

Code: 9A05407

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2015/2016

FORMAL LANGUAGES & AUTOMATA THEORY

(Computer Science & Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Define string and Alphabet. Discuss the operations on string.
(b) Define language. Discuss its operations.
- 2 The Moore machine to determine residue mod 3 for binary number is given below convert into equivalent Mealy machine.

Σ	0	1	Output (λ)
Q			
q_0	q_0	q_1	0
q_1	q_2	q_0	1
q_2	q_1	q_2	2

- 3 Use closure operations to show that the following language is not regular: $L = \{x \in \{a,b,c\}^* \mid \text{the middle symbol of } x \text{ is } b; \text{ and } x \text{ is of odd-length}\}$.
- 4 Construct regular grammar for following languages:
 - (a) $\{a^{2n} \mid n \geq 1\}$.
 - (b) $\{(ab)^n \mid n \geq 1\}$.
 - (c) The set of all strings over $\{a,b\}$ ending in a.
- 5 (a) Show that CFL's are closed under Kleene closure operation.
(b) Check whether the following grammar is ambiguous or not. Provide at least two examples to support your answer.

$$S \rightarrow AB / aaB \quad A \rightarrow a / Aa \quad B \rightarrow b$$
- 6 (a) Define PDA. Design a PDA for $L = \{xcx^r \mid x \in \{a,b\}^*\}$. Process the string abbacabba.
Note: x^r stands for reverse of the string x .
(b) What do you mean by an instantaneous description of a PDA? Explain with example
- 7 Design a TM for recognizing $L = \{xx \mid x \in \{a,b\}^*\}$. Show the moves of the TM for the strings abaaba and abaabb.
- 8 (a) Explain in detail about PCP and MPCP.
(b) Write about Universal Turing Machine.
