Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160704 Date:01/06/2022

Subject Name:Theory of Computation

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: Set, Subset, Complement	**03**
	(b)	Write and explain the principle of mathematical induction using example.	**04**
	(c)	Draw Finite automata for following regular expression: (i). $(0+1)^*(1+00)(0+1)^*$ (ii). $(111+100)^*0$	**07**
Q.2	**(a)**	Explain Regular language & Regular expressions	**03**
	(b)	Find a regular expression corresponding to each of the following subsets of $\{0,1\}^*$ (i). the language of all strings that do not end with 01 (ii). the language of all strings that begin with or end with 00 or 11	**04**
	(c)	Prove Kleene's theorem part-1	**07**
		OR	
	(c)	Explain procedure to minimize finite automata	**07**
Q.3	**(a)**	Define Context free grammar & context free language	**03**
	(b)	Write CFG for following (i) $\mathbf{L=\{a^ib^jc^k \mid i=j \text{ or } j=k\}}$ (ii) $\mathbf{L=\{a^ib^jc^k \mid j>i+k\}}$	**04**
	(c)	Convert following CFG to CNF : S -> S(S)/^	**07**
		OR	
Q.3	**(a)**	Define Regular grammar and give example.	**03**
	(b)	Explain types of derivation and ambiguity.	**04**
	(c)	Convert following CFG to CNF : S->aX/Yb X->S/^ Y->bY/b	**07**
Q.4	**(a)**	What is a pushdown automaton? Explain.	**03**
	(b)	Give the difference between top down and bottom up parsing.	**04**
	(c)	Design and draw deterministic PDA Accepting "Balance string of brackets"	**07**
		OR	
Q.4	**(a)**	Explain deterministic pushdown automata.	**03**
	(b)	Explain conversion from PDA to CFG.	**04**
	(c)	Design and draw PDA to accept string with more a's than b's.	**07**

Q.5	**(a)**	What is Turing machine? Explain its capabilities.	**03**
	(b)	Explain Church Turing thesis.	**04**
	(c)	Design a Turing machine to copy a string.	**07**
		OR	
Q.5	**(a)**	Explain Primitive Recursive Functions.	**03**
	(b)	Explain Universal Turing machine	**04**
	(c)	Design a Turing machine to delete a symbol.	**07**

****