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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 151003 **Date: 05/05/2017**

Subject Name: Integrated Circuits and Applications

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.**

Q.1	**(a)**	Draw two op-amp based differential amplifier and derive expression for its gain, input and output resistances, and bandwidth.	**07**
	(b)	Explain working of op-amp based Schmitt trigger circuit along with schematic and input/output waveforms.	**07**
Q.2	**(a)**	Describe the operation of differential instrumentation amplifier which uses resistive transducer in a bridge circuit. Show that the output voltage is directly proportional to the change in resistance value of a transducer.	**07**
	(b)	Design four input amplifier such that Vo= VA-VB+ VC-VD.	**07**
		OR	
	(b)	(i) A 741 op-amp as inverting amplifier is driven by peak to peak 10 volt sine wave. The closed loop gain is 4. Supply voltage of op-amp is +/-15V.Draw input and out waveforms.	**04**
		(ii) Define following terms for op-amp: (a) CMRR, (b) SVRR, (c) Slew Rate	**03**
Q.3	**(a)**	Illustrate operation of op-amp based triangular wave generator circuit with necessary waveforms as well as mathematical steps.	**07**
	(b)	Classify filters with four basic types. Explain ideal and practical characteristics of all. Draw attenuation characteristics also.	**07**
		OR	
Q.3	**(a)**	With the help of a circuit diagram explain the operation of first order high pass filter.	**07**
	(b)	Explain voltage to current converter with floating load. Based on that show low voltage dc voltmeter circuit and discuss it.	**07**
Q.4	**(a)**	Explain how op-amp can be used as a differentiator. Discuss the sources of error. Draw and explain practical differentiator circuit.	**07**
	(b)	Design a Biquad bandpass filter with a center frequency of w = 1000 rad/s and a bandwidth of 200 rad/s. The midband gain H = 1.	**07**
		OR	
Q.4	**(a)**	Draw the circuit of basic integrator using an op-amp. What are the problems associated with this configuration? How they are overcome?	**07**
	(b)	Draw and explain working of op-amp based full-wave rectifier circuit. How is it better in performance compared to full-wave rectifier circuit without op-amp?	**07**
Q.5	**(a)**	Draw circuit diagram of an astable multivibrator using IC 555 and explain its operation. Derive expression for frequency of operation and duty cycle.	**07**
	(b)	What are the different types of voltage regulators? Discuss LM317 based adjustable voltage regulator. Indicate bypass capacitors to improve transient response and protective diodes in the connection diagram.	**07**
		OR	
Q.5	**(a)**	Explain working of 555 timer based monostable multivibrator. Design the same for the output pulse width of 30 ms.	**07**
	(b)	Describe the working principle of phase-locked loop with basic blocks. Discuss its application as a frequency multiplier.	**07**

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