

[Nov-23]

GITAM (Deemed to be University)
[CSEN2041]
GST/GSS/GSB/GSHS Degree Examination

V Semester

FORMAL LANGUAGES AND AUTOMATA THEORY

(Effective for the admitted batch 2021-2022)

Time: 2 Hours

Max. Marks: 30

Instructions: All parts of the unit must be answered in one place only.

Section-A

1. Answer all Questions:

(5×1=5)

- a) Draw a finite automata for $0^*1^*2^*$.
- b) Define regular expression and write its applications.
- c) Why to eliminate useless symbols and how to identify them?
- d) Write the rules to obtain Push Down Automata from a given grammar.
- e) Define the formal description of Linear Bounded Automata.

Section-B

Answer the following:

(5×5=25)

UNIT-I

2. Define Moore and Mealy machines.

Find an equivalent Mealy machine for the following Moore machine:

States	Input		Output
	0	1	
q_0	q_0	q_1	0
q_1	q_0	q_2	0
q_2	q_0	q_2	1

OR

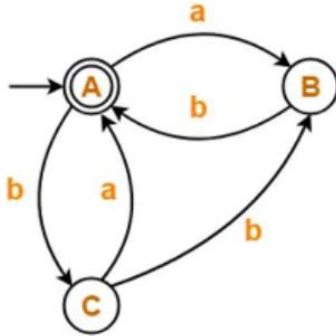
3. A language contains strings over $\Sigma = \{0, 1\}$ that do not end with 001. Design an NFA to accept the language and show that the machine accepts the string $w=101010$.

UNIT-II

4. State pumping Lemma and explain its importance with a suitable example.

OR

5. Using the Arden's theorem, obtain an equivalent regular expression for the following finite automata.



UNIT-III

6. Convert the following grammar in to its equivalent Chomsky Normal Form and show that both grammars are equivalent.
 $G = \{S \rightarrow Ab \mid bA, A \rightarrow a \mid aS \mid bAA, B \rightarrow b \mid bS \mid aBB\}$

OR

7. What is ambiguity in context-free grammars.
Check the grammar $G = \{S \rightarrow S+S \mid SS \mid (S) \mid S^* \mid a\}$ is ambiguous or not with the string $”(a+a)^*a”$.

UNIT-IV

8. Design a Pushdown automaton by null store to recognize the following language: $L = \{a^n b^{2n} \mid n \geq 0\}$. Write instantaneous description of PDA for the string “aabbbbb”.

OR

9. Obtain an equivalent non-deterministic PDA from the given CFG $G(\{S, X\}, \{a, b\}, P, S)$ where $P = \{S \rightarrow XS \mid \epsilon, A \rightarrow aXb \mid Xb \mid ab\}$.

UNIT-V

10. Design a Turing Machine for finding 2's complement of a given binary number and trace the machine with an example.

OR

11. Construct a Turing Machine that will accept the Language consists of all palindromes of 0's and 1's?