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10EC46

Fourth Semester B.E. Degree Examination, June/July 2017

### 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. Use of standard resistance and capacitance values table is permitted.

#### PART – A

1.
  - a. With a neat circuit diagram, explain the working of a basic op-amp circuits. (07 Marks)
  - b. Sketch an op-amp difference amplifier circuit. Explain the operation of the circuit and derive an equation for the output voltage. (07 Marks)
  - c. Two signals each ranging from 0.1V to 1V are to be summed and amplified by a factor of 5. Using 741 op-amp design a suitable inverting summing amplifier circuit. (06 Marks)
2.
  - a. Sketch and explain the operation of a capacitor coupled non-inverting amplifier circuit using single polarity power supply with necessary design steps. (08 Marks)
  - b. What is meant by setting upper cutoff frequency in a capacitor coupled op-amp? Explain how it is done in an inverting op-amp. (06 Marks)
  - c. Design a high input impedance capacitor coupled voltage follower using 741 op-amp. The lower cutoff frequency for the circuit is to be 50 Hz and the load resistance of 3.9 K $\Omega$ . Also determine the minimum theoretical input impedance of the circuit. (Consider  $M_{\min} = 50000$ ). (06 Marks)
3.
  - a. Explain Miller effect compensation. (08 Marks)
  - b. List the precautions to be observed for op-amp stability. (06 Marks)
  - c. Determine the upper cutoff frequency and the maximum distortion free output amplitude for a voltage follower.
    - i) When a 741 op-amp is used and
    - ii) When a LF 353 op-amp is used.
 For 741:  $f_2 = 800$  kHz,  $s = 0.5$  V/ $\mu$ s.  
 For LF353 :  $f_2 = 5$  MHz,  $s = 13$  V/ $\mu$ s (06 Marks)
4.
  - a. Draw the circuit of an instrumentation amplifier and explain its working and show how voltage gain can be varied. (08 Marks)
  - b. Explain the working of precision full wave rectifier using bipolar op-amp. (06 Marks)
  - c. Sketch the circuit of a current amplifier with floating load. Explain circuit operation and derive an equation for current gain. (06 Marks)

#### PART – B

5.
  - a. With a neat circuit diagram and waveforms, explain the working of triangular/rectangular waveform generator. (08 Marks)
  - b. With a neat circuit diagram, explain multiplier and divider. (06 Marks)
  - c. Using a 741 op-amp with  $\pm 12$  V supply, design a phase shift oscillator to have an output frequency of 5 kHz. (06 Marks)

- 6 a. With a neat circuit diagram, explain the operation of an inverting Schmitt trigger circuit. (06 Marks)
- b. Using op-amp, design a second order high pass filter to have a cutoff frequency of 7 kHz. (06 Marks)
- c. With a neat circuit diagram and waveforms, explain the operation of a stable multivibrator using op-amp. Also include design steps. (08 Marks)
- 7 a. What is an voltage regulator? With a neat sketch, explain the working of series op-amp regulator. (06 Marks)
- b. Design a voltage regulator using IC 723 to get an output voltage of 5V. (06 Marks)
- c. Explain the basic principle of operation of switching regulator. Discuss its advantages and limitations. (08 Marks)
- 8 a. Explain monostable multivibrator using IC 555. (06 Marks)
- b. Explain the operation of phase locked loop (PLL) with the help of neat block diagram. (07 Marks)
- c. With a neat block diagram, explain successive approximation ADC. (07 Marks)

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