

BACHELOR OF TECHNOLOGY (CBCS - 2023)  
B. Tech. Sem-IV CS&E-A&M : WINTER: 2025  
SUBJECT: THEORY OF COMPUTATION

Day : Friday  
Date : 21/11/2025

W-29279-2025

Time : 10:00 AM-01:00 PM  
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat diagrams **WHEREVER** necessary.

- Q.1 a) Design a DFA-with  $\epsilon = \{0,1\}$  accepts those strings which starts with 1 and ends with 0. (05)  
b) Design DFA with  $\epsilon = \{0,1\}$  accepts even no of 0's and even no of 1's. (05)

OR

Q.1 Explain NFA, Construct NFA ending with 'ab'. (10)

Q.2 Connect the following Regular Expression to its equivalent finite Automata (10)  
a)  $|0+(0+11)0^*|$  c)  $(a+b)c$   
b)  $ba^*b$  d)  $a(bc)^*$

OR

Q.2 Explain Pumping Lemma for Regular languages. (10)

Q.3 Verify whether the Grammar (10)  
 $S \rightarrow 0B|1A$   
 $A \rightarrow 0|0S|1AA|A$   
 $B \rightarrow 1|1S|0BB$

OR

Q.3 Explain Derivation tree with its types. (10)

Q.4 Define PDA with Instantaneous Description. (10)

OR

Q.4 Explain Deterministic Push down automata. (10)  
 $L = \{WCW^R|W \in \{a,b\}^+\}$

Q.5 Construct TM which accepts the language aba over  $\Sigma = \{a,b\}$ . (10)

OR

Q.5 Explain church-Turing Thesis. (10)

Q.6 Explain the Halting Problem. (10)

OR

Q.6 Explain Properties of recursive and recursively enumerable languages. (10)

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