

--	--	--	--	--	--	--	--	--	--



GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous)

(Affiliated to Andhra University, Visakhapatnam)

II B.Tech. - II Semester Regular Examinations, April – 2026

FORMAL LANGUAGES AND AUTOMATA THEORY

[Common to CSE & INF]

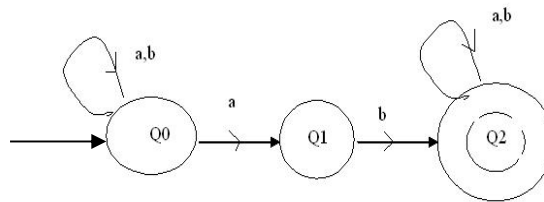
1. All questions carry equal marks
2. Must answer all parts of the question at one place

Time: 3Hrs.

Max Marks: 70

UNIT-I

1. a. Give the differences between NFA and DFA with examples. [7M]
- b. Convert the given NFA to DFA. [7M]



OR

2. a. Construct DFA for all strings of a's and b's which contains third symbol from LHS is 'a'. [7M]
- b. Construct mealy machine for 2's complement of a binary number. [7M]

UNIT-II

3. a. Construct a finite automata equivalent to the regular expression $r = (11+0)^*$. [7M]
- b. Define Pumping lemma and prove that $L = \{a^{n^2} \mid n \geq 1\}$ is not regular using pumping lemma. [7M]

OR

4. a. Find regular expressions for the set of all strings over $\{a,b\}$ with three consecutive b's? [7M]
- b. Construct a finite automaton for the regular expression $(a+b)^*a$. [7M]

UNIT-III

5. a. Explain Ambiguous grammar with example. [7M]
- b. Reduce the following grammar into Chomsky normal form. [7M]

$S \rightarrow abSb \mid a \mid aAb$

$A \rightarrow bS \mid aAAb$

OR

6. a. Generate CFG for the language $L = \{a^n b^m \mid n \neq m\}$. [7M]
- b. Reduce the following grammar into Greibach normal form. [7M]

$S \rightarrow A0, A \rightarrow 0B, B \rightarrow A0, B \rightarrow 1$

UNIT-IV

7. a. Construct the CFG for the PDA $M = (\{q_0, q_1\}, \{0,1\}, \{R, Z_0\}, \delta, q_0, Z_0, \Phi)$ and δ is given by [7M]
- $\delta(q_0, 1, Z_0) = (q_0, R Z_0)$
 $\delta(q_0, 1, R) = (q_0, RR)$
 $\delta(q_0, 0, R) = (q_1, R)$
 $\delta(q_1, 0, Z_0) = (q_0, Z_0)$
 $\delta(q_0, \epsilon, Z_0) = (q_0, \epsilon)$
 $\delta(q_1, 1, R) = (q_1, \epsilon)$
- b. Construct PDA to accept the set of all strings over $\{a,b\}$ consisting of equal no. of a's and b's accepted. [7M]

OR

8. a. Define PDA and Specify graphical representation and Instantaneous Description of PDA. [7M]
- b. Obtain a PDA to accept the language $L = \{ a^n b^{2n} \mid n \geq 1 \}$. [7M]

UNIT-V

9. a. Design Turing machine to accept the language $L = \{ 0^n 1^n 2^n \mid n \geq 0 \}$. [7M]
- b. Explain the ID and Move of a Turing machine. [7M]

OR

10. a. Differentiate NP complete and NP hard problems. [7M]
- b. Design a Turing machine to accept even palindromes derived from the input $\{a,b\}$. Give its transition table and diagram also. [7M]