Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER 2013

Subject Code: 151003 **Date: 29-11-2013**

Subject Name: Integrated Circuits and Applications

Time: 10.30 am - 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.**

Q.1 **(a)** What information is contained in a typical op-amp datasheet? Briefly explain. List three basic temperature grades for IC. What is the temperature range of 741C and 741A op-amp? **07**

(b) Which type of feedback Non-inverting op-amp has? Derive input impedance and bandwidth with feedback for it. Draw the circuit diagram. **07**

Q.2 **(a)** (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. Show values of output peak voltage also. Give your remarks about output. **04**

(ii) Define PSRR of an op-amp. In an op-amp PSRR is 150µV/V. If supply voltage is changed from +10V to +12V, What is the change in input offset voltage V_{io} ? **03**

(b) Draw the differential amplifier circuit using single op-amp and derive the expression for output voltage as a function of input voltages. Comment on its input resistance. **07**

OR

(b) Consider an inverting operational amplifier with R_F=100KΩ and R_1=1KΩ. Input offset voltage drift is 30µV/°C and input offset current drift is 300Pa/°C. Assume the amplifier is nulled at 25°C. Calculate the value of error voltage E_v and output voltage at 35°C if V_{in}=1mV dc. **07**

Q.3 **(a)** Explain voltage to current converter with floating load. Based on that show low voltagedc voltmeter circuit and discuss it. **07**

(b) What do you understand by precision rectifier ? Draw half wave precision rectifier circuit and explain with necessary waveforms. **07**

OR

Q.3 **(a)** Draw and explain summing amplifier circuit using op-amp in inverting configuration based on that design a circuit such that Vo = $-2(3V_1+4V_2+2V_3)$. **07**

(b) Explain op-amp based inverting comparator circuits with (i) positive reference voltage (ii) negative reference voltage. Show necessary waveforms. **07**

Q.4 **(a)** Draw the internal block diagram of 555 timer IC and explain the operation in monostable mode. **07**

(b) Explain op-amp based positive clipper circuit with necessary waveforms. Draw output waveforms for (i) Positive reference voltage (ii) Negative reference voltage. Assume input signal is sine wave. **07**

OR

Q.4 **(a)** Explain how op-amp can be used to generate free running square wave with necessary circuit diagram and waveforms. Show how time period can be calculated. **07**

(b) Explain the operation of 555 IC based astable multivibrator with necessary circuit diagram and waveforms. **07**

Q.5	**(a)**	Classify filters with four basic types. Explain ideal and practical characteristics of all. Draw attenuation characteristics also.	**07**
	(b)	Discuss fixed voltage regulators and adjustable voltage regulator with necessary circuit diagrams.	**07**

OR

Q.5	**(a)**	Explain magnitude and phase response of low pass function for biquad circuit.	**07**
	(b)	Explain the operating principle of Phase Locked Loop	**07**

****