CBCS SCHEME

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17EC45

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

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With a neat circuit diagram, explain basic op-amp circuit. **(08 Marks)**

b. Define the following terms with respect to op-amp and mention its value for 741 op-amp:
(i) CMRR (ii) Slew rate (iii) PSRR **(06 Marks)**

c. Two signals each range from 0.1V to 1V are to be summed and amplified by a factor 5 using LF353 BIFET op-amp design a suitable summing circuit. **(06 Marks)**

OR

2 a. With a neat circuit diagram, explain the working of direct coupled non inverting amplifier. **(08 Marks)**

b. Explain the working of difference amplifier using op-amp. Also obtain the condition for common mode nulling and output level shifting. **(08 Marks)**

c. A LM308 op-amp with a closed loop gain of 33 has a common mode input of 1.5V. Calculate the maximum output voltage produced. The CMRR for LM308 op-amp is 80 dB. **(04 Marks)**

Module-2

3 a. With a neat circuit diagram, explain the working High Z_{in} capacitor coupled voltage follower. Compare its input impedance with capacitor coupled voltage follower. **(08 Marks)**

b. Design a capacitor coupled inverting amplifier using 741 op-amp with input signal 30 mV and a load resistance of 2.2 KΩ is to have $A_V = 150$ and frequency $f_l = 80$ Hz. **(06 Marks)**

c. Design a high impedance capacitor coupled non-inverting amplifier using 741 op-amp to have a gain of 100 and $f_l = 120$ Hz. The input signal is 40 mV and the load resistance varies from 1.8 KΩ to 20 KΩ. **(06 Marks)**

OR

4 a. Sketch the circuit of 3 op-amp instrumentation amplifier and show that $V_0 = \frac{R_2}{R_1}\left[1+\frac{2R_f}{R_G}\right][V_2 - V_1]$. Also list the requirements for instrumentation amplifier. **(12 Marks)**

b. Explain the operation of precision full wave rectifier using half wave rectifier and summing circuit. **(08 Marks)**

Module-3

5 a. With a neat circuit diagram and waveforms, explain the working inverting Schmitt trigger. Also draw its transfer characteristics. **(08 Marks)**

b. Design a RC phase shift oscillator to have an output frequency of 5 kHz. Use 741 op-amp with ±12V supply. **(06 Marks)**

c. Explain a Peak detector circuit using op-amp. **(06 Marks)**

OR

6 a. Draw the circuit of sample and hold circuit and explain the operation with necessary waveforms. **(08 Marks)**

b. Explain the working of Logarithmic amplifier using op-amp. **(06 Marks)**

c. Design the capacitor coupled zero crossing detector using 741 op-amp having $I_{B\,max}$ = 500 nA and minimum signal frequency is 500 Hz. The supply voltages are ±12V. **(06 Marks)**

Module-4

7 a. Explain the working of first order active high pass filter using op-amp. Draw its frequency response. **(06 Marks)**

b. Design a second order low pass filter using 741 op-amp for a cut off frequency 1 kHz. **(06 Marks)**

c. Explain the working a single stage first order active band pass filter using op-amp. Draw its frequency response. **(08 Marks)**

OR

8 a. Explain the various performance parameters for IC regulators. **(06 Marks)**

b. Draw the functional block diagram 723 regulator and explain its operation. **(08 Marks)**

c. With a neat circuit diagram; explain the working of current limiting circuit (short circuit protection) in a 723 regulator. **(06 Marks)**

Module-5

9 a. Explain the working of Phase Locked Loop (PLL) with a neat block diagram. **(08 Marks)**

b. Explain the working of successive approximation type analog to Digital Converter (ADC). **(07 Marks)**

c. What output voltage produced DAC whose output range is 0 to 10V and whose binary input is (i) 0110 (ii) 10111100? **(05 Marks)**

OR

10 a. With a neat functional block diagram and waveforms, explain the working of astable multivibrator using 555 timer. Derive the expression for output frequency. **(12 Marks)**

b. Explain the working of 3 bit DAC using R-2R Ladder network. **(08 Marks)**

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