Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2141706 **Date: 08/06/2017**

Subject Name: Analog Signal Processing

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Define slew rate with formula.	
	2	Define common mode rejection ratio.	
	3	If feedback resistance is 47KΩ and input resistance of 4.7KΩ in inverting op amp then gain is = _____.	
	4	Which circuit uses the positive feedback?	
	5	The output of differentiator circuit for square wave input is _____.	
	6	The output of integrator circuit for square wave input is _____.	
	7	The gain of voltage follower is equal to _____.	
	8	What is he phase difference between input and output in negative feedback?	
	9	Which IC is used for VCO?	
	10	What should be the amplifier gain A and β condition of Wien bridge oscillator?	
	11	What is input offset voltage?	
	12	What is the gain formula of Differential input and differential output amplifier?	
	13	Draw only the input and output waveforms of absolute value output circuit.	
	14	Define duty cycle and f_o of Astable multivibrator.	
Q.2	**(a)**	Design scaling amplifier circuit using an op-amp to give output $V_O = -\left(3V_1 + 4V_2 + 3V_3\right)$.	**03**
	(b)	Derive the gain formula of Voltage shunt amplifier.	**04**
	(c)	Design an op-amp based practical differentiator circuit to differentiate an input signal that varies in frequency from 10 Hz to 1 kHz. Draw output waveform of the designed differentiator circuit for an input signal with 2V peak-to-peak amplitude with 1 kHz frequency.(Assume Capacitance=0.1 microfarad)	**07**
		OR	
	(c)	The IC 741 non inverting op-amp having following parameters: open loop gain is 2 X 10^5, R_i= 2MΩ, Ro=75 Ω, f_o=5Hz. supply voltage =+15 and -15 Volts. Compute closed loop gain, input resistance with feedback (R_{if}), R_{of} and f_F.	**07**
Q.3	**(a)**	For a practical op-amp input offset current is 20nA, while i/p bias current is 60nA.Calculate values of two input bias currents.	**03**
	(b)	Explain the Sample and hold circuit.	**04**
	(c)	Explain working of op-amp based Schmitt trigger circuit along with schematic and input/output waveforms.	**07**
		OR	

Q.3	**(a)**	Explain the Quadrature oscillator.	**03**
	(b)	Write short note on chopped stability amplifier using op-amp.	**04**
	(c)	Write short note on integrator circuit application of op-amp and draw its waveform with V_o expression.	**07**
Q.4	**(a)**	Draw only symbol and block diagram of op-amp.	**03**
	(b)	Draw small signal half wave rectifier using op amp.	**04**
	(c)	Draw and explain the 9400 V/F converter equivalent circuit, connection diagram, waveforms and its working.	**07**

OR

Q.4	**(a)**	Draw and derive Vo of the inverting summing amplifier.	**03**
	(b)	Draw and explain the monostable multivibrator.	**04**
	(c)	Write a short on : Triangular wave generator	**07**
Q.5	**(a)**	Derive only 0db gain frequency (f_b) and gain limiting frequency (f_a) for integrator.	**03**
	(b)	Draw only IC 555 timer pin connection diagram and internal block diagram.	**04**
	(c)	Which are the types of active filters, draw and explain the frequency response curves of filters and define bands.	**07**

OR

Q.5	**(a)**	Explain the frequency divider application of IC 555 using waveforms.	**03**
	(b)	Write comparison between passive and active filters.	**04**
	(c)	Draw and explain the first order Butterworth high pass filter and derive its transfer function.	**07**

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