



10EC46

Fourth Semester B.E. Degree Examination, June/July 2019

## Linear ICs and Applications

Time: 3 hrs.

Max. Marks: 100

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

### PART – A

- 1 a. Explain the direct coupled difference amplifier with neat circuit diagram and obtain the expression for output voltage. (06 Marks)  
b. Explain the following terms:  
i) Common mode rejection ratio  
ii) Power supply voltage rejection ratio  
iii) Input offset current  
iv) Slew rate (08 Marks)  
c. Explain the inverting summing circuit and obtain the expression for output voltage. (06 Marks)
- 2 a. Design a capacitor-coupled voltage follower using a 741 operational amplifier. The lower cutoff frequency for the circuit is to be 50 Hz and the load resistance is  $R_L = 3.9 \text{ K}\Omega$ . (04 Marks)  
b. Explain the capacitor-coupled voltage follower and high input impedance capacitor-coupled voltage follower with neat circuit diagrams. (09 Marks)  
c. A capacitor-coupled non-inverting amplifier is to have a +24V supply, a voltage gain of 100, an output amplitude of 5V, a lower cutoff frequency of 75 Hz, and a minimum load resistance of 5.6 K $\Omega$ . Using a 741 op-amp, design a suitable circuit. (07 Marks)
- 3 a. Explain the single stage amplifier with gain/frequency and phase/frequency responses. (06 Marks)  
b. With the frequency response of an op-amp, explain the high gain amplifier and lower gain amplifier stability. (10 Marks)  
c. Determine the upper cutoff frequency for (i) a voltage follower circuit using 741 op-amp and (ii) a unity gain inverting amplifier using a 741 op-amp. (04 Marks)
- 4 a. Explain the precision voltage source with the design equations. (07 Marks)  
b. Explain the current amplifiers/attenuator circuits with grounded and floating loads. (07 Marks)  
c. Design a non-saturating precision half-wave rectifier to produce a 2V peak output from a sine wave input with a peak value of 0.5V and frequency of 1 MHz. Use a bipolar opamp with a supply voltage of  $\pm 15\text{V}$ . (06 Marks)

### PART – B

- 5 a. Explain the voltage follower peak detector. (07 Marks)  
b. Write the design procedure of the waveform generator. (06 Marks)  
c. Using the non-inverting op-amp and a feedback network, explain the Wein bridge oscillator. (07 Marks)

- 6 a. Explain non-inverting and inverting zero crossing detectors. (08 Marks)  
b. Using a 741 opamp with a supply of  $\pm 12V$ , design an inverting Schmitt trigger circuit to have trigger points of  $\pm 2V$ . (05 Marks)  
c. Explain the Astable multivibrator using opamp and give the design equation. (07 Marks)
- 7 a. Explain the working principle of a series opamp regulator circuit. (08 Marks)  
b. Explain the principles of switch regulators. (05 Marks)  
c. Explain the current limit protection circuit. (07 Marks)
- 8 a. Describe the functional diagram of 555 timer. (05 Marks)  
b. Explain the monostable multivibrator operation using 555 timer functional diagram and also give the design equations. (09 Marks)  
c. Explain the working principle of weighted resistor DAC circuit with transfer characteristics of a 3 bit DAC. (06 Marks)

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