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10EC46

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020

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. Define the following parameters and mention their typical values for 741 op-amp:
(i) CMRR (ii) Slew rate (iii) Input off set voltage (06 Marks)
b. Explain the methods of dealing with input offset voltage and current of an op-amp.(05 Marks)
c. The difference of two input signals is to be amplified by a factor of 37. Each input has an amplitude of 50 mV. Using a LF353 op-amp design a suitable circuit. (05 Marks)
d. A 741 op-amp uses a $\pm 15V$ supply with a 2 mV, 120 Hz ripple voltage super imposed. Calculate the amplitude of the output voltage produced by the power supply ripple. Assume PSRR = 30 $\mu V/V$. (04 Marks)
- 2 a. Compare direct coupled and capacitor coupled op-amp circuits. (04 Marks)
b. Explain the method of increasing the input impedance of a non-inverting amplifier with necessary derivation. (08 Marks)
c. Design an capacitor coupled inverting amplifier using a 741 op-amp for $A_v = 50$, $V_0 = 2.5 V$, $R_L = 250 \Omega$ and to have a signal frequency range of 10 Hz to 1 kHz. Assume $I_{B(max)} = 0.5 \mu A$ for 741 op-amp. (08 Marks)
- 3 a. Explain the slew rate effect on output pulse rise time and amplitude. (06 Marks)
b. Determine the upper cut off frequency for:
(i) a voltage follower circuit using a 741 op-amp
(ii) a unity gain inverting amplifier using a 741 op-amp. (06 Marks)
c. Sketch a circuit to show the Z_{in} mod method of frequency compensation and explain its operation. (08 Marks)
- 4 a. Compare the performance of a differential input-output amplifier with difference amplifier and draw the circuit of both. (06 Marks)
b. Draw the circuit diagram of a precision FWR using precision HWR and Summing circuit and explain its operation. (08 Marks)
c. What is the problem associated with simple voltage source? With the circuit, explain how it is overcome by precision voltage source. (06 Marks)

PART - B

- 5 a. Describe the working of a sample and hold circuit. (06 Marks)
b. Explain how op-amp can be used as a log amplifier and also discuss saturation current and temperature compensation. (08 Marks)
c. Design a RC phase shift oscillator for an output frequency of 3.5 kHz. Assume supply of $\pm 12 V$ and $I_1 = 50 \mu A$. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. Explain the operation of a inverting Schmitt triggering circuit using two diodes gives different UTP and LTP. (08 Marks)
- b. Design an op-amp Astable Multivibrator to have an output frequency of 400 Hz. Use a 741 op-amp with supply of $\pm 18V$. Assume (UTP) = 0.5V, $R_2 = 1M\Omega$ and $C_1 = 0.1 \mu F$. (08 Marks)
- c. Mention the advantages of Active filter over passive filters. (04 Marks)
- 7 a. What are the advantages of IC voltage regulators? (04 Marks)
- b. Using 7805 IC design a current source to deliver 0.2 A current to a 22Ω , 10 W load. Assume $I_Q = 4.2 mA$. (06 Marks)
- c. How is current boosting achieved in a 723 IC? (06 Marks)
- d. Mention the advantages of switching regulators. (04 Marks)
- 8 a. Design a 555 astable multivibrator to operate at 5 kHz with a duty cycle of 40%. Assume $c = 0.01 \mu F$. (08 Marks)
- b. Draw the block diagram of the PLL and explain the functions of each block. (08 Marks)
- c. The basic step of a 9-bit DAC is 10.3 mV. If 000 000 000 represents 0V. What output is produced if the input is 101101111? (04 Marks)
