R09

Code: 9A05407

B.Tech II Year II Semester (R09) Supplementary Examinations May/June 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   Draw a DFA that recognizes the language of all strings of 0's and 1's for length ≥ 1 that, if they were interpreted as binary representations of integers, would represent integers evenly divisible by 3. Leading 0's are permissible.

2   Prove the theorem 'Let L be a set accepted by non-deterministic finite automata, then there exists a DFA that accepts L'.

3   Using the pumping lemma show that each of these languages is not regular:
(a) $L = \{a^n b a^{2n} | n >= 0\}$.
(b) $L = \{a^i b^i c^c | k > i + j\}$.

4   (a)   Construct CFG without $\in$ production form $S \to a|Ab|aBa$, $A \to b|\in$, $B \to b|A$.
(b)   Explain the relationship between derivation and derivation tree with an example.

5   (a)   Show that the Context Free Languages are not closed under intersection.
(b)   State whether $S \to aSbS / bSaS / \in$ is ambiguous or not. Support your answer by giving any two examples.

6   (a)   Show that if L is accepted by a PDA in which no symbols are ever removed from the stack, then L is regular.
(b)   Design a PDA for recognizing $L = \{a^i b^j / j <= i$ and $i, j > 0\}$. Show the moves of the PDA for the string 'aabb'.

7   Write short notes on:
(a)   Multitape TMs.
(b)   Universal TM.
(c)   Counter machine.

8   (a)   Define P and NP problems with examples.
(b)   What is PCP? Explain why PCP with two lists x = (01, 1, 1) and y = (0101, 10, 11) has no solution.

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