

17445

14115

3 Hours / 100 Marks

Seat No.

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- 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) 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) State ideal and typical values of
- 1) Input offset voltage
 - 2) CMRR
- (ii) Draw circuit diagram of subtractor using op amp.
- (iii) State the need of signal conditioning and signal processing.
- (iv) Draw pin diagram of IC LM 324.
- (v) Draw circuit diagram of inverting comparator.
- (vi) Define
- 1) Cut off frequency
 - 2) Roll off rate with reference to filter.

P.T.O.

(vii) State four merits of active filter over passive filter.

(viii) State functions of following pins of IC 555

- 1) Pin No. 2 Trigger i/p
- 2) Pin No. 6 Threshold input

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

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(i) Draw block diagram of Op amp and describe the function of input stage and DC level shifting stage.

(ii) Define the following parameters of Op amp.

- 1) Input bias current
- 2) Input offset current
- 3) Slew rate
- 4) CMRR.

(iii) Draw dual input balanced output differential amplifier and describe the operation of it.

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

16

a) Draw open loop inverting and noninverting amplifiers circuit diagrams.

b) Draw closed loop inverting amplifier using Op amp and derive expression for its gain.

c) Compare open loop and closed loop configuration of Op amp on following basis.

- (i) Circuit diagram
- (ii) Gain
- (iii) Bandwidth
- (iv) Application.

d) Draw the circuit of basic differentiator and derive the output expression.

e) Design the circuit to get the output expression

$$V_0 = - (2V_1 + V_2 + 5V_3).$$

f) Suggest Op amp based circuit to convert square wave to triangular wave. Draw the circuit diagram with input and output waveforms.

- 3. Attempt any FOUR of the following:** **16**
- a) Draw the circuit of V to I converter with floating load and describe its operation.
 - b) Describe the operation of instrumentation amplifier using two Op amp with neat circuit diagram.
 - c) Draw the circuit of zero crossing detector. Draw its input and output waveforms.
 - d) Draw the circuit of window detector. Describe operation of it.
 - e) Describe the operation of logarithmic amplifier with neat circuit diagram.
 - f) Describe the working of sample and hold circuit with circuit diagram.
- 4. Attempt any FOUR of the following:** **16**
- a) Compare comparator and regenerative comparator (Schmitt trigger) on four points.
 - b) Design first order low pass filter with 1 KHz cut off frequency and pass band gain 3.
 - c) Compare active filters and passive filters on four points.
 - d) Draw the second order high pass filter and describe its operation.
 - e) Describe the working of band pass filter with neat circuit diagram.
 - f) Draw the circuit of notch (narrow band reject) filter and describe its operation.

- 5. Attempt any FOUR of the following:** **16**
- a) Draw the functional block diagram of Timer IC 555.
State function of internal resistors of $5k\Omega$ in IC 555.
 - b) Describe the application of IC 555 as touch plate switch.
Draw the circuit diagram of it.
 - c) Describe the operation of frequency divider using IC 555
with suitable diagram.
 - d) Draw block diagram of PLL and describe the function of each block.
 - e) Explain the working of PLL as frequency multiplier.
 - f) Draw transfer characteristics of PLL. Define
 - (i) Lock range and
 - (ii) capture range of PLL.
- 6. Attempt any FOUR of the following:** **16**
- a) Draw astable multivibrator using IC 741 and state the formula for calculating frequency of output.
 - b) Draw circuit diagram of schmitt trigger using IC 555 with its input and output waveforms.
 - c) Draw and explain the working of phase shift oscillator using IC 741.
 - d) Describe the working of voltage controlled oscillator using IC 555.
 - e) Draw the circuit of bistable multivibrator using IC 555 and describe its operation.
 - f) Describe the working principle of wien bridge oscillator using IC 741.
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