Code: R7310501

R7

B.Tech III Year I Semester (R07) Supplementary Examinations, May 2013
FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE questions
All questions carry equal marks
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1 (a)   Prove the following theorem by Induction.
$$1 + 2 + 3 + \ldots \ldots \ldots + n = n(n + 1)/2$$
  (b)   A tree with 'n' vertices has (n-1) edges. Prove the following theorem by induction.

2   Design a Moore machine that will read sequences made up of letters A.E.I.O.U and
        will give as output the same sequences except that in case where can I directly
        follows an E, it will be changed to U. Design the Mealy machine for the same.

3   For each of the languages given below. Design a finite automata and regular
        expressions to recognize them. In all cases the alphabet is {0, 1}
  (a) L_1 = {w|w does not contain the substring 110}.
  (b) L_2 = {w|w contains and even number of 0's and exactly two 1's}.

4 (a)   What are the properties of the CFL generated by a CFG?
  (b)   Find the grammar for the language L = {a^{2n} bc, where n > 1}
  (c)   Find the language generated by S→0S1|0A|0|1B|1, A→0A|0, B→1B|1.

5   Define Griebach normal form for a CFG. Find GNF for the following grammar.
        $E \rightarrow E{+}T \,/\, T$ $T \rightarrow T{*}F \,/\, F$ $F \rightarrow (E) \,/\, a$

6 (a)   Design a PDA for L = {xx^r / x Є {a, b}*}. Process the string abbaabba. Is you PDA
        deterministic or non deterministic? Justify your answer.
         Note: x^r stands for reverse of the string x.
  (b)   Explain the differences between a PDA and a FA.

7   Design a TM for multiplication of two positive integers.
        Discuss any two modifications to the basic model of TM.

8 (a)   Explain about Turing reducibility.
  (b)   What is PCP? Give solution to the following PCP, if exists.
        W = (00, 001, 1000)   X = (0, 11, 011)

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