

# CBCS SCHEME

18EE46

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## Fourth Semester B.E. Degree Examination, June/July 2023 Operational Amplifiers and Linear ICs

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define the following terms:
- Bandwidth
  - CMRR
  - Slewrates
  - Input offset voltage.
- b. Mention the ideal characteristics of Op-Amp. (08 Marks)
- c. Draw the block diagram of Op-Amp and explain. (06 Marks)

OR

- 2 a. Derive an expression for the output of three inputs inverting amplifier and averaging amplifier. (12 Marks)
- b. Determine the value of all the components to design a peaking amplifier with a gain of 18 at a frequency of 25kHz. (06 Marks)
- c. Mention the good instrumentation amplifier requirements. (02 Marks)

### Module-2

- 3 a. Compare an Active filter and Passive filter. (06 Marks)
- b. With a neat circuit diagram, explain second order low pass Butterworth filter. Derive the expression for the gain of the filter. (10 Marks)
- c. What are the advantages of active filter over the passive filter? (04 Marks)

OR

- 4 a. Define voltage regulator. With a neat block diagram, explain the regulated power supply. (12 Marks)
- b. With a neat circuit diagram, explain voltage follower regulator using Op-Amp. (08 Marks)

### Module-3

- 5 a. With the neat circuit diagram, explain operation of triangular wave generator using Op-Amp. (06 Marks)
- b. Explain the operation of RC-Phase shift oscillator using Op-Amp. (08 Marks)
- c. Draw the circuit of an output stage for controlling the output amplitude and DC voltage level of a signal generator. Explain the operation. (06 Marks)

OR

- 6 a. Explain with the neat circuit diagram and waveform, the operation of inverting and non inverting zero crossing detector. (10 Marks)
- b. Comparison between Schmitt trigger and comparator. (06 Marks)
- c. For a non inverting regenerative comparator  $R_1 = 100K\Omega$ ,  $R_2 = 1K\Omega$  and  $V_{sat} = \pm 13.5V$ . Calculate tripping voltage. (04 Marks)

**Module-4**

- 7 a. What is precision rectifier? Draw and explain the operation of full wave precision rectifier using Op-Amp. (10 Marks)
- b. Explain the half wave precision rectifier clipper circuit using Op-Amp. (10 Marks)

**OR**

- 8 a. Define the following terms of D/A converter:
- i) Resolution
  - ii) Accuracy
  - iii) Monotonicity
  - iv) Conversion time
  - v) Stability. (10 Marks)
- b. With a neat diagram, explain the working of R-2R ADC. (10 Marks)

**Module-5**

- 9 a. What is PLL? With neat diagram explain the PLL. (08 Marks)
- b. Define lock range, capture range and pull in time for PLL. (06 Marks)
- c. Explain how XOR gates can be used as phase detector in PLL. (06 Marks)

**OR**

- 10 a. Explain the basic working principle of timer circuit. (10 Marks)
- b. With a neat circuit diagram, explain astable multivibrator using IC555. (10 Marks)

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