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BICS-010

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

Term-End Examination

June, 2012

BICS-010 : FORMAL LANGUAGES AND AUTOMATA

Time : 3 hours *Maximum Marks : 70*

*Note : Attempt **any seven** questions.*

1. (a) Is the language $\{a^n\ ba^m\ b\ a^{n+m} \mid n,\ m \geq 1\}$ regular ? Prove your claim. 6

   (b) Show that if L is regular language, then the language L^n is regular for all $n \geq 0$. 4

2. Write a grammar for the language : $\{a^n\ b^n\ c^n : n \geq 0\}$. 10

3. (a) Prove or disprove the following statements about regular expressions : 5

   (i) $(R+S)^* = R^* + S^*$

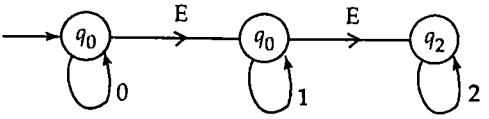
   (ii) $(RS+R)^*\ RS = (RR^*\ S)^*$

   (b) Explain with example the algebraic laws for regular expressions. 5

4. Explain the difference between deterministic and non - deterministic Push Down Automata giving their definition. Illustrate with an example of each. 10

5. Construct PDA for the following 10
$L = \{a^n\ c\ b^n \mid n \geq 1\}$ over the alphabet $S = \{a, b, c\}$

6. (a) Construct a DFA from the given NFA with S moves : 5



(b) Draw a moore or mealy machine that generates out put 'yes' when accepts a set of string from $(0+1)^*$ terminating in last two same symbols. 5

7. Let F_1 and F_2 are two natural function which are computed by TMS M_1 and M_2 respectively. Construct a TM that computes max (F_1, F_2). 10

8. (a) State Myhill-Nerode theorem. 5

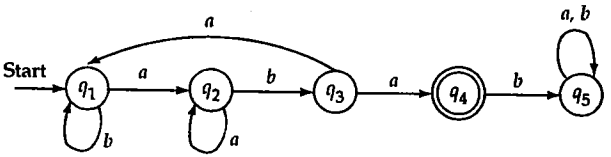
(b) Convert the given grammar in Chomsky Normal Form (CNF) 5

$S \rightarrow ABa$

$A \rightarrow aab$

$B \rightarrow Ac$

9. Find the regular expression corresponding to given digraph. 10



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

(a) Pumping Lemmas

(b) Turning Machine Halting problem

(c) Undecidability.