

17445

21718

3 Hours / 100 Marks

Seat No.

--	--	--	--	--	--	--	--

- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) Attempt any SIX of the following: 12
- (i) Define:
 - 1) Slew rate
 - 2) CMRR
 - (ii) Draw circuit diagram of basic integrator using Op-Amp.
 - (iii) Draw pin diagram of IC LM-324.
 - (iv) State the need of signal processing (any two points)
 - (v) Draw sample and hold circuit using Op-Amp.
 - (vi) Give classification of filters.

P.T.O.

(vii) Draw circuit diagram of narrow band pass filter using Op-Amp.

(viii) State functions of following pins of : IC 555

1) Threshold

2) Discharge

b) **Attempt any TWO of the following:**

8

(i) Describe the function of intermediate stage and output stage of Op-Amp with its block diagram.

(ii) State ideal and practical values of any four parameters of Op-Amp.

(iii) Draw the circuit diagram of level-shifting stage of Op-Amp and explain.

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

16

a) Explain the concept of virtual ground and virtual short with reference to Op-Amp.

b) Compare open-loop and closed loop configuration of Op-Amp (any four points)

c) Derive expression for gain of closed loop inverting amplifier.

d) Derive the expression for output of differentiator with neat circuit diagram.

e) Design and draw the circuit for the following operation using Op-Amp. $V_0 = -(V_1 + V_2 + V_3)$

f) Suggest Op-Amp based circuit to convert rectangular to saw-tooth wave and draw the circuit diagram with input and output waveform.

3. Attempt any FOUR of the following:**16**

- a) Explain the operation of instrumentation amplifier using 3 Op-Amps.
- b) Draw V-I converters with grounded load and derive expression for its output.
- c) State the need of phase detector and draw its circuit diagram.
- 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 window detector.
- f) Describe the operation of Op-Amp based schmitt trigger with neat circuit diagram.

4. Attempt any FOUR of the following:**16**

- a) Draw circuit diagram and input output waveform of ZCDs.
- b) Design and draw high pass filter with cut off frequency 2 KHz and passband gain of 2.
- c) State merits and demerits of active filters over passive filters (2 each)
- d) Explain the operation of wide bandpass filter with the help of neat circuit diagram.
- e) Describe Notch filter with neat circuit diagram.
- f) Define with respect to filters:
 - (i) Roll off rate
 - (ii) BW
 - (iii) Q-factor
 - (iv) Stop-band

5. Attempt any FOUR of the following:**16**

- a) Describe the operation of phase-detector and VCO in PLL.
- b) Draw neat block diagram of IC 555 and give function of each pin.
- c) Describe the operation of touch-plate switch using IC 555 with neat diagram.
- d) Explain the operation of frequency divider using IC 555.
- e) Draw and describe the block diagram of PLL.
- f) Define and state the expression for lock range and capture range of PLL.

6. Attempt any FOUR of the following:**16**

- a) Describe VCO using IC 555 with neat circuit diagram.
 - b) Draw and explain astable multivibrator using IC 741.
 - c) Design monostable multivibrator with $T_p = 1$ ms using IC 555.
 - d) Design wein bridge oscillator for 1 kHz frequency using Op-Amp. Draw designed circuit.
 - e) Draw and describe operation of bistable multivibrator using Op-Amp.
 - f) How overall phase shift is achieved in phase shift oscillator using Op-Amp? Draw its circuit diagram.
-