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06EC46

Fourth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Linear ICs and Applications

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define the following opamp parameters and mention their typical values for IC 741:
   i) Input voltage range
   ii) CMRR
   iii) Input offset voltage
   iv) Slew rate
   v) Input impedance. **(10 Marks)**

   b. With a neat circuit diagram, explain direct coupled inverting amplifier. Also, design an inverting amplifier using a 741 opamp. The voltage gain is to be 75 and the output voltage amplitude is to be 3V. $I_{B(max)}$ = 500nA. **(10 Marks)**

2 a. Explain a high input impedance capacitor coupled voltage follower, with necessary circuit diagram. **(10 Marks)**

   b. Design a capacitor-coupled inverting amplifier to operate with a +20V supply. The minimum input signal level is 50mV, the voltage gain is to be 68, the load resistance is 500Ω, and the lower cutoff frequency is to be 200 Hz. Use a 741 opamp. **(10 Marks)**

3 a. What are the effects of slew rate on
   i) Bandwidth
   ii) Output amplitude and
   iii) Output pulse rise time. **(06 Marks)**

   b. With a neat circuit diagram, explain Zin Mod technique of frequency compensation. **(06 Marks)**

   c. What precautions should be observed for opamp circuit stability? Draw the necessary diagram. **(08 Marks)**

4 a. With a neat circuit diagram, explain instrumentation amplifier. **(08 Marks)**

   b. Explain the operation of high input impedance full-wave precision rectifier with necessary diagram. Draw the voltage waveforms at various points in the circuit and write the appropriate equations to show that full-wave rectification is performed. **(12 Marks)**

PART – B

5 a. With a neat circuit diagram and waveforms, explain operation of a triangular/rectangular waveform generator with frequency and duty cycle controls. **(10 Marks)**

   b. Explain and design an RC phase – shift oscillator with following specifications: f_0 = 5 kHz, supply voltage = ±15V. IC 741 is to be used. **(10 Marks)**

6 a. Explain the operation of an inverting Schmitt trigger circuit with different UTP and LTP levels. Discuss the design procedure and also indicate the input/output characteristics for the same. **(10 Marks)**

b. Design a second-order high-pass active filter to have a cutoff frequency of 10 kHz. Use a 715 opamp. Draw the circuit and indicate the frequency response of the filter $I_{B(max)} = 1.5\mu A$. **(10 Marks)**

7 a. Explain the terms line regulation, load regulation and ripple rejection for a dc voltage regulator. **(06 Marks)**

b. With a neat schematic, explain the salient features of 723 regulator. **(08 Marks)**

c. Explain the principle of operation of a switching regulator. **(06 Marks)**

8 Write short notes on the following:

a. 555 timer as monostable multivibrator.

b. Voltage-controlled oscillator.

c. R-2R ladder DAC.

d. Servo tracking ADC. **(20 Marks)**

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