Code: 9A05407

R09

B.Tech II Year II Semester (R09) Supplementary Examinations December 2016

FORMAL LANGUAGES & AUTOMATA THEORY

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 Give DFA's accepting the following languages over the alphabet (0, 1}.
   (a) The set of all strings ending in 00.
   (b) The set of all strings with three consecutive 0's (not necessary at the end)
   (c) The set of strings with 011 as a substring.

2 (a) Discuss binary the significance of NFA and DFA.
   (b) Write about NFA with ε transitions and also discuss the significance of NFA with ε.

3 Find a string of minimal length in Σ={a,b} that is not in the language corresponding to the given regular expression.
   (a) 1*(01)*0*.
   (b) (0*+1*)(0*+1*)(0*+1*).

4 (a) Write the procedure for elimination of ε-productions from the grammar with an example.
   (b) Eliminate unit productions from the following grammar.
   S→A|bb.
   A→B|a.
   B→S|a.

5 (a) Using pumping lemma, prove that L = {$\mathbf{a^i b^j c^k}$ **/** i < j and i<k} is not a CFL.
   (b) Find CNF for the following grammar.
   S → abSb / a / aAb A → aS / aAAb / Є

6 (a) Construct a PDA for L = {$a^n b^{2n}$ / n >=1}. Show the moves of the PDA for the string 'aabbbb'.
   (b) Show that the set of all strings over {a , b} with equal number of a's and b's can be accepted by a deterministic PDA.

7 (a) What is a counter machine? Explain in detail about the process of simulating a TM by a four counter machine.
   (b) Design a TM for L = { x Є {a, b}* / x ends with ab }. Draw its transition diagram and table.

8 (a) What is PCP? Find the solution to the following instance of PCP:
   w = (1, 10111, 10) and x = (111, 10, 0)
   (b) Discuss in detail about LBA model with one example.

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