

Department of Computer Science & IT
The Islamia University of Bahawalpur

MCS -3rd (Morning)
Midterm - 24 Nov. 2016
Instructor: Dr. Nadeem Akhtar

Subject: Theory of Automata and Formal Languages (CSIT-21304)
Time: 75 min.
(Marks: 30)

Q1. Short questions

- a) Define the relationship between Finite Automata, Regular Language and Regular Expression. Give examples.
- b) Define Regular expression. Give examples.
- c) Differentiate between the transition function of DFA and NFA. Give examples.

(2 + 2 + 2 = 6)

Q2. Describe the languages denoted by the following Regular expressions:

(Note: The alphabet $\Sigma = \{a, b\}$)

- a) $(a \Sigma^*) \cup (\Sigma^* b)$
- b) $aaa(\Sigma\Sigma)^*$
- c) $b^* (ab^+)^*$
- d) $b \Sigma\Sigma\Sigma a$

(2 + 2 + 2 + 2 = 8)

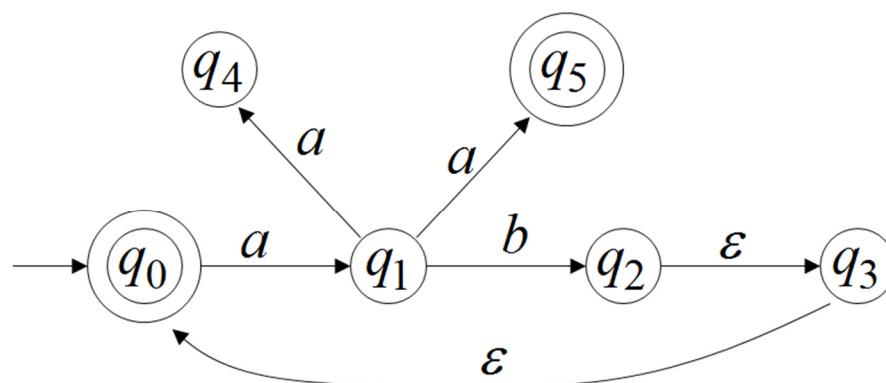
- Q3.**
- a) Write the formal definition of NFA. Give two examples and formally describe them.
 - b) Describe the Regular expression: $0^*1 \cup 1^*0$

And construct a Finite Automata that recognizes the regular language generated by the above Regular expression. Also formally describe the finite automata.

[Note: alphabets $\Sigma = \{0, 1\}$]

(4 + 4 = 8)

- Q4. The following is the state diagram of a Finite Automaton M**
[where alphabet $\Sigma = \{a, b\}$]



- a) Give the complete formal description of machine M
- b) Describe the language accepted by Finite Automaton M.
- c) What sequence of states does the machine go through on input abababaa? Does the machine accepts this input?

(3 + 3 + 2 = 8)