

# 17445

16172

**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) Assume suitable data, if necessary.
  - (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) State ideal and typical values of:
    - 1) Slew Rate
    - 2) CMRR
  - (ii) Draw circuit diagram of non-inverting adder with 3 inputs.
  - (iii) Draw pin diagram of IC LM 324.
  - (iv) State the need of signal conditioning and signal processing.
  - (v) State basic difference between active filter and passive filter.
  - (vi) Draw the pin diagram of IC 555.
  - (vii) Define multivibrator and give its classification.
  - (viii) Classify filters based on frequency response.

P.T.O.

b) Attempt any TWO of the following:

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- (i) Draw block diagram of OPAMP and state the function of DC level shifting stage and output stage.
- (ii) Draw dual input balanced output differential amplifier and describe the operation of it.
- (iii) Draw ideal and practical voltage transfer characteristics of OP-AMP.

2. Attempt any FOUR of the following:

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- a) Draw closed loop inverting amplifier using OPAMP and derive expression for its gain.
- b) Compare open loop and closed loop configuration of OP-AMP with respect to :
  - (i) Circuit diagram
  - (ii) Gain
  - (iii) Bandwidth
  - (iv) Application
- c) Describe virtual ground and virtual short concept with reference to OP-AMP.
- d) Draw the circuit of basic differentiator. Draw output waveforms for sine and square wave input.
- e) If  $R_1 = 2\text{K}\Omega$ ,  $R_F = 100\text{K}\Omega$ ,  $V_{cc} = \pm 15\text{V}$  and rms input voltage  $V_i = 50\text{mV}$ . Calculate output voltage in inverting and non inverting mode.
- f) Using OPAMP, draw the circuit to show the output  $V_0 = 5(V_1 - 4V_2)$  Where  $V_1$  and  $V_2$  are input voltages.

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

- a) Describe the operation of instrumentation amplifier using 3 - Op Amps with neat circuit diagram.
- b) Draw and explain the circuit of V to I converter with floating load using OP-AMP.
- c) Describe the operation of logarithmic amplifier with neat circuit diagram.
- d) Describe the operation of OP-AMP based schmitt trigger for sine to square wave conversion with the help of circuit diagram.
- e) Explain working of active negative peak detector with neat circuit and waveforms.
- f) Draw the circuit of window detector. Describe its operation with waveform.

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

- a) Write the comparison between comparator and schmitt trigger. (four points)
- b) Design first order low pass filter with 1 KHz cut off frequency and pass band gain 3.
- c) Draw the second order high pass filter and describe its operation.
- d) Draw the circuit and frequency response of wide band reject filter and narrow band reject filter.
- e) Draw the circuit diagram of second order high pass Butterworth filter with frequency response. Give expression for cut off frequency and gain.

- f) Draw the circuit diagram of OPAMP based filter circuit which fulfill following response. Refer Figure No. 1.

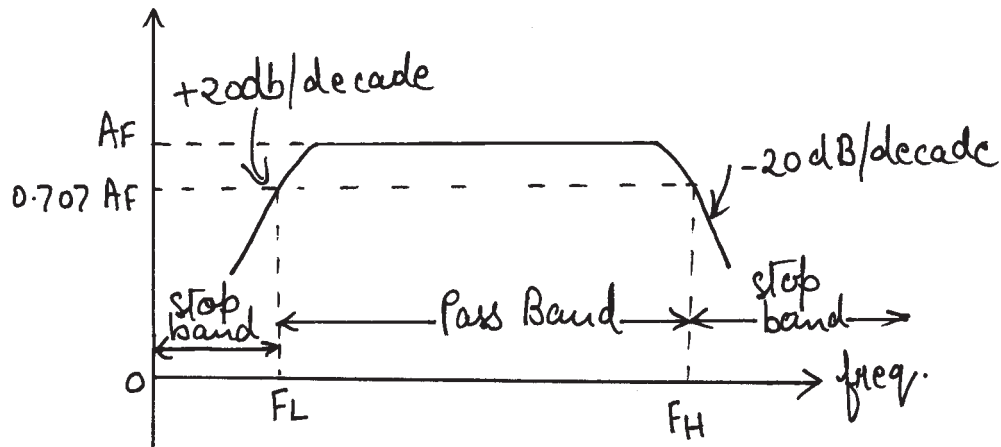


Fig. No. 1

5. Attempt any FOUR of the following:

16

- Draw the functional block diagram of timer IC 555. State the function of internal pnp transistor in IC 555.
- Draw the block diagram of PLL and describe the function of each block.
- Draw transfer characteristics of PLL. Define:
  - Lock range and
  - Capture range of PLL.
- Draw the circuit diagram of touch plate switch using IC 555 and describe its operation.
- Draw and describe the operation of water level controller using IC 555.
- Describe with the help of block diagram the operation of FM demodulator using PLL.

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

- a) Describe the working of voltage controlled oscillator using IC 741.
- b) Draw the circuit diagram of Wein bridge oscillator using IC 741 and give expression for frequency of oscillations.
- c) Design and draw monostable multivibrator using IC555 with  $T_p = 1\text{ms}$ .
- d) Draw and describe operation of astable multivibrator using OPAMP.
- e) Draw and explain the working of phase shift oscillator using IC 741.
- f) Define:
  - (i) Q factor of filter
  - (ii) Pass band of filter

Give the relation between roll off rate and order of filter.

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