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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 KΩ. 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/μs.
For LF353 : $f_2 = 5$ MHz, $s = 13$ V/μs **(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 ±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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