B.E.-Instrumentation Engineering Sem IV

IN404 - Linear Integrated Circuits

P. Pages : 2 **GUG/S/18/3919**

Time : Three Hours * 1 0 2 8 * Max. Marks : 80

Notes : 1. Same Answer book must be used for all questions.
2. All questions carry marks as indicated.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) How does negative feedback affect the performance of an inverting amplifier? **4**

b) In what way is the voltage follower a special case of the non inverting amplifier? **4**

c) Discuss the necessity of 'DC' level shifter in operational amplifier. Draw and explain any one 'DC' level shifter circuit. **8**

OR

2. a) Define the following with respect to op-amp. Also mention their ideal values and practical values for IC 741. **8**
i) Supply voltage Rejection Ratio.
ii) Large signal voltage gain.
iii) Slew Rate.
iv) Input bias current.

b) Why open loop op-amp configurations are not used in linear applications? **4**

c) Differentiate between constant current source and current mirror? **4**

3. a) Design a differentiator that will differentiate an input signal with f_{max} = 100 Hz. **8**

b) Explain how addition and subtraction is accomplished using op-amp. Also derive an expression for the output voltage. **8**

OR

4. a) Draw the circuit of voltage to current converter if the load is (i) floating and (ii) grounded. Is there any limitation on the size of the load when grounded? **8**

b) Draw the circuit diagram of instrumentation amplifier and derive the expression for its gain. Enlist three application of the Instrumentation amplifier. **8**

5. a) Design a first order high pass filter at a cut off frequency of 2 kHz with a passband gain of 2. Also plot its frequency response. **8**

b) Draw the circuit of a Wien bridge oscillator and derive an expression for its frequency of oscillation. **8**

OR

6.	a)	Design RC phase – shift oscillator which oscillates at 5 kHz. Assume C = 0.1μF.	**4**
	b)	How an op-amp is used to produce the sinusoidal and triangular waveforms? Draw relevant circuit diagrams.	**4**
	c)	Distinguish between active and passive filters.	**4**
	d)	Design a 50 Hz active notch filter, assume C = 0.068 μF.	**4**
7.	a)	Define the terms upper and lower threshold of a Schmitt trigger? Draw the circuit diagram of Schmitt trigger and explain its operation in detail.	**8**
	b)	Design and draw clipper circuit for a clipping level of +0.35V, given an input sine wave of 0.5V peak. Assume amplifier gain is 10 and input resistance is 1 kΩ.	**4**
	c)	What is a zero crossing detector? Draw the circuit diagram and input, output waveforms.	**4**

OR

8.	a)	Define Resolution and conversion time of a data converter?	**4**
	b)	Draw the circuit diagram of R-2R ladder type DAC and Derive expression for output voltage.	**8**
	c)	What is a sample and hold circuit? Why is it needed?	**4**
9.	a)	Design an astable multivibrator using IC 555 for a frequency of 1 kHz and a duty cycle of 70%. Assume C = 0.1μF.	**8**
	b)	With neat block diagram, discuss the operation of PLL. Derive the expression for lock range and capture range.	**8**

OR

10.	a)	Derive the expression for the period of a pulse generated when 555 timer is used as monostable multivibrator.	**8**
	b)	Design a +12V regulator using LM 723, with a current limiting value of 50mA.	**8**

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