

# 17445

**11920**

**3 Hours / 100 Marks**

Seat No.

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- 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) Use of Non-programmable Electronic Pocket Calculator is permissible.  
(6) 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) Input offset voltage
  - 2) Slew rate
- (ii) Draw ideal voltage transfer curve of an op-amp.
- (iii) Give two applications of instrumental amplifier.
- (iv) Draw circuit diagram of V to I converter with floating load.
- (v) List four specification of I C LM324.
- (vi) Give classification of filter.
- (vii) List two merits and two demerits of filter.
- (viii) Draw the pin diagram of IC 555.

P.T.O.

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

8

- (i) Define
  - 1) CMRR
  - 2) SVRR
  - 3) Input capacitance
  - 4) Input bias current
- (ii) Differentiate open loop and closed loop configuration of op-amp on any four points.
- (iii) State the use of level shifter stage? Draw its circuit diagram.

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

16

- a) Derive the equation for virtual ground concept in op-amp.
- b) With neat sketch, derive the expression for output voltage of non-inverting averaging amplifier.
- c) Draw the circuit diagram of active integrator and obtain expression for output voltage.
- d) Suggest op-amp based circuit to convert squarewave to triangular wave and draw the circuit diagram with input and output waveform.
- e) Explain need for signal conditioning.
- f) Derive the equation for gain of non-inverting amplifier.

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

16

- a) Construct and draw the circuit to get the output voltage  $V_0 = 3V_1 + 2V_2$  where  $V_1$  &  $V_2$  are input voltage.
- b) Draw and explain circuit diagram of sample and hold amplifier.
- c) Draw and explain circuit diagram of antilogarithmic amplifier.
- d) Draw and explain circuit diagram of window detector.
- e) State the needs of peak to peak detector and draw its circuit diagram.
- f) Draw the block diagram of IC 555 and explain function of  $5k \Omega$  resistor network.

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

- a) Derive the equation for gain of inverting amplifier.
- b) Define with respect to filter.
  - (i) Cut-off frequency.
  - (ii) Roll of rate.
  - (iii) Q factor.
  - (iv) Bandwidth.
- c) Draw the circuit diagram of second order Butterworth High Pass filter.
- d) Design a first order low pass butterworth filter with a passband gain and of two and cut-off frequency of  $2\text{KH}_z$ , Draw the designed circuit.
- e) Describe the operation of wide band pass filter with the help of circuit diagram.
- f) Draw and explain block diagram of PLL.

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

- a) Draw following circuit diagram using op-amp.
  - (i) Window detector.
  - (ii) Active peak detector.
- b) Draw the circuit diagram and ideal frequency response of band reject filter.
- c) Draw and describe the operation of water level controller using IC 555.
- d) Explain use of PLL in FM detection.
- e) Define :
  - (i) Phase lock range
  - (ii) Capture rangeWith respect PLL.
- f) Draw and explain frequency divider using IC555.

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

- a) Draw and describe operation of Bistable multivibrator using op-amp.
  - b) Explain the working of IC 555 as a voltage controlled of oscillator (vco).
  - c) Draw and describe operation of astable multivibrator using IC 555.
  - d) Design and draw op-amp based wein bridge oscillator for frequency  $100 \text{ KHz}$ .
  - e) Draw and explain Astable multivibrator using IC 741.
  - f) Explain the working of IC 555 as schmitt trigger. Draw the circuit diagram and sketch the output waveforms.
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