

CBCS SCHEME

17EE46



USN

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

Fourth Semester B.E. Degree Examination, Aug./Sept. 2020

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. Draw the block diagram of an op-amp and explain. (10 Marks)
- b. Sketch the 3-input non-inverting summing amplifier circuit. Explain the operation of the circuit and derive an equation for the output voltage. Also explain how to convert it to an adder and averaging amplifier. (10 Marks)

OR

- 2 a. List the ideal characteristics of an op-amp (any six). (06 Marks)
- b. Mention the advantages of using negative feedback in op-amps (any 4). (04 Marks)
- c. What is an instrumentation amplifier? Obtain an expression for output voltage V_0 , in terms of change in resistance ΔR of an instrumentation amplifier using transducer bridge. (10 Marks)

Module-2

- 3 a. With a neat circuit diagram, explain the working of 1st order low pass filter and draw its typical frequency response curve. (10 Marks)
- b. Design a set adjustable positive voltage regulator using IC LM317 for the output voltage of 5 V. (04 Marks)
- c. Mention the advantages of active filter over passive filters. (any six) (06 Marks)

OR

- 4 a. Draw the circuit of a adjustable voltage regulator and explain its operation. (10 Marks)
- b. Design a second order low pass filter for a cut-off frequency of 1 kHz. Also draw the circuit diagram and mention the component values. (06 Marks)
- c. Design a narrow band pass filter for the following specifications, centre frequency 1.5 kHz, Q-factor is 7, gain at f_c is 15. (04 Marks)

Module-3

- 5 a. With a neat circuit diagram, explain the working of triangular / rectangular wave generator. (10 Marks)
- b. With a neat circuit diagram and waveform explain the working of inverting Zero Cross over Detector (ZCD). (10 Marks)

OR

- 6 a. With a neat circuit diagram and necessary derivation for load current, explain voltage to current converter with grounded load. (10 Marks)
- b. Design a RC-phase shift oscillator using op-amp for a frequency of 500 Hz. Also draw the circuit diagram and name the component values take $C = 0.1 \mu F$ (06 Marks)
- c. Define the working principle of voltage to frequency (V/F) converter and mention its applications (any 4). (04 Marks)

CMRIT LIBRARY
BANGALORE - 560 037

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. With a neat circuit diagram and waveform explain the working of precision Full Wave rectifier. (10 Marks)
b. With a neat circuit diagram, explain the working of successive approximation type ADC. (10 Marks)

OR

- 8 a. Explain the operation of R-2R ladder digital to analog converter circuit. (10 Marks)
b. Design a non-saturating precision half wave rectifier to produce a 2 V peak output from a 1 MHz sine wave input with a 0.5 V peak value. Use Bi-polar op-amp with a supply voltage of $\pm 15V$. (10 Marks)

Module-5

- 9 a. With a neat block diagram, explain phase locked loop in detail. (10 Marks)
b. Draw the pin diagram of 555IC timer and mention its pin functions. (05 Marks)
c. Design a monostable multivibrator using IC 555 timer to obtain a pulse width of 10 msec. (05 Marks)

OR

- 10 a. With a neat diagram, explain the internal architecture of IC555 timer. (10 Marks)
b. Define the following terms related to PLL:
(i) Lock range.
(ii) Capture range.
(iii) Pull in time
(iv) Tracking range. (08 Marks)
c. Mention the applications of IC555 timer (any 4). (02 Marks)

CMRIT LIBRARY
BANGALORE - 560 037