Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–IV EXAMINATION – WINTER 2015

Subject Code:X41103 **Date:23/12/2015**

Subject Name: Integrated Circuits and Applications

Time: 02:30pm to 05:00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain Integrator circuit using Op-amp in detail.	**07**
	(b)	(1) Explain the characteristics of Ideal Op-amp (04) (2) Draw the equivalent circuit diagram of Op-amp and its ideal voltage transfer curve (03)	**07**
Q.2	**(a)**	Design amplifier circuit by using Op-amp 741 such that it can amplify output signal which is 10 times than the input signal with same phase. Find out the factor by which amplifier can increase bandwidth than open loop configuration. (Open loop gain A = 200,000 and Open loop bandwidth fo = 5 Hz)	**07**
	(b)	An Op-amp has slew rate of 1 V/µS with gain of 40 dB. If this amplifier has to faithfully amplify sinusoidal signals from zero to 20 KHz without any distortion what must be maximum input signal level.	**07**
		OR	
	(b)	Explain triangle wave generator using Op-amp in detail.	**07**
Q.3	**(a)**	The Op-amp is used as an inverting amplifier with following specification: $\frac{\Delta Vio}{\Delta T} = 30\frac{\mu V}{°C}$ maximum $\frac{\Delta Iio}{\Delta T} = 300\frac{pA}{°C}$ maximum $R1 = 1\ K\Omega, RF = 100\ K\Omega$ and $RL = 10\ K\Omega$ Vs = +/- 15 V. Assume that the amplifier is nulled at 25° C. Calculate the value of error voltage Ev and the output voltage ate 35° C if: (a) Vin = 1 mV dc (b) Vin = 10 mV dc.	**07**
	(b)	Draw and explain the positive and negative clipper circuit using Op-amp.	**07**
		OR	
Q.3	**(a)**	Draw and explain the circuit diagram by using Op-amp which can perform the following task: $Vo = 0$ if $Vin > 0$ $Vo = -Vin$ if $Vin < 0$	**07**
	(b)	Explain Op-amp based inverting comparator circuit with (i) Positive reference voltage (ii) Negative reference voltage. Show the necessary waveform.	**07**
Q.4	**(a)**	What is the difference between active and passive filters? Classify filters based on roll off factors, operating range, and frequency response.	**07**
	(b)	What is the application of sample and hold circuit? Draw and explain the working of sample and hold circuit.	**07**
		OR	

Q.4	**(a)**	Analyze second order Butterworth High Pass filter. Draw its frequency response and state design procedure.	**07**
	(b)	If V_1 and V_2 are two input voltages and V_o is the output voltage then design the circuit diagram with the Op-amp that gives the output voltage $V_o = 2V_1 - 2V_2$	**07**
Q.5	**(a)**	Explain the adjustable voltage regulator in detail.	**07**
	(b)	Explain astable multivibrator using 555 timer in detail.	**07**
		OR	
Q.5	**(a)**	Explain 555 timer as a monostable multivibrator in detail.	**07**
	(b)	List the applications of Operational tranconductance amplifier. Explain its application as a current controlled Integrator.	**07**

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