

Department of Computer Science & IT
The Islamia University of Bahawalpur

MCS -3rd - **Evening**
Midterm – 09 June 2016
Instructor: Dr. Nadeem Akhtar

Subject: Theory of Automata and Formal Languages
Time: (1 hr 30 mins.) 90 mins.
(Marks: 50)

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