Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2021

Subject Code: 2141002 Date:03/09/2021

Subject Name: Analog Circuit Design

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.**

Q.1	**(a)**	Define the following parameters of Op-Amp: 1) Slew Rate 2) CMRR 3) UGB	**03**
	(b)	Draw and explain block diagram of Op-amp.	**04**
	(c)	What is RC Phase shift oscillator? Brief and derive with necessary equations.	**07**
Q.2	**(a)**	Explain transfer characteristics of an ideal Op-amp?	**03**
	(b)	What is an oscillator? Explain the concept of oscillation with Barkhausen criteria.	**04**
	(c)	Draw the hybrid Π model for a single stage CE transistor amplifier having load resistance R_L and obtain the expression for short circuit current gain.	**07**
		OR	
	(c)	Draw the hybrid Π model for a transistor in CE configuration and derive the expression for trans conductance g_m. Justify the validity of this model.	**07**
Q.3	**(a)**	Define the following terms 1) Input offset voltage 2) Thermal Drift 3) Total output offset voltage	**03**
	(b)	Discuss How op-amp can be used as current to voltage converter.	**04**
	(c)	Derive expression for closed loop gain of a voltage series feedback amplifier using op-amp.	**07**
		OR	
Q.3	**(a)**	Explain the precision rectifier and draw half wave precision rectifier circuit.	**03**
	(b)	Discuss the features of LM317 Regulator.	**04**
	(c)	Show how Op-Amp can be used as summing, scaling and averaging amplifiers using non inverting configuration.	**07**
Q.4	**(a)**	Draw clipper and clamper circuit with waveform using op-amp	**03**
	(b)	Draw and explain peak detector.	**04**
	(c)	An astable 555 Oscillator is constructed using the following components, R1 = 1kΩ, R2 = 2kΩ and capacitor C = 10uF. Calculate the output	**07**

frequency from the 555 oscillator and the duty cycle of the output waveform.

OR

Q.4	**(a)**	What is SMPS ? Discuss it's advantages and disadvantages.	**03**
	(b)	Explain zero crossing detector with circuit diagram and waveform.	**04**
	(c)	Draw and explain Op-amp based two-sided voltage limiter circuit and its response.	**07**
Q.5	**(a)**	Differentiate between active and passive filters.	**03**
	(b)	Discuss magnitude and frequency scaling in filter design.	**04**
	(c)	Draw sallen-key LPF and derive its transfer function.	**07**

OR

Q.5	**(a)**	State the properties of Butterworth filter.	**03**
	(b)	Draw the block diagram of PLL and explain each block.	**04**
	(c)	Show how Bi-quad circuit can be used as a universal filter?	**07**

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