Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2022

Subject Code:2141002 Date:23-06-2022

Subject Name:Analog Circuit Design

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 characteristics of an ideal Op-amp.	**03**
	(b)	Define the following parameters of Op-Amp: (i) Slew Rate (ii) CMRR (iii)Input offset voltage (iv)Input bias current	**04**
	(c)	Draw the hybrid Π common emitter transistor model. Derive the expression for input conductance.	**07**
Q.2	**(a)**	Draw and explain block diagram of Op-amp.	**03**
	(b)	List the parameter those affecting to the transistor at high frequencies.	**04**
	(c)	Derive the expression for the frequency for the RC phase shift oscillator using transistor.	**07**
		OR	
	(c)	Write a short-note on crystal oscillator.	**07**
Q.3	**(a)**	For Hybrid-π transistor model g_m = 50 mA/V, rb'e = 1 K, Ce = 1 pF, and Cc = 0.2 pF is given then determine the values of f_β and f_T.	**03**
	(b)	Explain in detail working of Inverting amplifier in open loop op-amp configuration.	**04**
	(c)	Derive expression for closed loop gain of a voltage series feedback amplifier using op-amp.	**07**
		OR	
Q.3	**(a)**	Define the following parameters of Op-Amp: (i) PSRR (ii) Unity Gain Bandwidth (iii)Thermal Drift	**03**
	(b)	Draw and explain the op amp as an averaging amplifier.	**04**
	(c)	Explain the ideal integrator. What are the problems associated with this configuration? How it can overcome?	**07**
Q.4	**(a)**	What is the difference between active and passive filters?	**03**
	(b)	Explain Op-amp based Zero Crossing Detector with circuit diagram and waveforms.	**04**
	(c)	What is instrumentation amplifier? With help of neat diagram explain operation of Three OP-AMP based Instrumentation amplifier.	**07**
		OR	
Q.4	**(a)**	Draw simplified internal block diagram of 555 Timer IC.	**03**
	(b)	Explain the magnitude characteristic of band pass and band stop filter.	**04**

	(c)	Write a short note on first order low-pass butterworth filter.	**07**
Q.5	**(a)**	Draw and explain schematic symbol for the op-amp.	**03**
	(b)	List advantages of Schmitt trigger over the conventional comparators.	**04**
	(c)	Explain with the circuit diagram and waveforms, the monostable multivibrator using 555 timer.	**07**

OR

Q.5	**(a)**	What do you mean by Voltage regulator? List different types of voltage regulators.	**03**
	(b)	Draw and explain triangular wave generator circuit using Op-amp.	**04**
	(c)	What is PLL? Explain operation of PLL with basic blocks and mention any four applications of it in radio communication.	**07**

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