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

- Define the following parameters with respect to op-amp. 1
  - Input offset current
  - ii) Input offset voltage
  - **CMRR** iii)
  - **PSRR** iv)

(08 Marks)

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

If a Non-inverting amplifier is designed for a gain of 50, using op-amp with 90dB CMRR, calculate common mode output (Vocm) for a common mode input (Vicm) of 100mV.

(04 Marks)

## OR

- Design a direct-coupled non-inverting amplifier and explain its design steps. (08 Marks) a.
  - 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)
  - Design a inverting amplifier using 741 op-amp with voltage gain of 50. The output voltage amplitude is 2.5V. (04 Marks)

## Module-2

- Draw the circuit to set the upper cut-off frequency using inverting amplifier and explain. 3 a. (08 Marks)
  - A capacitor coupled non-inverting op-amp is to have gain of  $A_v = 66$  and  $V_i = 15$ mV with  $R_L = 2.2K\Omega$  and  $f_1 = 120Hz$ . Design the circuit. (08 Marks)

- Explain with a neat circuit design, precision full wave rectifier and also its design steps. (08 Marks)
  - Design a precision voltage source, with  $V_o = 9V$  and supply voltage is  $\pm 12V$ . Allow 10% b. tolerance in zener diode [Assume 1N749 with  $V_z = 4.3V$ ]. (08 Marks)

## Module-3

- Design a precision clipper to clip both ends, using dead zone circuit with relevant 5 a. waveforms, explain the same. (08 Marks)
  - Design capacitor coupled zero-crossing detector with f1 = 1kHz square wave input and  $V_{o(p-p)} = 6V$ . Use 741 op-amp with ±12V supply [Assume  $\Delta V = 1V$ ,  $V_B = 0.1V$ ]

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  $f_1 = 300$ Hz and  $f_2 = 30$ kHz. Also state whether the design is narrow band or wide band. Use 741 op-amp for designing. [Assume  $c_2 = 1000$ pF]. (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)



