Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER– II • EXAMINATION – WINTER 2015

Subject Code: 620007 **Date:09/12/2015**

Subject Name: Theory of Computation

Time:02.30 pm to 05.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Write De Morgan laws & prove it using truth table.	**07**
	(b)	Let A = {10, 15} and B = {10, 20}. Find P(A), P(B), P(A−B).	**07**
Q.2	**(a)**	Write regular expression for the following: 1) Identifier with minimum string length is 1, contains only letter, underscore and digits. It must begin with letter or underscore. 2) String ending in 1 and not containing 00.	**07**
	(b)	Verify that! Given statement is a tautology: p V q V r V s	**07**
		OR	
	(b)	Let P(n) be the statement, 1 + 2 + … + n = [n(n+1)/2]. To show that P(n) is true for every n ≥ 0, using mathematical induction principle.	**07**
Q.3	**(a)**	Define Finite Automata. Explain all terms involved in definition. Write one suitable example of Finite Automaton.	**07**
	(b)	Draw transition diagram and transition table to recognize $\{0, 1\}^*\{10\}$.	**07**
		OR	
Q.3	**(a)**	Define Nondeterministic Finite Automata. Explain all terms involved in definition. Write one suitable example of Nondeterministic Finite Automaton.	**07**
	(b)	Draw an NFA-Λ that accepting $\{0\}\{1\}^*$ U $\{0\}^*\{1\}$.	**07**
Q.4	**(a)**	Define Context-Free Grammar (CFG). Explain all terms involved in definition. Write one suitable example of CFG.	**07**
	(b)	Consider given production rules: S → S + S | S – S | S * S | S / S | (S) | a Derive : (a – a) * (a + a)	**07**
		OR	
Q.4	**(a)**	Define Pushdown Automaton (PDA). Explain all terms involved in definition. Write one suitable example of PDA.	**07**
	(b)	Write state transition table Deterministic PDA that accept string with more a's than b's with suitable example.	**07**
Q.5	**(a)**	Explain top-down parsing with suitable example.	**07**
	(b)	Explain bottom-up parsing with suitable example.	**07**
		OR	
Q.5	**(a)**	Define Turing Machines (TM). Explain all terms involved in definition. Write one suitable example of TM.	**07**
	(b)	Draw state transition diagram, a TM accepts $\{a, b\}^*\{aba\}$	**07**

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