

17445

21819

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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) Attempt any SIX of the following:

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(i) Define:

- 1) CMRR
- 2) Slew rate

(ii) Draw basic differentiator using op-amp.

(iii) List any four specifications of IC LM 324.

(iv) Give advantages and applications of instrumentation amplifier (each two)

(v) Define sample period and hold period. With reference to sample and hold circuit.

(vi) Define:

- 1) Q- factor
- 2) Cut off frequency

(vii) Give classification of filter.

(viii) Draw pin diagram of IC 565.

P.T.O.

b) **Attempt any TWO of the following:****8**

- (i) Draw and explain ideal voltage transfer characteristics of op-amp.
- (ii) Describe the function of input stage and level shifting stage of op-amp with its block diagram.
- (iii) Compare ideal and practical parameters of op-amp values w.r.t.
 - 1) PSRR
 - 2) Gain bandwidth product
 - 3) CMRR
 - 4) Input bias current

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

- a) State the virtual ground concept in op-amp. Write its mathematical equation.
- b) State the need of signal conditioning and signal processing. List any four applications of instrumentation amplifier.
- c) Draw and describe following op-amp based operation using log and antilog amplifier $V_0 = V_1 \times V_2$.
- d) Design and draw low pass filter with cut off frequency 2 KHz and pass band gain of 2.
- e) How the PLL can be used as multiplier?
- f) Draw and explain bistable multivibrator using IC- 555.

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

- a) Draw neat diagram of integrator and obtain expression for output voltage.
- b) Compare open loop and close loop configuration of op- amp on following basis:
 - (i) Circuit diagram
 - (ii) Gain
 - (iii) Bandwidth
 - (iv) Application
- c) Draw circuit diagram of Schmitt trigger using op-amp.
- d) Draw notch filter with its frequency response
- e) Draw and describe the operation of water level controller using IC 555.
- f) Draw and describe wein bridge oscillator using IC- 741.

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

- a) Draw closed loop inverting amplifier using op-amp and derive expression for it's gain.
- b) For unity gain amplifier if $V_{in} = +2V$. What will be the output voltage? Draw the circuit diagram of unity gain amplifier.
- c) Draw circuit and derive equation of two op-amp instrumentation amplifier.
- d) Draw the second order high pass filter and describe it's operation.
- e) Draw transfer characteristics of PLL.
Define:
 - (i) Lock range and
 - (ii) Capture range of PLL.
- f) Draw and explain working of phase shift oscillator using IC-741.

- 5. Attempt any FOUR of the following:** **16**
- a) With neat diagram explain the concept of frequency compensation and offset nulling.
 - b) Draw circuit diagram and input output waveform of inverting ZCD. And non- inverting ZCD (Zero Crossing Detector).
 - c) State the need of peak to peak detector and draw it's circuit diagram.
 - d) Describe the operation of wide band pass filter with the help of circuit diagram.
 - e) Describe with the help of block diagram the operation of FM demodulator using PLL.
 - f) State the principle of oscillator. Write its necessity conditions.
- 6. Attempt any FOUR of the following:** **16**
- a) Draw and explain the circuit of V to I converter with floating load using op-amp.
 - b) Explain how active filter is better than passive filter.
 - c) Draw block diagram of IC 555. Explain the use of pin 2 and 6.
 - d) Describe the operation of phase detector and role of VCO in PLL.
 - e) How monostable multivibrator can be used as frequency divider?
 - f) State the working of IC 555 as a voltage controlled oscillator (VCO).
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