Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– III EXAMINATION – SUMMER 2026

Subject Code:3130907 Date:19-06-2026

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define following terms: 1. Output offset voltage, 2. Input bias current, 3. Input offset current,	**03**
	(b)	Describe block diagram of OPAMP.	**04**
	(c)	Describe J-K Master Slave flip flop with necessary truth table.	**07**
Q.2	**(a)**	Compare inverting and non inverting amplifier.	**03**
	(b)	Describe instrumentation amplifier using OPAMP	**04**
	(c)	Explain inverting circuit using OPAMP with necessary equations and waveforms.	**07**
		OR	
	(c)	Explain non-inverting circuit using OPAMP with necessary equations and waveforms.	**07**
Q.3	**(a)**	Discuss zero crossing detector using OPAMP	**03**
	(b)	Classify active filter.	**04**
	(c)	Describe integrator circuit with necessary waveforms.	**07**
		OR	
Q.3	**(a)**	Discuss peak detector using OPAMP	**03**
	(b)	Discuss PID controller with necessary sketches.	**04**
	(c)	Describe wein bridge oscillator circuit with necessary waveforms.	**07**
Q.4	**(a)**	What is an encoder? How does a priority encoder differ from a conventional encoder?	**03**
	(b)	How do you characterize or define a combinational circuit? How does it differ from a sequential circuit?. Give one example of combinational circuit	**04**
	(c)	Calculate following with help of K-Map and implement the output with necessary circuit. $y=\Sigma m\ (0,1,3,5,9,12)+ d(2,4,6,7)$	**07**
		OR	
Q.4	**(a)**	What is a demultiplexer and how does it differ from a decoder?	**03**
	(b)	Briefly describe the concept of look-ahead carry generation with respect to its use in adder circuits.	**04**
	(c)	Calculate the following with help of Quine McClukey tabular method.: $Y=\Sigma\ (2,6,8,9,10,11,14,15)$	**07**
Q.5	**(a)**	Define following terms with respect to A to D converter: 1. Resolution 2. Accuracy 3. Sampling frequency	**03**
	(b)	Elaborate full adder circuit with truth table.	**04**
	(c)	Explain the process of digital-to-analogue conversion in a binary ladder	**07**

network. Write an expression for the output analogue voltage for an n-bit binary ladder network.

OR

Q.5	**(a)**	Define following terms with respect to D to A converter: 1. Settling time 2. Nonlinearity 3. Monotonocity	**03**
	(b)	Elaborate full subtractor circuit with truth table.	**04**
	(c)	Explain the principle of operation of a simultaneous or flash-type A/D converter. What are the merits and demerits of this type of converter?	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III EXAMINATION – SUMMER 2025

Subject Code:3130907 Date:31-05-2025

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	State all ideal characteristics of an opamp	**03**
	(b)	Describe Input Offset Voltage and Input Bias Current	**04**
	(c)	Describe the working of JK master slave FF with necessary truth tables and waveforms	**07**
Q.2	**(a)**	Discuss the working of Zero Crossing Detector with necessary diagram and waveforms	**03**
	(b)	Sketch the block diagram of an opamp and briefly explain the function of each block	**04**
	(c)	Discuss (i) CMRR (ii) Slew Rate	**07**
		OR	
	(c)	Explain the working of an Integrator with necessary diagrams	**07**
Q.3	**(a)**	Compare RC phase shift and Wien bridge oscillator	**03**
	(b)	A noninverting opamp with R_1 = 1kΩ and R_F = 10kΩ has following parameters: A = 200,000, R_i = 2MΩ, R_o = 75Ω, f_o = 5Hz, Supply voltages = ±15V, Output Voltage Swing = ±13V. Solve and find the values of A_F, R_{iF}, R_{oF}	**04**
	(c)	Describe the working of Instrumentation Amplifier using opamp. List it's advantages and applications	**07**
		OR	
Q.3	**(a)**	Write a brief note on Voltage Follower circuit	**03**
	(b)	Compare a Comparator and Schmitt Trigger circuit	**04**
	(c)	Explain the working of closed loop opamp in non-inverting mode and derive the voltage gain formula	**07**
Q.4	**(a)**	Compare Combinational and Sequential Digital circuits	**03**
	(b)	Discuss the applications of shift registers	**04**
	(c)	Minimize the following expressions using K maps: (i) F = Σm (4,5,7,12,14,15) + Σd (3,8,10) (ii) F = ΠM (0,3,7,8,9,10,11,15)• Πd (2,4)	**07**
		OR	
Q.4	**(a)**	List the steps to be followed in Quine Mckluskey method	**03**
	(b)	Describe the working of a decimal to binary encoder with the help of logic diagram and truth table	**04**
	(c)	Write a note on Ring Counter	**07**
Q.5	**(a)**	Explain the following terms of DAC: a) Accuracy b) Resolution c) Setting time	**03**
	(b)	Explain resolution and quantization error about ADC	**04**

	(c)	Draw & explain R-2R ladder D/A converter with necessary equations	**07**

OR

Q.5	**(a)**	List Analog to Digital Converter ICs	**03**
	(b)	Illustrate different methods for analog to digital conversion	**04**
	(c)	Draw the block diagram and explain about a 3 terminal voltage regulator	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2024

Subject Code:3130907 Date:29-06-2024

Subject Name: Analog & 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)**	List all ideal characteristics of an Op-Amp.	**03**
	(b)	Classify the types of negative feedback and explain each in brief.	**04**
	(c)	Draw and explain block diagram of a typical OP-AMP	**07**
Q.2	**(a)**	Compare the inverting and non-inverting comparators	**03**
	(b)	Explain how to generate triangular wave using OPAMP	**04**
	(c)	Draw the circuit Op-Amp as a Integrator and explain with necessary waveforms	**07**
		OR	
	(c)	Explain positive peak detector circuit using OPAMP.	**07**
Q.3	**(a)**	Calculate maximum frequency for a sine wave, output voltage of 12 V peak with an OPAMP having slew rate 1 V/μS	**03**
	(b)	Explain the use of external offset voltage compensation circuits in op amps.	**04**
	(c)	Explain the working of J- K flip flop with the help of diagram	**07**
		OR	
Q.3	**(a)**	Reduce the following function using Boolean Algebra's Laws and Theorems **F=AB'C + B + BD' + ABD' + A'C**	**03**
	(b)	Explain the operation of Zero crossing detector.	**04**
	(c)	Describe 3 to 8 line decoder with logic diagram and truth table.	**07**
Q.4	**(a)**	Compare decoder and demultiplexer.	**03**
	(b)	Draw and Explain 4-bit bidirectional Shift Register.	**04**
	(c)	Implement a full adder using 8 : 1 multiplexer.	**07**
		OR	
Q.4	**(a)**	Differentiate the Asynchronous counter and Synchronous counter	**03**
	(b)	Simply the following function using K map and implement using logic gates. $F = \sum m(2,9,10,12,13) + D(15,14)$	**04**
	(c)	Explain full subtractor and construct full subtractor using half subtractors.	**07**
Q.5	**(a)**	Define following specification of ADC i) Resolution ii)Conversion time and iii) Quantization error	**03**
	(b)	Explain R-2R ladder DAC with necessary diagram	**04**
	(c)	Describe operation of D/A converter with binary – weighted resistors	**07**
		OR	
Q.5	**(a)**	Explain terms Accuracy and settling time for DAC	**03**
	(b)	What will be resolution of 4 bit ADC with 5V input? Define quantization error for ADC.	**04**
	(c)	Explain working of successive approximation type ADC	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(NEW) EXAMINATION – SUMMER 2023

Subject Code:3130907 Date:28-07-2023

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define Slew Rate, CMRR, & Input Offset Voltage.	**03**
	(b)	What is cross over distortion in power amplifier?	**04**
	(c)	Sketch the block schematic of a typical operational amplifier and briefly explain the function of each block.	**07**
Q.2	**(a)**	List applications of instrumentation amplifier.	**03**
	(b)	Design an R-C phase shift oscillator to produce a sinusoidal output at 1KHz, using capacitor value 0.1 μF.	**04**
	(c)	Draw integrator circuit with example of input and output Waveforms. Derive expression for output voltage.	**07**
		OR	
	(c)	Draw & explain in detail the logic diagram & the truth table of clocked SR flip-flop.	**07**
Q.3	**(a)**	For an inverting amplifier, V1 = 1V, V2 = 3V, V3 = 2V with R1 = R2 = R3 = 2KΩ and RF = 3KΩ. Determine the output voltage.	**03**
	(b)	Implement the following function using 8:1 Multiplexer. $F(A,B,C,D) = \bar{A}B\bar{D} + ACD + \bar{B}CD + \bar{A}\bar{C}D$	**04**
	(c)	Explain the circuit diagram of op-amp as a Peak detector.	**07**
		OR	
Q.3	**(a)**	Simplify $\bar{A}BC\bar{D} + BC\bar{D} + B\bar{C}\bar{D} + B\bar{C}D$.	**03**
	(b)	Classify digital logic gates. Draw truth table and symbols of basic logic gates.	**04**
	(c)	Prove that NAND and NOR gates are universal gates.	**07**
Q.4	**(a)**	Design D FF using SR FF. Write truth table of D FF.	**03**
	(b)	Explain Master-Slave J-K flip-flop configuration.	**04**
	(c)	Simplify the Boolean function F(A,B,C,D) = Σm (1,5,6,12,13,14), Σd=(2,4) using K-map method. Implement using basic logic gates.	**07**
		OR	
Q.4	**(a)**	Design half subtractor logic circuit.	**03**
	(b)	Write short note on Gray code.	**04**
	(c)	Explain Half Adder circuit .Explain Full adder circuit with the help of two Half adder.	**07**
Q.5	**(a)**	Compare RC phase shift and Wien bridge oscillator.	**03**
	(b)	Explain R-2R ladder DAC with necessary diagram.	**04**
	(c)	Explain the working of Zero crossing Detector.	**07**

OR

Q.5	**(a)**	Define following a) Attenuation b) Pass Band c) Cut of frequency	**03**
	(b)	Draw Schmitt trigger circuit. Plot input and output waveforms.	**04**
	(c)	List out various commonly used A/D converters. Draw & explain Flash A/D converter with necessary decoding table. Also mention pros & cons of the same.	**07**

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