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10EC46

Fourth Semester B.E. Degree Examination, December 2012
Linear ICs and Applications

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. Missing data may be assumed.

PART – A

1 a. Explain the basic circuit of operational amplifier. **(08 Marks)**

b. Define Slew rate and unity gain band width. What is the effect of slew rate on the output voltage of an op-amp? **(06 Marks)**

c. Design an inverting amplifier using op-amp 741. The voltage gain is to be 50 and the output voltage amplitude is to be 2.5V. **(06 Marks)**

2 a. With a neat circuit diagram, explain capacitor coupled voltage follower with relevant design steps. **(10 Marks)**

b. With a neat circuit diagram, explain the design of high input impedance capacitor coupled non-inverting amplifier. **(10 Marks)**

3 a. Explain how stability of high gain amplifier and lower gain amplifier is analyzed. **(06 Marks)**

b. Explain phase-lag compensation and phase lead compensation. **(10 Marks)**

c. Determine the upper cutoff frequency for a (i) voltage follower, (ii) unity gain inverting amplifier using a 741 op-amp. Given that UGB of 741 is 800 kHz. **(04 Marks)**

4 a. With a neat circuit diagram, explain op-amp as precision voltage source. **(10 Marks)**

b. Briefly explain non-saturating precision half wave rectifier. **(05 Marks)**

c. Using Lipolar op-amps with $V_{CC} = \pm 15V$, design the high input impedance precision full wave rectifier. The input peak voltage is to be 1V and no amplification is to occur. **(05 Marks)**

PART – B

5 a. 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 1% of the peak amplitude of the wave. Design a suitable op-amp circuit for precision clamping using a supply of ±12V. **(08 Marks)**

b. Briefly explain op-amp square wave/triangular wave generator with relevant circuit diagram, waveforms and expressions. **(08 Marks)**

c. Using a BIFET op-amp with a supply of ±12V, design a Wein bridge oscillator to have an output frequency of 15 kHz. **(04 Marks)**

6 a. With a neat circuit diagram, waveform and expressions explain capacitor coupled non-inverting crossing detector. **(08 Marks)**

b. Explain op-amp inverting Schmitt trigger for adjustable UTP and LTP. **(08 Marks)**

c. Using a 741 op-amp design a first order active low pass filter to have a cut off frequency of 1 kHz. **(04 Marks)**

7 a. With a neat internal diagram of IC723, explain the functions of each block. **(10 Marks)**

b. Explain basic switching regulator circuit with relevant expressions. Mention its advantages and disadvantages. **(10 Marks)**

8 a. Explain 555 timer as monostable multivibrator with relevant circuit diagram, waveforms and expressions. **(07 Marks)**

b. Explain op-amp D/A converter with R and 2R resistors. **(07 Marks)**

c. Draw the block diagram of PLL and explain it. **(06 Marks)**

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