

Department of Computer Science & IT
The Islamia University of Bahawalpur

MCS –3rd - **Special**

Subject: Theory of Automata and Formal Languages

Midterm – 14 June 2016

Time: (1 hr 20 mins.) 80 mins.

Instructor: Dr. Nadeem Akhtar

(Marks: 50)

<p>Q1. Short questions</p> <p>a) Write the formal definition of Pushdown Automata.</p> <p>b) Write the formal definition of Context Free Grammar. Give an example.</p> <p>c) Differentiate between the transition function of NFA and PushDown Automata.</p> <p>d) Differentiate between Regular Language and Context-Free Language.</p>	(20)
<p>Q2. Construct a Pushdown Automata that recognizes $\{0^n1^n \mid n \geq 0\}$. Give its complete formal description (i.e. Transition diagram, Transition functions)</p>	(10)
<p>Q3. Construct a CFG for the language $\{0^n1^n \mid n \geq 0\} \cup \{1^n0^n \mid n \geq 0\}$</p> <p>Write the derivation of the string 111000 and 0011 in this grammar</p>	(10)
<p>Q4. a) $\Sigma = \{0, 1\}$. Describe the language denoted by the following regular expression.</p> <p style="text-align: center;">$0^*1^+ \cup 1^+1^*$</p> <p>Also construct Finite Automata that recognizes this language</p> <p>b) $\Sigma = \{a, b\}$. Describe the language denoted by the following regular expression.</p> <p style="text-align: center;">$a(b \cup a)^*bba$</p> <p>Also construct Finite Automata that recognizes this language</p>	(10)