

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

15EE46

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022 Operational Amplifiers and Linear ICs

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain the block diagram of an Operational amplifier. (06 Marks)
- b. With a neat circuit diagram and waveform explain the operation of Peaking amplifier. (06 Marks)
- c. Design a op-Amp based Non-inverting amplifier with a closed loop gain = 3. (04 Marks)

OR

- 2 a. Mention the ideal characteristics of an op-Amp (Any six). (06 Marks)
- b. Draw the circuit of a 3 input inverting summing amplifier and derive the expression for output voltage. Explain how to convert it to an adder and averaging amplifier. (06 Marks)
- c. With the help of a neat circuit diagram explain how op-Amp differential amplifier can be used as a subtractor. (04 Marks)

Module-2

- 3 a. Define Line Regulation, Load Regulation and Ripple Rejection Ratio. (06 Marks)
- b. With a neat circuit diagram and frequency response curve explain the operation of First Order Butterworth Low pass active filter. Also obtain the gain condition for the same. (06 Marks)
- c. Design a set adjustable positive voltage Regulator using IC LM 317 for a output voltage of 5 V. (04 Marks)

OR

- 4 a. Mention the advantages of Active filters over Passive filters. (04 Marks)
- b. Draw the circuit of Voltage Follower Regulator and explain its operation. (06 Marks)
- c. Design a narrow band pass filter for the following specifications:
 $f_c = 1.5$ kHz, $Q = 7$, gain at f_c is 15. (06 Marks)

Module-3

- 5 a. Explain Barkhausen criteria for sustained oscillations. (04 Marks)
- b. Explain the working of voltage to current converter with grounded load using op-Amp. (06 Marks)
- c. Design a R-C phase shift oscillator using op-Amp for a frequency of 500 Hz. Draw the circuit diagram. (06 Marks)

OR

- 6 a. With a neat circuit diagram and waveform explain the working principle of op-Amp inverting Zero Crossing Detector. (06 Marks)
- b. Draw the circuit of a Wein Bridge Oscillator using op-Amp and explain the circuit operation. Also obtain the condition for frequency of oscillation. (06 Marks)
- c. Define the working principle of voltage to frequency converter and mention the applications of voltage to frequency converter. (04 Marks)

Module-4

- 7 a. With a neat circuit diagram and waveform describe the operation of Precision Full wave Rectifier. (08 Marks)
- b. Explain the operation of R-2R type DAC. (08 Marks)

OR

- 8 a. Describe the operation of op-Amp sample and Hold circuit with circuit diagram and waveform. (08 Marks)
- b. Explain successive approximation type ADC. (08 Marks)

Module-5

- 9 a. Explain the Block diagram of PLL? (10 Marks)
- b. In the Astable Multivibrator using 555 timer IC $R_A = 2.2 \text{ k}\Omega$, $R_B = 3.9 \text{ k}\Omega$ and $C = 0.1 \text{ }\mu\text{F}$. Determine the positive pulse width t_c , Negative pulse width t_d and Free running frequency f_0 . (06 Marks)

OR

- 10 a. Mention the applications of PLL? Explain any one application with the help of Block diagram. (08 Marks)
- b. Explain the operation of monostable multivibrator using 555 timer IC. (08 Marks)
