

Vidyalankar

S.Y. Diploma : Sem. IV [ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI]

Linear Integrated Circuits

Time: 3 Hrs.]

Prelim Question Paper

[Marks : 100

- Instructions :**
- (1) All questions are compulsory.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data if necessary.
 - (5) Preferably, write the answers in sequential order.

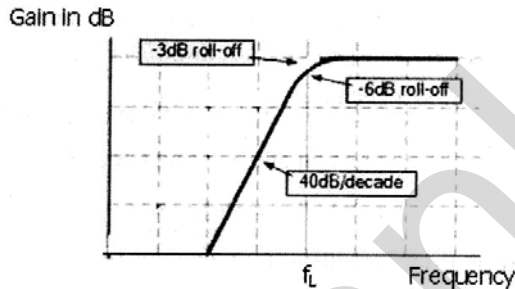
1. (a) Attempt any **SIX** of the following: [12]
 - (i) Define: (1) Input offset current (2) CMRR
 - (ii) Draw circuit diagram of basic integrator using op-amp.
 - (iii) List any four specification of IC LM 324
 - (iv) State the need of signal conditioning (any two points)
 - (v) Draw the circuit diagram of 1st order High Pass Filter.
 - (vi) Define: (1) Roll-off rates (2) Frequency response
 - (vii) Draw sample and hold circuit.
 - (viii) State functions of following pins of IC 555
 - (1) Trigger
 - (2) Control Voltage
- (b) Attempt any **TWO** of the following: [8]
 - (i) Describe the function of input stage and level shifting stage of op-amp with it's block diagram.
 - (ii) State ideal values of following parameters of op-amp as well as state typical values of following parameters of op-amp IC741
 - (iii) Draw and explain equivalent circuit of op-amp.
2. Attempt any **FOUR** of the following: [16]
 - (a) Compare open loop and closed loop configuration of op-amp on following basis
 - (i) Circuit Diagram
 - (ii) Gain
 - (iii) Bandwidth
 - (iv) Application
 - (b) Describe virtual ground and virtual short concept with reference to op-amp.
 - (c) Draw closed loop Inverting amplifier using op-amp and derive expression for it's gain.
 - (d) Derive the expression for relation between i/p and o/p of basic differentiator and draw basic differentiator.
 - (e) Design and draw the circuit for the following operation using op-amp
$$V_0 = 2V_1 + V_2 - 5V_3$$
 - (f) Suggest op-amp based circuit to convert square wave to triangular wave and draw the circuit diagram with input and output waveform.
3. Attempt any **FOUR** of the following: [16]
 - (a) Describe the operation of instrumentation amplifier using 3 op-amps.
 - (b) Explain current to voltage converter.
 - (c) Draw the circuit diagram of Peak detector (Positive Peak and Negative Peak).
 - (d) Draw and describe following op-amp based operation using log and antilog amplifier
$$V_0 = V_1 \times V_2$$

- (e) Draw circuit diagram and input output waveforms of inverting ZCD and non-inverting ZCD.
- (f) Describe the operation of op-amp based Schmitt trigger for sine to square wave conversion with the help of it's circuit diagram.

4. Attempt any **FOUR** of the following:

[16]

- (a) Draw and Explain Window Detector.
- (b) Design and draw high pass filter with cut off frequency 1 Khz and passband gain of 2.
- (c) Suggest and draw op-amp based circuit using Butterworth filter to fulfill following response



- (d) Describe the operation of wide band reject filter with the help of circuit diagram.
- (e) Explain all pass filter.
- (f) Classify the op-amp filters on following basis:
 - i) Components used
 - ii) Frequency range
 - iii) Frequency response
 - iv) Nature of passband and stopband

5. Attempt any **FOUR** of the following:

[16]

- (a) Draw the block diagram of SE 555. State the function of both internal transistors in IC 555.
- (b) Draw and describe the operation of Bistable multivibrator..
- (c) Draw and describe the operation of frequency divider using IC 555.
- (d) Describe the operation of phase detector and role of VCO in PLL.
- (e) Define center frequency and pull in time for PLL.
- (f) Describe with the help of block diagram the operation of FM demodulator using PLL.

6. Attempt any **FOUR** of the following:

[16]

- (a) Draw the block diagram of VCO using IC 555. Describe how output frequency varies with the variation in voltage applied to pin 5 of IC 555.
- (b) Draw the circuit diagram of square wave generator using IC 555. State the purpose of external diode used in the circuit and state expression of it's output frequency.
- (c) Design and draw monostable multivibrator using IC555 with $T_p = 1\text{ms}$.
- (d) Design and draw op-amp based RC Phase Shift oscillator for frequency 200 Hz.
- (e) Draw and describe operation of Bistable multivibrator using op-amp.
- (f) Using IC741 draw and explain, with neat circuit diagram Wein bridge oscillator.

