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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 $R_L = 3.9\ K\Omega$. **(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 KΩ. 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 investing 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 ±15V. **(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 ±12V, design an inverting Schmitt trigger circuit to have trigger points of ±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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