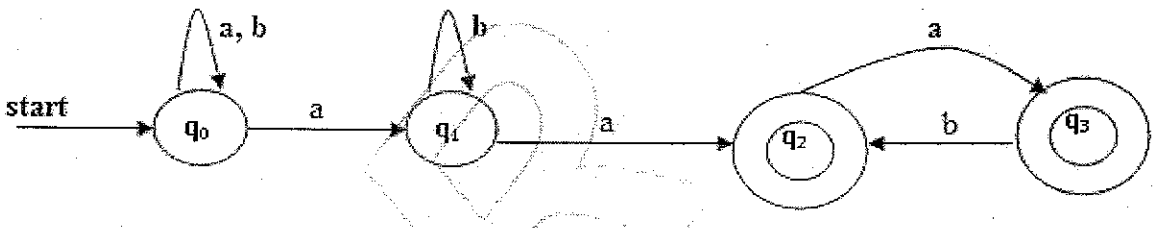

Figure: 1a

b) Convert the following figure 1b Non-Deterministic Finite Automata with ∈ transition to without ∈ transition.

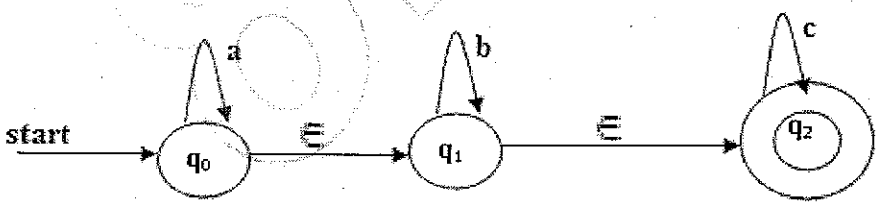

Figure: 1b

3.a) Define Regular Expression.
b) Derive the regular expression from the following finite automata figure 2.

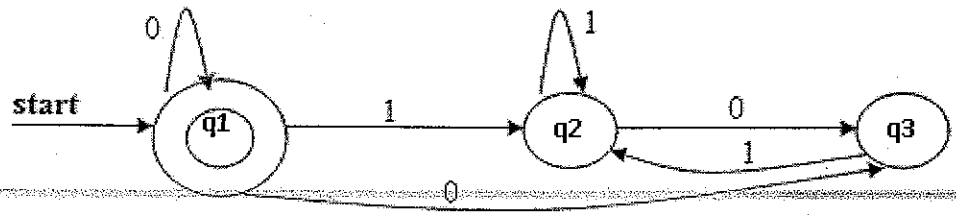

Figure: 2

c) State and prove Arden's theorem.

4.a) When does a grammar is said to be ambiguous grammar?
b) What is difference between left and right linear grammar?
c) Find the left most and right most derivation for the string +*-xyx in the grammar
E→ +EE / *EE / -EE / x/ y

5.a) Define Chomsky and Grieback Normal Forms.

b) Convert the following grammar into Chomsky Normal Form.

S→ 1A/0B, A→1AA / 0S/ 0, B→ 0BB/1

c) Convert the following grammar into Grieback Normal Form.

S→aAS, S→a, A→ SbA, A→SS, A→ba

6.a) Define Push Down Automata.

b) Design Push Down Automata for the language, L={ $a^n b^{2n}$: n>0}.

c) Find the Push Down Automata that accepts the Context Free Grammar

S→XY, X→ax/bx/a, Y→ ya/yb/a

7.a) Define Turing Machine.

b) Design a Turing Machine that accepts the language { $0^n 1^n$: n>1}.

c) What is Curch's Hypothesis?

8. Writ short notes on:

a) Chomsky Hierarchy

b) Linear Bounded Automata

c) Universal Turing Machine.

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