

Department of Computer Science & IT
The Islamia University of Bahawalpur

MCS –3rd
Midterm – 07 April 2016
Instructor: Dr. Nadeem Akhtar

Subject: Theory of Automata and Formal Languages
Time: (1 hr 30 mins.) 90 mins.
(Marks: 30)

<p>Q1. Short questions</p> <p>a) Differentiate between a <i>Set</i> and <i>Sequence</i>. Give an example</p> <p>b) Define Regular Language. Write Regular Operations.</p> <p>c) Differentiate between the transition function of DFA and NFA. Give example</p>	(06)
<p>Q2. Describe the languages denoted by the following Regular expressions: (Note: The alphabet $\Sigma = \{a, b\}$)</p> <p>a) $(a \Sigma^*) \cup (\Sigma^* b)$</p> <p>b) $b^* (ab^+)^*$</p> <p>c) $aaa(\Sigma\Sigma)^*$</p> <p>d) $(a \cup \epsilon) b^*$</p>	(08)
<p>Q3. a) Describe the language denoted by the following regular expression. $(\Sigma = \{0, 1\})$ $0^*1 \cup 1^*0$</p> <p>Also construct Finite Automata that recognizes this language</p> <p>b) Prove that the class of regular languages is closed under the concatenation operation. Give an example.</p>	<p>4</p> <p>4</p> <p>(08)</p>
<p>Q4. The alphabet $\Sigma = \{a, b\}$.The following is the state diagram of a Finite Automaton M</p> <div><pre>graph LR start(()) --> q0(((q0))) q0 -- a --> q1((q1)) q1 -- a --> q4((q4)) q1 -- a --> q5(((q5))) q1 -- b --> q2((q2)) q2 -- ε --> q3((q3)) q3 -- ε --> q0</pre></div> <p>a) Give the complete formal description of machine M.</p> <p>b) Describe the language accepted by Finite Automaton M.</p> <p>c) What sequence of states does the machine go through on input abababaa?</p>	<p>3</p> <p>3</p> <p>2</p> <p>(08)</p>