Roll No. .....

12590

M. Tech. 1st Semester (Regular/Re-appear/Imp./Mercy Chance) Examination – December, 2025

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE (CSE New)

Paper : MCSE-105

Time : Three Hours] ***[Maximum Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. **1** is ***compulsory***. All questions carry equal marks.

1. Answer the followings :

(a) Design a Finite Automata to accept the language L = {^, b, bb, aaab, abaa .....}

(b) What do you mean by Left Recursion ?

(c) Explain the Properties of Melay and Moore machine.

(d) State and Prove Arden's Theorem.

(e) Explain the various Applications of Regular Languages.

(f) Explain Halting Problem of Turing Machine.

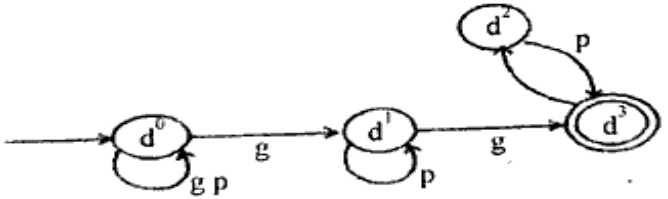
(g) What do you mean by Parsing ?

(h) Explain Universal Turing Machine.

SECTION – I

2. (a) Design a DFA that accepts all binary strings that, when interpreted as a binary number, are divisible by 4.

(b) Construct a DF A for given NFA



3. (a) Design a DFA that accepts all strings over Σ = {*a, b*} where every block of consecutive b's has an even length.

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(b) Convert the following grammar G into Greibach Normal Form (GNF).

$S \rightarrow XA|BB$

$B \rightarrow b|SB$

$X \rightarrow b$

$A \rightarrow a$

SECTION – II

4. What do you mean by Push down Automata? Explain its various types with example.

5. Differentiate between Top Down Parsing and Bottom Up Parsing. Discuss various types of Bottom up Parser.

SECTION – III

6. Explain Turing Machine. Design a Turing machine over $\{a, b\}$ to accept the Language $L = \{anbn|n >= 1\}$

7. Explain Non Deterministic Turing Machine. Design a Turing machine over $\{a, b\}$ to accept the Language $L = \{an\ b2n|n > 0\}$.

SECTION – IV

8. Explain Primitive Recursive Function. Prove that the Binary Product of two Natural Numbers is Primitive Recursive.

9. (a) Write a short note on Church Turing Thesis.

(b) Explain Rice Theorem in detail.

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