USN | | | | | | | | | | 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 ±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 μV/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 ±12 V and $I_1 = 50\ \mu A$. **(06 Marks)**

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 ±18V. Assume (UTP) = 0.5V, R_2 = 1MΩ and C_1 = 0.1 μF. **(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 22 Ω, 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 μF. **(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)**

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