

Code No: R20A0507

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, April 2025

Formal Language and Automata Theory

(CSE & CSE-AIML)

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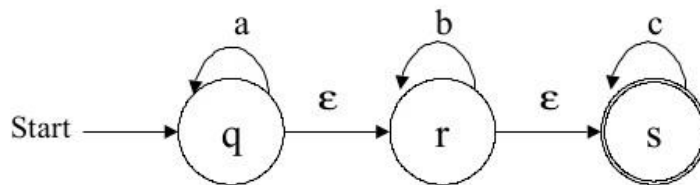
Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing **ONE** Question from each SECTION and each Question carries 14 marks.

SECTION-I

- | | | | BCLL | CO(s) | Marks |
|----|--|--|----------|--------------|--------------|
| | | | L3 | CO-I | [7M] |
| 1 | <p>A Short notes on</p> <p style="margin-left: 20px;">i) Write about relations on sets.</p> <p style="margin-left: 20px;">ii) Define Grammar? What are the tuples.</p> <p style="margin-left: 20px;">iii) Define Finite Automaton.</p> <p style="margin-left: 20px;">iv) Show that $(0^*1^*)^* = (0+1)^*$.</p> <p>B Construct a DFA for the language over $\{0, 1\}^*$ such that it contains “000” as a substring.</p> | | L3 | CO-I | [7M] |
| OR | | | | | |
| 2 | <p>A Differentiate between Moore and Mealy Machine.</p> <p>B Convert the following NFA with ϵ moves to DFA without ϵ moves.</p> | | L2
L3 | CO-I
CO-I | [7M]
[7M] |



SECTION-II

- | | | | | | |
|----|--|--|----------|----------------|--------------|
| 3 | <p>A Draw and explain the relationship between finite automata and regular expression.</p> <p>B Construct Finite Automata for the regular expression $0^*1^*(00)^*1$.</p> | | L3
L3 | CO-II
CO-II | [7M]
[7M] |
| OR | | | | | |
| 4 | <p>A Write the algorithm for converting FA to Regular Expressions.</p> <p>B State Arden's theorem and construct the regular expression for the following FA using Arden's theorem.</p> | | L2
L2 | CO-II
CO-II | [7M]
[7M] |

SECTION-III

- 5 *A* Define Context free grammars with example. L2 CO-III [7M]
 B Let $G = \{\{S, A\}, \{a, b\}, P, S\}$ where L3 CO-III [7M]
 $P: S \rightarrow aAS \mid a,$
 $A \rightarrow SbA \mid SS \mid ba$
 Construct a string $w = aabbaa$, using Leftmost and Rightmost Derivation.

OR

- 6 *A* Write procedure to eliminating of ϵ -productions. L2 CO-III [7M]
 B Consider the grammar $S \rightarrow S+S \mid S^*S \mid a \mid b$. Find the leftmost and L3 CO-III [7M]
 Rightmost derivations for string $w = a^*a+b$.

SECTION-IV

- 7 *A* Convert the following grammar into Greibach normal form. L3 CO-IV [7M]
 $S \rightarrow AA/a$
 $A \rightarrow SS/b$
 B A PDA is more powerful than a finite automaton. Justify this L2 CO-IV [7M]
 statement.

OR

- 8 *A* Write the Pumping Lemma for Context Free Languages. L2 CO-IV [7M]
 B Construct an equivalent PDA for the following CFG L3 CO-IV [7M]
 $S \rightarrow aAB \mid bBA$
 $A \rightarrow bS \mid a$
 $B \rightarrow aS \mid b$

SECTION-V

- 9 *A* Write properties of recursively enumerable languages. L2 CO-V [7M]
 B Design Turing Machine for the Language $L = \{a^n b^n c^n / n \geq 1\}$. L2 CO-V [7M]
 OR
10 *A* Explain about various types of Turing Machine. L2 CO-V [7M]
 B Define the following and give examples L2 CO-V [7M]
 a) P – type problem
 b) NP – Hard problem
