

# CBCS SCHEME

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Fourth Semester B.E. Degree Examination, June/July 2023

## Linear Integrated Circuits

Max. Marks: 100

Time: 3 hrs.

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

### Module-1

- 1 a. Define the following parameters of Op-Amp & also mention its typical values of 741  
i) Slew Rate ii) output Impedance iii) CMRR iv) PSRR (08 Marks)
- b. With neat circuit diagram, explain the basic Op-Amp circuit. (05 Marks)
- c. Design a Non-Inverting amplifier using 741 Op-Amp, is to amplify the input voltage of 100mv to a level of 3v output. (07 Marks)

OR

- 2 a. Design an inverting amplifier using a 741 Op-Amp. The voltage gain is to be 50 & output voltage amplitude is to be 2.5V. (07 Marks)
- b. With neat circuit diagram, explain inverting summing amplifier and derive for output voltage and show how it can be converted into averaging circuit. (07 Marks)
- c. Sketch the direct coupled difference amplifier circuit. Derive an equation for output voltage and explain operation. (06 Marks)

### Module-2

- 3 a. Design inverting amplifier circuit is to be capacitor coupled and to have a signal frequency range of 10Hz to 1KHz. If load resistance is  $250\Omega$  with  $A_v=50$  and  $V_o=3V$ . Use 741 Op-Amp. (07 Marks)
- b. What is instrumentation amplifier ? Compare differential input / output amplifier and a difference amplifier. (06 Marks)
- c. With neat sketch explain the working of a precision voltage source with zener diode & Op-Amp. (07 Marks)

OR

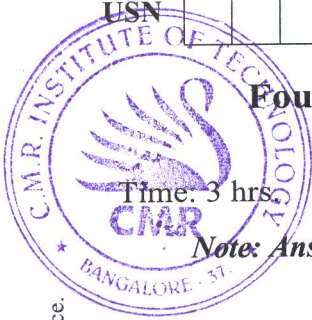
- 4 a. Sketch and explain high  $Z_{in}$  capacitor coupled voltage follower with necessary design steps and also show that input impedance is very high. (07 Marks)
- b. Sketch the circuit of simple current to voltage converter and explain, then show how it should be modified to function as current amplifier. (06 Marks)
- c. Design capacitor coupled non-inverting amplifier to have voltage gain of 66. The signal amplitude is of 15mv. The load resistance is  $2.2 k\Omega$  and lower cutest frequency is to be 120Hz and draw circuit. (07 Marks)

### Module-3

- 5 a. Sketch and explain the working of phase shift oscillator using Op-Amp. (07 Marks)
- b. With neat sketch explain Inverting Schmitt trigger circuit with necessary waveforms and equations. (07 Marks)
- c. Explain the applications of analog multiplier. (06 Marks)

OR

- 6 a. Explain the working of Wein bridge oscillator using Op-Amp with neat sketch of circuit, waveform & equations. (07 Marks)
- b. Draw an Op-Amp sample and hold circuit. Sketch the input signal, control, output waveforms and explain the circuit operation. (08 Marks)
- c. Sketch the circuit of Fundamental log amplifier and explain its working. (05 Marks)



**Module-4**

- 7 a. Sketch the circuit and frequency response of first order Low pass filter and explain its operation. (07 Marks)
- b. Show how band pass filter can be constructed by the use of low pass filter and high pass filter and explain the operation. (07 Marks)
- c. List and explain the characteristic of 3-Terminal IC regular. (06 Marks)

**OR**

- 8 a. Draw and explain the functional block diagrams of 723 IC regular. (06 Marks)
- b. Design a second order high pass filter to have a cutest frequency & 12KHz. Use a 715 Op-Amp with  $I_{B(max)} = 1.5\mu A$ . (07 Marks)
- c. Discuss the performance parameter of three terminal IC regulator can be used as a current source. (07 Marks)

**Module-5**

- 9 a. Draw the internal schematic of IC 555, configure it for astable operation and explain with necessary equators and waveforms. (07 Marks)
- b. Draw the block diagram of a PLL and explain the function of each block. (06 Marks)
- c. Derive the expression for output voltage of R-2R Ladder type DAC and explain. (07 Marks)

**OR**

- 10 a. With neat circuit diagram explain mono stable multivibrator using IC 555 timer and derive the expression of pulse width. (07 Marks)
- b. With neat circuit diagram, explain the working of IC566 voltage controlled oscillator with necessary waveforms. Also derive for output frequency. (06 Marks)
- c. Draw the block diagram of successive approximation type ADC and explain it. (07 Marks)

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