9/12/2024 EXTC SEM-IV C SCHEME LIC QP CODE: 10064354

Time: 3 Hours **Total Marks: 80**

N.B.:
1) Question No.1 is compulsory
2) Solve any three from the remaining five.
3) Figures to the right indicate full marks.

Q. 1 Attempt any four questions.

A) Compare Active filters and Passive filters. **[5]**
B) List the specifications of a power supply and explain the following: Load Regulation, Line Regulation and Ripple Rejection. **[5]**
C) Explain inverting type ZCD with input-output waveforms. **[5]**
D) Write note on Pulse Width Modulator. **[5]**
E) Explain the block diagram of Op-Amp IC 741. **[5]**

Q. 2 A) Design a practical differentiator to differentiate the input sine wave signal. Assume fa =1 kHz, C1 = 0.1uF and R1 = 82 Ohms. **[10]**
B) Design Second order Butterworth High Pass filter with Cut off frequency 10 kHz. Draw the designed circuit and frequency response. **[10]**

Q. 3 A) Design square wave generator using Op-Amp to generate a perfect square of 50% duty cycle with output frequency of 1 kHz. Assume the feedback factor to be 0.1. Also draw the output waveform and waveform across the capacitor. **[10]**
B) Draw and explain working of RC-phase shift Oscillator and derive the expression for output frequency. **[10]**

Q. 4 A) Explain the Astable Multi-vibrator using IC 555. Derive the expression for Tc and Td and duty cycle. Draw the corresponding waveforms. **[10]**
B) Design a voltage regulator using IC 723 to give output voltage Vo = 5 V and output current of 2 A. **[10]**

Q. 5 A) What is an Instrumentation Amplifier? Draw a neat diagram of three-op-amp I A. Derive its output voltage equation. **[10]**
B) With the help of a neat diagram, input-output waveforms and voltage transfer characteristics explain the working of an Inverting Schmitt Trigger. Derive the expression for the Upper and Lower threshold levels. Explain how to vary these levels. **[10]**

Q. 6 Write short notes on: (Attempt any four)

A) The Voltage follower (Buffer). **[5]**
B) Wein-Bridge Oscillator using op-amp **[5]**
C) Three Terminal IC Voltage Regulators **[5]**
D) Phase Locked Loop (PLL) with one application **[5]**
E) Window detector **[5]**
