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06EE56

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

1 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 kΩ, R_2 = 100 kΩ, R_L = 1.5 kΩ, c_1 = 3.9 μF, c_2 = 0.68 μF. 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)**

3 a. Explain the working of a two output precision half wave rectifier. Sketch the input and output waveforms. **(08 Marks)**

b. A ±5V, 10 kHz square wave from a signal source with a resistance of 100 Ω 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 ±12V. **(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} = ±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)**

c. 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_1 and R_2 for LM217 voltage regulator to produce an output voltage of 9V. **(10 Marks)**

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