CBCS SCHEME

18EE46

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:
   i) Bandwidth
   ii) CMRR
   iii) Slewrate
   iv) Input offset voltage. **(08 Marks)**
 b. Mention the ideal characteristics of Op-Amp. **(06 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 $V_{sat} = \pm13.5V$. 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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