Code No: R2031041 **R20** SET - 1

III B. Tech I Semester Supplementary Examinations, JULY -2023
ANALOG ICs AND APPLICATIONS
(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) List any six characteristics of an ideal op-amp and give the practical op-amp equivalent circuit. [7M]
   b) Explain the principle of basic linear voltage regulator using op-amp. [7M]

(OR)

2. a) Explain the following terms in an op-amp: i)Bias current ii)Thermal drift [7M]
   b) Explain the operation of LM79XX series fixed voltage regulator with a neat diagram. [7M]

UNIT-II

3. a) Derive the op-amp output voltage equation for the following: [7M]
   (i) Integrator, (ii) Differentiator.
   b) Draw the circuit of a high speed sample-and-hold circuit and explain its operation, sketching the input signal, control and output voltage waveforms. [7M]

(OR)

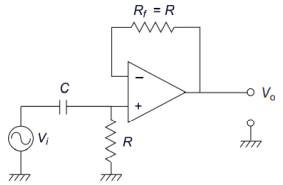
4. a) Draw the circuit diagram of an antilogarithmic amplifier using op-amp and explain its operation. [7M]
   b) Define the terms Upper and Lower Tripping Points of a Schmitt trigger. What is the significance of the two parameters? [7M]

UNIT-III

5. a) Design a second order low-pass Butterworth filter with a cut-off frequency of 12 kHz and unity gain at low frequency. Also determine the voltage transfer function magnitude in dB at 15Hz for the filter. [7M]
   b) Design a narrowband band pass filter using an op-amp. The resonant frequency is 100 Hz and Q = 2. Assume C = 0.1 µF. draw the equivalent diagram. [7M]

(OR)

6. a) Consider the op-amp high pass filter with 20 dB/decade roll-off shown below. Calculate the value of R if C = 0.001 µF and f_c = 15 kHz. [7M]



   b) Design a narrowband band pass filter with a resonant frequency of 300 Hz and a bandwidth of 30 Hz. Draw the equivalent circuit. [7M]

UNIT-IV

7. a) Draw the 555 monostable multivibrator circuit and explain its working with the help of waveforms. [7M]
   b) Find the lock and capture frequencies for PLL 565, with free-running frequency of 120 kHz, demodulation capacitor of 1 µF and supply voltage of ±5 V. [7M]

(OR)

8. a) Draw the 555 Timer circuit in a stable mode and explain the working with the help of waveforms. [7M]
   b) What is the principle of PLL? Draw the block schematic and explain the same. [7M]

UNIT-V

9. a) Explain R-2R ladder-network type digital to analog converter with the help of a circuit. [7M]
   b) An 8-bit analog to digital converter can accept voltages from +0 V to +12 V. What is the minimum value of input voltage to cause digital output change of 1 LSB? If the applied input voltage is 4.8 V, what is the digital output? [7M]

(OR)

10. a) What is the principle of successive-approximation type analog to digital converter? Explain with a neat diagram. [7M]
    b) A 4-bit digital to analog converter produces output voltage of 0.1V for a digital input of 0001 V. Find the value of V_o for maximum input. [7M]