Srinivas Institute of Technolog
Library Mangalo

**CBCS SCHEME**

USN

**18EE46**

## Fourth Semester B.E. Degree Examination, July/August 2022

# Operational Amplifiers and Linear IC's

Time: 3 hrs. Max. Marks: 100

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

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-1

1 a. Draw the block diagram of an Op – Amp and write the function of each block. **(08 Marks)**

b. Explain the working of Op – Amp as non – inverting amplifier. Derive the expression for its voltage gain. **(08 Marks)**

c. An Input of 3V is Fed to the non inverting terminal of an Op – Amp. The amplifier has $R_i = 10\ k\Omega$ and $R_f = 10k\Omega$. Find the output voltage. **(04 Marks)**

**OR**

2 a. What is an Instrumentation Amplifier? Also obtain the expression for output voltage in terms of change in Resistance $\Delta R$ using transducer bridge. **(08 Marks)**

b. Draw and explain the 2 input inverting summing amplifier and derive its output voltage equation Vo. Also explain how to convert it to an averaging amplifier. **(08 Marks)**

c. Explain the Virtual ground concept of an Op - Amp. **(04 Marks)**

## Module-2

3 a. Draw the First Order Low Pass Butterworth filter and obtain its Frequency Response. **(10 Marks)**

b. Explain Working and design of voltage follower Regulator. **(06 Marks)**

c. Design a First Order Low Pass filter with a cut off frequency of 1KHz and Pass band gain of 2. Assume $C = 0.001\ \mu F$. **(04 Marks)**

**OR**

4 a. Draw the First Order High Pass Butterworth filter and obtain its Frequency Response. **(10 Marks)**

b. With a neat circuit diagram, explain the Adjustable Voltage Regulator and its Operation. **(06 Marks)**

c. Find the Range in which output voltage can be varied with the help of 317 IC Regulator using $R_1 = 820\Omega$ and $R_2 = 10K\Omega$ potentiometer. **(04 Marks)**

## Module-3

5 a. Sketch the circuit of triangular waveform generator and explain its operation. **(08 Marks)**

b. Draw and explain the Operation of Non Inverting Zero Crossing detectors. **(04 Marks)**

c. Explain the working of voltage to current converter with grounded load. **(08 Marks)**

**OR**

6 a. With a neat circuit diagram and waveforms, explain the Operation of inverting Schmitt trigger circuit. **(08 Marks)**

b. Give comparison between Schmitt trigger and Comparator. **(04 Marks)**

c. Explain the working of R – C phase shift oscillator using Op - Amp. **(08 Marks)**

## Module-4

7 a. With a neat circuit diagram, explain the Operation of Non Saturating precision half Wave Rectifier. **(10 Marks)**

b. Explain the working of Successive Approximation Type ADC with neat sketch. **(10 Marks)**

**OR**

8 a. Explain the Operation of R – 2R ladder digital to Analog Converter Circuit. **(10 Marks)**

b. With a neat circuit diagram, explain the working of Precision full wave Rectifier. **(10 Marks)**

## Module-5

9 a. Draw the basic block diagram of Phase Locked Loop (PLL) and explain its each component. **(10 Marks)**

b. With a neat diagram, explain the Internal Architecture of IC 555 Timer. **(10 Marks)**

**OR**

10 a. Draw and explain working of Monostable Multivibrator using 555 Timer and draw its Input – Output wave forms. **(12 Marks)**

b. Define the following terms related to PLL :

i) Lock range ii) Capture range iii) Pull in Time iv) Tracking range. **(08 Marks)**

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