

00851

**B.Tech. IN COMPUTER SCIENCE AND  
ENGINEERING (BTCSVI)**

**Term-End Examination**

**December, 2012**

**BICS-010 : FORMAL LANGUAGES AND  
AUTOMATA**

*Time : 3 hours*

*Maximum Marks : 70*

*Note : Attempt any seven questions.*

1. (a) Find a DFA machine that accepts the language which has a substring 0101 input alphabet  $\Sigma = \{0, 1\}$ . 5
- (b) Explain with examples the algebraic laws for regular expressions. 5
2. Show that  $L = \{a^n b^n c^n \mid n \geq 1\}$  is not context free but context sensitive. 10
3. Define a Turing machine. Design a Turing machine that accepts the language  $L = \{a^n b^{n+1} \mid n > 0\}$ . 10
4. State and prove that post correspondence problem (PCP) is decidable. 10

5. Construct a grammar for the language  $L = \{a^{n^2} \mid n > 1\}$ . Identify the type of the grammar obtain. 10
6. (a) Differentiate between the Mealy Machine and Moore Machine with example. 5  
 (b) Prove that if  $L$  is the regular language over alphabet  $S$ , then  $\bar{L} = S^* - L$  is also a regular language. 5
7. (a) State Myhill-Nerode Theorem. 5  
 (b) Convert the given grammar in Chomsky Normal Form (CNF) 5  
 $S \rightarrow ABa$   
 $A \rightarrow aab$   
 $B \rightarrow AC$
8. Give the production rule for Type 0, Type 1, Type 2 and Type 3 grammars of Chomsky hierarchy. 10
9. (a) What is ambiguous grammar ? Explain with example. 5  
 (b) Construct finite automata equivalent to following regular expression 5  
 $10 + (0 + 11)0^*1$

10. Write short notes on **any two** :

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- (a) Universal Turing Machine
  - (b) The set P, NP and NP complete
  - (c) Undecidability
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