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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 : $R_1 = 2.7 \text{ k}\Omega$, $R_2 = 100 \text{ k}\Omega$, $R_L = 1.5 \text{ k}\Omega$, $c_1 = 3.9 \text{ }\mu\text{F}$, $c_2 = 0.68 \text{ }\mu\text{F}$. 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)
3.
 - a. Explain the working of a two output precision half wave rectifier. Sketch the input and output waveforms. (08 Marks)
 - b. A $\pm 5\text{V}$, 10 kHz square wave from a signal source with a resistance of $100 \text{ }\Omega$ 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 $\pm 12\text{V}$. (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 $UTP = +4\text{V}$, and $LTP = -5\text{V}$. Use a 741 op-amp with $V_{CC} = \pm 15\text{V}$. (08 Marks)
 - c. Sketch the circuit, output waveform and the capacitor waveforms of an astable multivibrator. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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 $\pm 12\text{V}$, 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)
