(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY- JUNE 2017

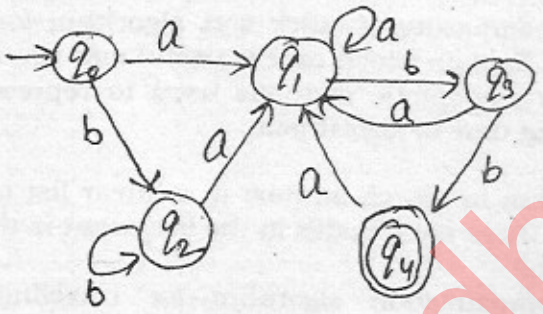
Paper Code: ETCS-206 **Subject: Theory of Computation**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt all question as directed. Internal choice is indicated.

Q1 (a) Explain deterministic and non deterministic automata with example. **(5x5=25)**
(b) State and prove Pumping Lemma for regular languages.
(c) Differentiate between Chomsky Normal Form and Greibach Normal Form.
(d) Construct a Turing Machine M to accept the set L of all string over {0,1} ending with 010.
(e) State and prove Savitch Theorem.

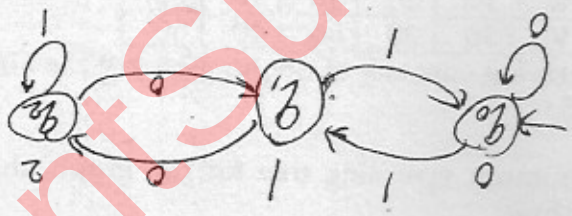
Q2 (a) Design a minimum state automation for the following DFA. **(6.5)**



(b) Prove that i. a*(ab)*(a*(ab)*(a*(ab)*)*=(a+ab)*
ii. (1+00*1)+(1+00*1) (0+10*1)*(0+10)*1)=(0+10*1)* **(6)**

OR

Q3 (a) Convert the following Moore Machine to its equivalent Mealy Machine. **(6.5)**



(b) Prove that if L_1 & L_2 are context free languages, then $L=L_1 \cup L_2$ is also context free. **(6)**

Q4 (a) Convert the following grammar G to Chomsky Normal Form:- **(6)**
S→ABCa,A→aAbb, A→e,B→bB,B→b,B→AC,C→aCa,C→e
(b) Prove that intersection of a CFL L with a regular language M is a CFL. **(6.5)**

OR

Q5 (a) Prove that class of deterministic context free languages is closed under complement. **(6.5)**
(b) Check whether the following grammar is ambiguous. If it is ambiguous remove the ambiguity and write an equivalent unambiguous grammar. S→I C t S | iC t S e S|a,C→b. **(6)**

Q6 (a) Construct a turning Machine for checking if a set of parenthesis is well-formed. **(6)**
(b) Define Turning Machine. Give a block diagram with specified functions of each part of it. What is the difference between a Turning Machine and Two way finite Automata? **(6.5)**

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P1/2

OR

Q7 (a) State and prove Halting Problem for Turning machine. **(6.5)**

(b) Design a Turning Machine to accept the language $L=\{a^n b^n, n>1\}$. Show an ID for the string 'aaabbb' with tape symbols. **(6)**

Q8 Write short notes on **any two:-** **(6.25x2=12.5)**

(a) Prove that a function $f:\Sigma^* \rightarrow \Sigma^*$ is called polynomial-time computable if there is a polynomially bounded Turning Machine computing it.

(b) Explain classification of problems with example.

(c) State & prove Cook's Theorem

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