Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2022

Subject Code:3151605   **Date:06-01-2023**
Subject Name:Formal Language and Automata Theory
Time:10:30 AM TO 01:00 PM   **Total Marks:70**
Instructions:
   1. Attempt all questions.
   2. Make suitable assumptions wherever necessary.
   3. Figures to the right indicate full marks.
   4. Simple and non-programmable scientific calculators are allowed.

			MARKS
Q.1	(a)	Define Transition Diagrams for a DFA.	03
	(b)	State the formal notation for ε-NFA.	04
	(c)	Explain subset construction method with suitable example.	07
Q.2	(a)	What is Bounded Mineralization?	03
	(b)	Explain partial function with example.	04
	(c)	Explain the steps involved in pumping lemma for regular language using appropriate example.	07
		OR	
	(c)	Prove that every language defined by a regular expression is also defined by a finite automaton.	07
Q.3	(a)	State notations for CFG derivation.	03
	(b)	Explain ambiguity in grammar with suitable example.	04
	(c)	Explain Chomsky Normal Form (CNF) with example.	07
		OR	
Q.3	(a)	Define Context Free Grammars.	03
	(b)	Show that every regular language is a context-free language.	04
	(c)	Explain BacosNaur Form (BNF) with example.	07
Q.4	(a)	Define Pushdown Automaton.	03
	(b)	Explain intersection and complements of CFL.	04
	(c)	Design and draw PDA to accept string with more x's than y's.	07
		OR	
Q.4	(a)	Define Deterministic Pushdown Automaton.	03
	(b)	How to convert a PDA to a CFG?	04
	(c)	Design and draw deterministic PDA Accepting "Balance string of brackets"	07
Q.5	(a)	Define Turing Machine.	03
	(b)	Write a short note on Universal Turing Machine.	04
	(c)	Develop a Turing Machine to accept palindromes over {a,b}*	07
		OR	
Q.5	(a)	Define Context Sensitive Language.	03
	(b)	Explain grammar and chomsky hierarchy.	04
	(c)	Draw a Turing Machine that accepts the language $\{a^n b^n a^n \mid n \geq 0\}$ over {a,b}*.	07

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