

# END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2016

<b>Paper Code: ETCS 206</b>	<b>Subject: Theory of Computation</b>
<b>Time : 3 Hours</b>	<b>Maximum Marks :75</b>
<b>Note: Attempt any five questions including Q. No. 1 which is compulsory. Assume missing data if any.</b>	

- Q1. a) Differentiate between DFA and NFA. (5x5=25)  
 b) What is Ambiguity? How it is removed?  
 c) Define Recursively Enumerable Language. What are its Different Properties?  
 d) Differentiate between NP-Hard and NP-Complete Problem.  
 e) Differentiate between Moore Machine and Mealy Machine
- Q2. a) Briefly explain Chomsky classification of languages. with examples.(8)  
 b) Draw a DFA for all strings over {0,1} consisting of even no of 0's and even no of 1's. (4.5)
- Q3. a) State and prove Pumping Lemma for Regular Languages. Also prove that language  $L = \{a^n b^n \text{ for } n=0,1,2,3,\dots\}$  is not regular. (8)  
 b) Find a Regular Expression corresponding to each of the following subset[0,1]: (4.5)  
 i) The language of all strings containing atleast two 0's.  
 ii) The language of all strings Containing atmost two 0's.
- Q4. a) Consider the CFG whose Productions are (6.25)  
 $S \rightarrow bB/aA$   
 $A \rightarrow b/bS/aAA$   
 $B \rightarrow a/aS/bBB$  for the string bbaababa. Find.  
 i) Left Most Derivation  
 ii) Right Most Derivation  
 iii) Parse Tree  
 b) What is PDA? Construct a PDA accepting the set of all strings over {a,b} with equal no. of a's and b's. (6.25)
- Q5. a) What are the different closure properties of CFL? Explain with proof. (7)  
 b) State Pumping lemma for CFL. Provide an example to understand.(5.5)
- Q6. a) State & explain Halting Problem. (6.5)  
 b) What is Turing Machine? What are its different variant? Explain.(6)
- Q7. a) State and prove Savitch's Theorem. (6)  
 b) Briefly explain Cook's Theorem. (6.5)
- Q8. Write short notes on **any two**: (6.25x2=12.5)  
 a) Space & Time Complexity  
 b) Turing Church's Thesis  
 c) Chomsky Normal form

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