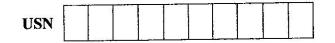
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## Fifth Semester B.E. Degree Examination, December 2010 Linear IC s and Applications

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.

- 2. Missing data may be suitably assumed.
- 3. Use of resistor, capacitor standard values list, op-amp data sheets is permitted.

## PART - A

- a. Explain the working of a high input impedance capacitor coupled voltage follower circuit, with a neat circuit diagram. (08 Marks)
  - b. Design and explain the operation of a single polarity non-inverting amplifier, with a neat sketch. (08 Marks)
  - c. A capacitor coupled inverting amplifier has the following components:  $R_1 = 2.7 \text{ k}\Omega$ ,  $R_2 = 100 \text{ k}\Omega$ ,  $R_L = 1.5 \text{ k}\Omega$ ,  $c_1 = 3.9 \text{ }\mu\text{F}$ ,  $c_2 = 0.68 \text{ }\mu\text{F}$ . Determine the circuit voltage gain, input impedance, lower cut off frequency and the impedance of  $c_1$  at  $f_1$ . (04 Marks)
- 2 a. Explain in detail about the phase lag and phase lead frequency compensation methods, along with the circuit and the frequency response curves. (10 Marks)
  - b. Discuss the effect of slew rate on bandwidth and output impedance. (08 Marks)
  - c. Calculate the slew rate limited cutoff frequency for a voltage follower circuit using a 741 op-amp if the peak of sine wave output is to be 5V? (02 Marks)
- a. Explain the working of a two output precision half wave rectifier. Sketch the input and output waveforms. (08 Marks)
  - b. A  $\pm 5$ V, 10 kHz square wave from a signal source with a resistance of 100  $\Omega$  is to have its positive peak clamped precisely at ground level. Tilt on the output is not to exceed 2% of the peak amplitude of the wave. Design a suitable op-amp circuit using a supply of  $\pm 12$ V.

(06 Marks)

- c. Discuss the holding time and acquisition time for a sample and hold circuit and write the equations for determining the capacitor size and the minimum acquisition time. (06 Marks)
- 4 a. With a circuit diagram, explain the working of a capacitor coupled crossing detector.

(07 Marks)

- b. Design a non inverting Schmit trigger circuit to have UTP = +4V, and LTP = -5V. Use a 741 op-amp with  $V_{CC} = \pm 15V$ . (08 Marks)
- c. Sketch the circuit, output waveform and the capacitor waveforms of an astable multivibrator.

  (05 Marks)

## PART - B

- 5 a. Sketch the circuit of a triangular/rectangular waveform generator. Draw the output waveforms at different stages and explain the circuit operation. (10 Marks)
  - b. Draw the circuit of a phase shift oscillator and explain. Sketch the output and the feedback voltage.

    (06 Marks)
  - c. Using a BIFET op-amp with a supply of ±12V, design a Weinbridge oscillator to have an output frequency of 20 kHz. (04 Marks)
- 6 a. Draw the circuit of a second order low pass filter and explain the working. (08 Marks)
  - b. Design a single stage bandpass filter to have cut off frequencies of 1 kHz and 50 kHz and a voltage gain of 1. (06 Marks)
  - e. Give the description of a band stop filter with the aid of frequency response curve. (06 Marks)
- 7 a. What is an universal active filter? List the salient features of FLT U2 specialized IC filter.
  (06 Marks)
  - b. Explain the theory of operation of a switched capacitor filter. List out the advantages of a switched capacitor filter. (08 Marks)
  - c. With a block diagram, explain the operation of a phase locked loop. (06 Marks)
- 8 a. Briefly explain the action of a dc voltage regulator. Write the equation for the line regulation, load regulation and ripple rejection. (10 Marks)
  - b. Explain with a schematic diagram LM217 integrated circuit positive voltage regulator. Calculate the resistances of R<sub>1</sub> and R<sub>2</sub> for LM217 voltage regulator to produce an output voltage of 9V. (10 Marks)

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