

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - IV CS&E-A&M : WINTER: 2025
SUBJECT: THEORY OF COMPUTATION

Day : Friday
Date : 21/11/2025

W-23946-2025

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

N.B.

- 1) All questions carry marks as indicated.
- 2) Assume suitable data whenever necessary.
- 3) Illustrate your answer whenever necessary with the help of neat sketches.

Q.1 a) Design a finite Automata to accept string starting with '00' and ending with '1' consider $\Sigma = \{0,1\}$ (05)

b) Design a finite automata over $\Sigma = \{0,1\}$ to accept even number of 0's and even number of 1's. (05)

OR

Q.1 a) Define term 'Regular expression'. (05)

b) Define Moore and Mealy Machine. (05)

Q. 2 a) Draw NFA with ϵ Moves for the regular expression given as $a.(a+b)^*(b+a)^*$ (05)

b) Write regular expression for (05)

1) string starting with 'a' and ending with 'bb'

2) string with even number of a's and even number of 'b' s

OR

Q. 2 a) Explain Regular grammars for FA (05)

b) Construct Binary Adder as finite state Machine (05)

Q. 3 a) State and explain grammar Simplification Method (05)

b) Write short note on 'pumping Lemma' (05)

OR

Q. 3 a) Give the GNF for the following CFG (05)

$S \rightarrow AB$

$A \rightarrow BS | b$

$B \rightarrow SA | a$

b) For the grammar given below (05)

$S \rightarrow A1B$

$A \rightarrow 0A | \epsilon$

$B \rightarrow 0B | 1B | \epsilon$

Give parse tree for leftmost and rightmost of the string

Q. 4 a) Find the PDA for given grammar (05)

$S \rightarrow 0S1 | 00 | 11$

b) Construct PDA accepting languages consisting of even palindromes string a's and b's (05)

OR

Q. 4 a) Design PDA to check whether a given string over {a, b} ends in abb. (05)

b) What is formal definition of grammar? Give the types and details of derivation process. (05)

Q. 5 Write short note on applications of Turing machines (10)

OR

Q. 5 Design Turing machine to replace string 110 by 101 in a binary input-string (10)

Q. 6 Explain Halting problem with example (10)

OR

Q. 6 Explain Chomsky hierarchy with example (10)

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