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Fourth Semester B.E. Degree Examination, June/July 2024 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. Explain the general stages of op-amps with a neat block diagram. (08 Marks)
- b. Design AC inverting amplifier, given following values $R_{in} = 50\Omega$, $C_i = 0.1\mu F$, $R_1 = 100\Omega$, $R_F = 1K\Omega$, $R_L = 10K\Omega$, Supply voltages = $\pm 15V$. Determine Bandwidth of the amplifier. (06 Marks)
- c. List the advantages of negative feedback. (06 Marks)

OR

- 2 a. Sketch the 3-input inverting summing amplifier circuit. Explain the operation of the circuit and derive an equation for the output voltage. (06 Marks)
- b. List the ideal characteristics of an op-amp. (06 Marks)
- c. What is an instrumentation amplifier? For instrumentation amplifier using transducer bridge, obtain the expression for output voltage V_0 in terms of change in resistance ΔR of the transducer. Draw the circuit diagram. (08 Marks)

Module-2

- 3 a. With a neat circuit diagram, explain the working of first order high pass filter and draw its typical frequency response curve. (08 Marks)
- b. With a neat circuit diagram and frequency response, explain the working of low pass filter. (08 Marks)
- c. List the advantages of active filters over passive-filters. (04 Marks)

OR

- 4 a. Explain the following performance parameters of DC voltage regulators:
 - i) Line regulation
 - ii) Load regulation
 - iii) Temperatures stability
 - iv) Ripple rejection. (08 Marks)
- b. With a neat circuit diagram, explain the working of voltage follower regulator. (06 Marks)
- c. Draw the circuit of a LM317 adjustable positive voltage regulator and explain its operation and design. (06 Marks)

Module-3

- 5 a. With a neat block diagram, explain the working principle of oscillator. (06 Marks)
- b. With a neat circuit diagram, explain the operation of triangular/rectangular wave generator. (08 Marks)
- c. Design the RC-phase oscillator to generate frequency of 200Hz, given $C = 0.1\mu F$. (06 Marks)

OR

- 6 a. With a neat circuit diagram and waveform, explain the working of non-inverting zero cross over detector. (10 Marks)
- b. With a neat circuit diagram, explain the operation of inverting Schmitt trigger with waveforms. (10 Marks)

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 diagram, explain the working of successive approximation type ADC. (10 Marks)

OR

- 8 a. With a neat circuit diagram, explain the working of 4-bit R-2R ladder digital to analog converter circuit and obtain an expression for output voltage. (10 Marks)
- b. With a neat circuit diagram, explain the operation of Linear Ramp ADC. (10 Marks)

Module-5

- 9 a. With a neat block diagram, explain the operating principle of PLL. (10 Marks)
- b. With a neat diagram and waveforms, explain the edge triggered phase detector. (10 Marks)

OR

- 10 a. Draw the neat diagram and explain the internal architecture of IC555 timer. (10 Marks)
- b. With a neat circuit diagram and relevant waveforms, explain the working of Monostable Multivibrator using 555 timer. (10 Marks)

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