

B.Tech III Year I Semester (R07) Supplementary Examinations December 2015

FORMAL LANGUAGES & AUTOMATA THEORY

(Computer Science and Engineering)

(For 2008 regular admitted batch only)

Time: 3 hours

Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What is finite state machine? Define finite automata and discuss the representation of finite automata.
(b) Discuss the applications of finite automata.
- 2 Design a Moore and Mealy machine for a binary input sequence such that if it has a substring 101 the machine outputs 'A' if input has substring 110 it outputs B, otherwise it outputs C.
- 3 (a) What are the applications of regular expressions and finite automata?
(b) Denote a regular expression for the language that accepts all strings in which 'a' appears tripled over the set $\Sigma=\{a\}$ and also construct the finite automata for the same.
- 4 For each of the following languages give a CFG that generates it:
(a) $\{a^i b^j c^k : i < j \text{ or } i > k\}$.
(b) $\{a^i b^j : i \leq j \leq 2i\}$.
(c) $\{a^m b^n : m \geq n \text{ and } m-n \text{ is even}\}$.
- 5 (a) State and prove pumping lemma for Context Free Languages.
(b) Using pumping lemma, prove that $L = \{a^i b^j c^i / i \geq 1\}$ is not a CFL.
- 6 (a) Construct a PDA for recognizing $L = \{a^{n+1} b^n / n \geq 0\}$. Show the moves of the PDA for the string aaaabbbb.
(b) Distinguish between Finite Automata and Push Down Automata.
- 7 Write short notes on:
(a) Multi-tape TMs.
(b) Universal TM.
(c) Counter machine.
- 8 (a) Show that PCP is undecidable over one symbol alphabet.
(b) Explain about Chomsky hierarchy of languages.
