

# CBCS SCHEME

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15EE46

## Fourth Semester B.E. Degree Examination, June/July 2018 Operational Amplifiers and Linear Integrated Circuits

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Discuss the Ideal characteristics of an OPAMP. (04 Marks)
- b. Show that the output of subtractor is proportional to the different between the two input voltages. (06 Marks)
- c. Draw and explain the operation of peaking amplifier. (06 Marks)

OR

- 2 a. For a non inverting amplifier, the values of  $R_1$  and  $R_f$  are  $1K\Omega$  and  $10K\Omega$  respectively. The various op-amp parameters are, open loop gain is  $2 \times 10^5$ , input resistance is  $2M\Omega$ , output resistance is  $75\Omega$ , single break frequency is  $5Hz$ , supply voltage are  $\pm 12V$ . Calculate the closed loop gain, Input Resistance, output Resistance and Bandwidth with feedback. (08 Marks)
- b. What is an Instrumentation amplifier? For instrumentation amplifier using transducer bridge, obtain the expression for output voltage  $V_o$  in terms of change in Resistance  $\Delta R$  of the transducer. Draw the circuit diagram. (08 Marks)

### Module-2

- 3 a. Derive the expression for the phase shift produced by an All pass Filter. (08 Marks)
- b. With a neat diagram, explain the operation of a voltage follower regulator using OPAMP. (08 Marks)

OR

- 4 a. Explain the following performance parameters of voltage Regulator.  
(i) Line Regulation (ii) Load Regulation (iii) Ripple Rejection. (05 Marks)
- b. Design second order Low pass Filter for a cut-off frequency of  $100Hz$  with capacitor selected as  $0.1\mu F$  and draw the circuit diagram. (05 Marks)
- c. Briefly explain with the help of schematic Diagram, the working of LM317 IC Regulator. (06 Marks)

### Module-3

- 5 a. Draw and explain triangular wave generator using square wave generator and integrator method. Draw the required waveforms. (10 Marks)
- b. With a neat circuit diagram and waveforms, explain the operation of inverting Schmitt trigger circuit with different LTP and UTP. (06 Marks)

OR

- 6 a. Using 741 OPAMP with a supply voltage of  $\pm 12V$ , design a RC phase shift oscillator to have an output frequency of  $3.5 KHz$ . Draw the circuit diagram. (06 Marks)
- b. Draw and explain the operation of voltage to frequency converter using OPAMP. (05 Marks)
- c. Design the wein bridge oscillator circuit to have output frequency of  $10KHz$ . Use  $C = 0.01\mu F$ . (05 Marks)

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**Module-4**

- 7 a. Design the precision full wave rectifier circuit to produce a 2V peak output from a sine wave input with a 0.5V peak value and 1MHz frequency. Use Bipolar OPAMPS with a supply voltage of  $\pm 15V$ . Choose adequate diode current as  $500\mu A$ . Draw the circuit diagram. (06 Marks)
- b. Explain the successive approximation A/D converter technique with the help of block diagram. (05 Marks)
- c. Sketch and explain the working of sample and Hold circuit. (05 Marks)

**OR**

- 8 a. With a neat circuit diagram, explain the operation of a high input impedance full wave precision rectifier. Draw the voltage waveforms at various points in the circuit and write the appropriate equations to show that full wave ratification is performed. (08 Marks)
- b. Explain the working of Dual slope ADC with the help of neat diagram. (08 Marks)

**Module-5**

- 9 a. Draw and explain the functional block diagram of IC 555. (08 Marks)
- b. Explain PLL IC 565 application as frequency multiplier and frequency synthesizer. (08 Marks)

**OR**

- 10 a. Design an Astable multivibrator having an output frequency of 10KHz with a duty cycle of 25%, using IC 555. Use  $C = 0.01\mu F$ . (08 Marks)
- b. What is phase locked loop? Explain the working of the building blocks of PLL. (08 Marks)

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