CBCS SCHEME

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15EC46

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Linear Integrated Circuits

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. State the assumptions made.

Module-1

1 a. Define the following parameters with respect to op-amp.
i) Input offset current
ii) Input offset voltage
iii) CMRR
iv) PSRR (08 Marks)

b. Sketch an illustration to show the effect of op-amp slew rate and explain. (04 Marks)

c. If a Non-inverting amplifier is designed for a gain of 50, using op-amp with 90dB CMRR, calculate common mode output (V_{ocm}) for a common mode input (V_{icm}) of 100mV. (04 Marks)

OR

2 a. Design a direct-coupled non-inverting amplifier and explain its design steps. (08 Marks)

b. Two signals each ranging from 0.1V to 1V are to be summed. Using 741 op-amp design a suitable inverting summing circuit. (04 Marks)

c. Design a inverting amplifier using 741 op-amp with voltage gain of 50. The output voltage amplitude is 2.5V. (04 Marks)

Module-2

3 a. Draw the circuit to set the upper cut-off frequency using inverting amplifier and explain. (08 Marks)

b. A capacitor coupled non-inverting op-amp is to have gain of $A_v = 66$ and $V_i = 15mV$ with $R_L = 2.2K\Omega$ and $f_l = 120Hz$. Design the circuit. (08 Marks)

OR

4 a. Explain with a neat circuit design, precision full wave rectifier and also its design steps. (08 Marks)

b. Design a precision voltage source, with $V_o = 9V$ and supply voltage is $\pm 12V$. Allow 10% tolerance in zener diode [Assume 1N749 with $V_z = 4.3V$]. (08 Marks)

Module-3

5 a. Design a precision clipper to clip both ends, using dead zone circuit with relevant waveforms, explain the same. (08 Marks)

b. Design capacitor coupled zero-crossing detector with $f_l = 1kHz$ square wave input and $V_{o(p-p)} = 6V$. Use 741 op-amp with $\pm 12V$ supply [Assume $\Delta V = 1V$, $V_B = 0.1V$] (08 Marks)

OR

6 a. Define Barhausen's criteria. Explain with design, phase shift oscillator and with relevant waveforms. **(08 Marks)**

b. Show the realization of logarithmic amplifier using an op-amp. Obtain the expression for the output voltage. **(08 Marks)**

Module-4

7 a. Write a brief note on the following op-amp applications:
   i) First order low pass filter
   ii) Second order high pass filter. **(08 Marks)**

b. Design a single stage bandpass filter with frequency of $f_1 = 300Hz$ and $f_2 = 30kHz$. Also state whether the design is narrow band or wide band. Use 741 op-amp for designing. [Assume $c_2 = 1000pF$]. **(08 Marks)**

OR

8 a. Explain the working of a series regulator using op-amp. **(06 Marks)**

b. With a neat internal diagram of IC723. Explain the functions of each block. Mention the advantages. **(10 Marks)**

Module-5

9 a. Explain D to A converter using R-2R network. **(08 Marks)**

b. With a neat block diagram, explain the blocks of PLL. **(08 Marks)**

OR

10 a. Explain 555 timer as Monostable muiltivibrator with waveforms. **(08 Marks)**

b. Explain the working of A to D converter using successive approximation method. **(08 Marks)**

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