

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III EXAMINATION – WINTER 2025****Subject Code:3130907****Date:15-12-2025****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) Draw symbol of OP-AMP and equivalent circuit of OP-AMP.	03
	(b) Explain Non-inverting Amplifier and Inverting Amplifier with waveform.	04
	(c) Draw block diagram of OP-AMP. Explain each block in detail.	07
Q.2	(a) List out and discuss all the ideal characteristics of an OP-AMP.	03
	(b) Define following terms: 1.Input Offset voltage 2.Input offset current 3.Input bias current 4. CMRR	04
	(c) Derive an expression for the output of a Inverting Summing amplifier with three input and Average amplifier.	07
	OR	
	(c) Explain Half Adder circuit .Explain Full adder circuit with the help of two Half adder.	07
Q.3	(a) Explain Square wave generator circuit using OP-AMP	03
	(b) Draw and explain peak detector circuit using OP-AMP. Write applications of Peak detector.	04
	(c) Minimize following Boolean function using K-map $F(A,B,C,D) = \sum m(1,3,7,11,15) + \sum d(0,2,5)$	07
	OR	
Q.3	(a) Draw voltage follower circuit. Prove that voltage follower has unity gain.	03
	(b) Discuss Wein bridge oscillators with circuit diagram.	04
	(c) Explain circuit of OP-AMP as an integrator and draw output wave form.	07
Q.4	(a) In response to a square wave input, the output of an OP-AMP changed from -3 V TO +3 V over a time period of 0.25 microsecond. Determine the slew rate of the OP-AMP.	03
	(b) Simplify and prove that Boolean function $F=(A+\bar{B}+AB)(A+\bar{B})(\bar{A}B)=0$	04
	(c) Minimize the following expression using K-map and realize using the logic gates. $F(a, b, c, d) = \sum m(1,2,9,10,11,14,15)$	07
	OR	
Q.4	(a) What is Flip Flop? Draw Basic Block Diagram of SR Flip Flop and Explain Working of SR Flip Flop with Truth Table.	03
	(b) Draw a 4-bit asynchronous up counter, explain its working with truth table.	04
	(c) Explain the working of R-2R Ladder D/A converter.	07

- Q.5** **(a)** Design half subtractor logic circuit. **03**
 (b) Explain working of sample and hold circuit using op-amp. Write application of it. **04**
 (c) Draw diagram of serial in parallel out operation of shift register and explain its **07**
 working with truth table.

OR

- Q.5** **(a)** Draw block diagram of 3 to 8 Decoder with truth table. **03**
 (b) Explain Master-Slave J-K flip-flop configuration. **04**
 (c) Draw a 3-bit up/down ripple counter, explain its working with truth table. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024

Subject Code: 3130907**Date: 29-11-2024****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

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|------------|---|-----------|
| Q.1 | (a) Explain memory and differentiate between 1-bit memory and 1-byte memory. | 03 |
| | (b) Describe Amplifiers and Oscillators. State basic difference between them. | 04 |
| | (c) Draw and explain working of zero crossing detector, and state its applications. | 07 |
| | | |
| Q.2 | (a) Define input bias current, input offset current, and slew rate. | 03 |
| | (b) State the non-idealities in an op-amp. | 04 |
| | (c) Draw and explain the internal structure of an operational amplifier. | 07 |
| OR | | |
| | (c) Draw and explain the working of a differential amplifier. | 07 |
| | | |
| Q.3 | (a) Write the features of an ideal op-amp. | 03 |
| | (b) Draw and explain Op-Amp as an integrator. | 04 |
| | (c) Draw and explain the working of an inverting amplifier. | 07 |
| OR | | |
| Q.3 | (a) Explain Op-amp as phase shift amplifier. | 03 |
| | (b) Draw and explain Op-Amp as an instrumentation amplifier. | 04 |
| | (c) Draw and explain summing amplifier. | 07 |
| | | |
| Q.4 | (a) Compare combinational and sequential circuits. | 03 |
| | (b) Draw and explain peak detector. | 04 |
| | (c) State and explain don't care conditions in K-Map. Give suitable example. | 07 |
| OR | | |
| Q.4 | (a) Explain in brief the difference between latch and flip-flop. | 03 |
| | (b) Draw and explain precision rectifier. | 04 |
| | (c) State truth table of full subtractor and design it using 3 X 8 decoder. | 07 |
| | | |
| Q.5 | (a) State applications of shift registers. | 03 |
| | (b) Explain parallel comparator A/D converter | 04 |
| | (c) Discuss asynchronous and synchronous counters. Compare them. | 07 |
| OR | | |
| Q.5 | (a) Explain sample and hold circuit. | 03 |
| | (b) Draw and explain the working of RS Flip-Flop. | 04 |
| | (c) Draw and explain the working of successive approximation A/D converter. | 07 |

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3130907

Date:18-01-2024

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) Draw transistor C-E amplifier circuit. Draw its ac equivalent circuit.	03
	(b) What is cross over distortion in power amplifier?	04
	(c) Draw equivalent circuit of OP-Amp. Explain each part.	07
Q.2	(a) List applications of instrumentation amplifier.	03
	(b) Prove that voltage follower has unity gain.	04
	(c) Discuss the classification of active filter and explain the frequency response of each type.	07
	OR	
	(c) What do you mean by slew rate in an OP-AMP? Also mention about causes of slew rate and explain its significance in applications.	07
Q.3	(a) How to detect peak of waveform using OP-AMP?	03
	(b) Sketch and explain Wein bridge oscillator.	04
	(c) Draw and explain the use of op-amp as a zero-crossing detector.	07
	OR	
Q.3	(a) Explain how to generate triangular wave using OPAMP.	03
	(b) Write a short note on Precision rectifier.	04
	(c) Draw and explain the block diagram of basic three terminal IC regulator.	07
Q.4	(a) Explain the different types of triggering methods used for flip flops.	03
	(b) Write short note on binary codes.	04
	(c) Explain Master-Slave J-K flip-flop configuration.	07
	OR	
Q.4	(a) What is multiplexer?	03
	(b) Design full adder circuit.	04
	(c) Minimize following Boolean function using K-map and implement using basic logic gates: $F(A,B,C,D) = \sum m(1, 2, 3, 8, 9, 11, 14)$ with $d(7, 15)$	07
Q.5	(a) Define following specification of DAC a) Accuracy b) Resolution c) Setting time	03
	(b) Compare combinational logic circuit with sequential logic circuit.	04
	(c) Design a 4 bit synchronous up counter.	07

OR

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| Q.5 | (a) Sketch sample and hold circuit and explain its working. | 03 |
| | (b) Which are the different methods for A/D conversion? | 04 |
| | (c) Explain in detail 7 segment LED display. | 07 |

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– III(NEW) EXAMINATION – WINTER 2022****Subject Code:3130907****Date:24-02-2023****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 the following a) Input Offset Current b) Slew Rate c) Input Bias Current	03
	(b) Explain the ideal voltage transfer characteristics of Op-Amp.	04
	(c) Draw the block schematic of a typical operational amplifier Op-Amp and briefly explain the function of each block.	07
Q.2	(a) Explain the procedure of offset voltage compensation in an op amp.	03
	(b) Explain voltage follower with its application.	04
	(c) Draw and explain working of Op-amp based Wien Bridge oscillator with its advantages and application.	07
	OR	
	(c) With neat circuit diagram explain the working of an Integrator with relevant waveforms.	07
Q.3	(a) Implement the following logic function using the 8:1 multiplexer. $F(A,B,C) = \sum m(0,1,3,5,7)$	03
	(b) Minimize the following expression and realize using basic gates. $Y = \sum m(0,2,5,6,7,8,10,13,15)$	04
	(c) Simplify the Boolean function $F = \bar{A}\bar{B}\bar{C} + A\bar{B}D + \bar{A}\bar{B}C\bar{D}$ using don't care conditions $d = ABC + A\bar{B}\bar{D}$ in 1) Sum of products (SOP) and 2) Product of sums (POS) by means of K Map and implement it with no more than two NOR gates. Assume that both the normal and complement inputs are available.	07
	OR	
Q.3	(a) Compare Multiplexer and Demultiplexer.	03
	(b) Explain how Demultiplexer can be used as a 3:8 Decoder.	04
	(c) Derive full subtractor with the help of necessary truth table and K-map. Also express in terms of logic diagram.	07
Q.4	(a) What are Preset and Clear inputs with flip flop? Why are they provided with flip flop?	03
	(b) Classify the various modes of operation of shift register.	04
	(c) Explain the working of Master Slave JK flip flop.	07
	OR	
Q.4	(a) Differentiate between combinational logic circuit and sequential logic circuit.	03

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| | (b) | Write a short notes on Parallel in serial out shift register. | 04 |
| | (c) | Explain S R flip flop with it's working operation. | 07 |
| Q.5 | (a) | Compare various D/A converters. | 03 |
| | (b) | Define 3- bit parity generator circuit using even parity bit. | 04 |
| | (c) | Explain R-2R ladder DAC with necessary diagram. | 07 |
| | | OR | |
| Q.5 | (a) | Define following specification of ADC | 03 |
| | | 1)Conversion Time | |
| | | 2)Resolution | |
| | | 3)Quantization | |
| | (b) | State the difference between Asynchronous and Synchronous counters. | 04 |
| | (c) | Explain working of Successive approximation type ADC | 07 |