

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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- 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) $L = \{a^n b a^{2n} | n \ge 0\}.$
 - (b) $L = \{a^i b^i c^c | k > i + j \}.$
- 4 (a) Construct CFG without \in production form S \rightarrow a|Ab|aBa, A \rightarrow b| \in , B \rightarrow 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 → aSbS / bSaS / C 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 $L = \{a^ib^j / j \le i \text{ and } i, j > 0\}$. 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.
