Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: BE03009011 **Date: 15-12-2025**

Subject Name: Analog and Digital Electronics

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)**	Draw the symbol and write truth table of NAND, NOR, EX-NOR gate	**03**
	(b)	Define slew rate, CMRR, output offset voltage and input bias current	**04**
	(c)	Draw and explain block diagram of an OPAMP.	**07**
Q.2	**(a)**	Define the term inverting, non-inverting and differential amplifier.	**03**
	(b)	Discuss the application of OPAMP as a zero-crossing detector.	**04**
	(c)	The OPAMP is a 741C with the following specifications: A = 200000, Ri = 2MΩ, Ro = 75Ω, fo = 5Hz, Supply voltage = +15V, and output voltage swing = ±13V. It is connected as a close loop noninverting amplifier with R1 = 1kΩ and RF = 10 kΩ. Calculate the values of A_F, R_{iF}, R_{oF} and f_F.	**07**
		OR	
	(c)	Derive the voltage gain equation of single OPAMP close loop differential amplifier.	**07**
Q.3	**(a)**	Draw the circuit diagram of triangular wave generator using OPAMP.	**03**
	(b)	Draw the transfer characteristic of OPAMP comparator and explain in brief.	**04**
	(c)	Draw and explain working of adjustable voltage regulator using IC LM 317.	**07**
		OR	
	(a)	Draw the circuit diagram of peak detector using OPAMP	**03**
	(b)	Draw the circuit of non-inverting negative half wave precision rectifier using OPAMP and explain in brief.	**04**
	(c)	Explain with diagram the working of Wien bridge oscillator using an OPAMP.	**07**
Q.4	**(a)**	Compare the performance of SR flipflop using NAND gates and NOR gates.	**03**
	(b)	Classify the register based on data shifting and circuit technology with brief description.	**04**
	(c)	Explain the working of decade counter with logic diagram and timing diagram.	**07**
		OR	

	(a)	Write excitation table of T flipflop and also write it's characteristic equation from 2 variable k-map.	**03**
	(b)	Analyze the synchronous operation of a 4-bit shift left register by logic diagram and timing diagram.	**04**
	(c)	Explain the working of 4-bit synchronous counter with look ahead carry. Also draw logic diagram and timing diagram.	**07**
Q.5	**(a)**	State applications of Digital to Analog converter.	**03**
	(b)	Explain 2-bit digital comparator with logic diagram and truth table.	**04**
	(c)	Explain the voltage to time conversion type ADC with circuit diagram and waveforms.	**07**

OR

	(a)	Write analog output voltage equation of weighted resistor D/A converter and explain in brief.	**03**
	(b)	Draw and explain the 4-variable k-map with assuming suitable data.	**04**
	(c)	Explain in detail the process of sampling, quantization and encoding used for A/D converter.	**07**

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