Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC- SEMESTER–III - EXAMINATION – SUMMER 2017

Subject Code: X30902 **Date:29/05/2017**

Subject Name: Analog & Digital Electronics

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)**	What is an op-amp? Explain how is op-amp used as voltage follower.	**07**
	(b)	What are the specifications of ideal op-amp? Discuss the following parameters of op-amp (i) Slew rate (ii) CMRR (iii) Virtual ground.	**07**
Q.2	**(a)**	Do as directed: (i) $(110.111)_2 = (\quad)_{10}$ (ii) $(1001)_8 = (\quad)_2$ (iii) $(A6F.CD)_{16} = (\quad)_8$ (iv) $(10011111)_2 = (\quad)_{16}$	**07**
	(b)	State and prove De Morgan's theorem with examples.	**07**
		OR	
	(b)	Simplify the Boolean function: $F = \bar{A}\,\bar{B}\,\bar{C} + A\bar{C}\,\bar{D} + A\bar{B} + ABC\bar{D} + \bar{A}\,\bar{B}\,C$ (i) Express it in sum of minterms. (ii) Find the minimal sum of products using K-map.	**07**
Q.3	**(a)**	Simplify the following logic expressions using Boolean algebra: (a) $A + \bar{A}B$ (b) $(A+B)(B+C)(C+A)$ (c) $(A+B)(\bar{A}+C)$	**07**
	(b)	Explain briefly the operation of 4 to 1 line multiplexer with diagram.	**07**
		OR	
Q.3	**(a)**	Explain TTL circuit in detail.	**07**
	(b)	Explain full-adder with logic circuit and truth table.	**07**
Q.4	**(a)**	Draw the block diagram of IC 555 and explain its operation in detail.	**07**
	(b)	What is a flip flop? Explain briefly S-R flip-flop with truth table.	**07**
		OR	
Q.4	**(a)**	Explain the Synchronous counter.	**07**
	(b)	Explain the J-K flip-flop with logic diagram and truth table.	**07**
Q.5	**(a)**	Do as directed: (i) Encode $(2345)_{10}$ in BCD. (ii) Encode $(1236)_{10}$ in excess-3 code. (iii) Find 1's and 2's complement of number 10100111.	**07**
	(b)	Draw symbols and truth table for AND, OR, NOT gates. Prove that NAND and NOR gates are universal gates.	**07**
		OR	
Q.5	**(a)**	What is zero-crossing detector? Explain operation of zero-crossing detector with circuit.	**07**
	(b)	Explain the operation of Schmitt trigger circuit.	**07**

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