

22423

23242

3 Hours / 70 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.

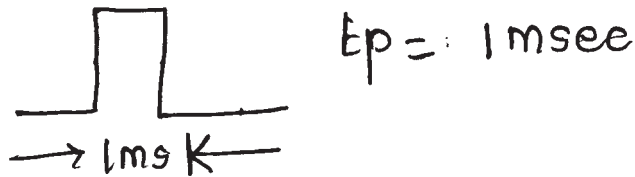
Marks

- 1. Attempt any FIVE of the following: **10****
- a) Draw Ideal voltage transfer curve of OP-amp.
 - b) Draw the circuit diagram of OP-AMP based integrator.
 - c) Draw pin diagram of IC-LM324 with labelling.
 - d) Define:
 - i) Q Factor
 - ii) Roll off ratewith respective filters.
 - e) Define oscillator. List the types of it.
 - f) State need of signal conditioning and signal processing.
 - g) Draw pin diagram of timer IC-555.

P.T.O.

2. Attempt any THREE of the following: 12

- a) Draw the Pin diagram of IC 741 and state the function of each Pin.
- b) Draw V to I converter with grounded load. Derive equation for output voltage V_o .
- c) Sketch the IC-555 based monostable multivibrator with suitable value of R and C for pulse width $t_p = 1$ m sec.



- d) On the basis of following parameters compare open loop and closed loop configuration of op-amp.
 - i) Voltage gain
 - ii) Input Resistance
 - iii) Output Resistance
 - iv) Bandwidth

3. Attempt any THREE of the following: 12

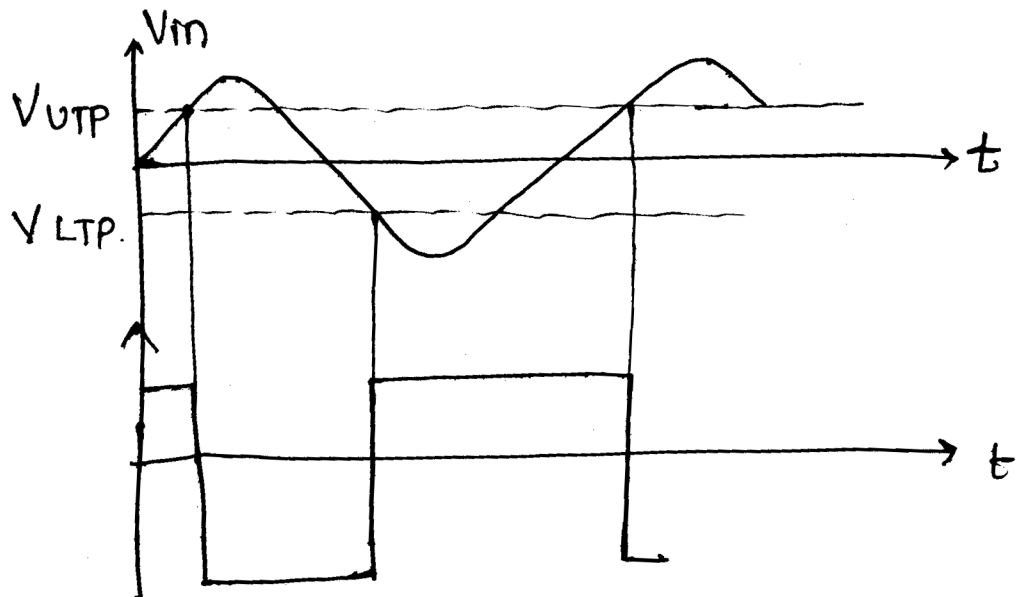
- a) Draw output waveforms for active differentiator for sine and square wave input.
- b) Draw circuit diagram of Instrumentation amplifier using 3 op-amps. Give the expression at the output of each op-amp.
- c) Draw circuit diagram of phase shift oscillator using IC-741 state any 2 applications of it.
- d) Draw circuit diagram of Bistable multivibrator using IC-555. Draw input output waveforms of it.

- 4. Attempt any THREE of the following:** **12**
- a) Draw block diagram of op-amp. State function of each block.
 - b) For unity gain amplifier if $V_{in} = + 7 \text{ V}$ what will be the output voltage? Draw circuit diagram of unity gain amplifier.
 - c) Design a circuit to obtain output voltage $V_0 = - 5 (V_1 + V_2)$. Draw the designed circuit.
 - d) Design op-amp based wein bridge oscillator for frequency of 750 Hz.
 - e) Design Astable Multivibrator AMV for 10 kHz frequency and 60% duty cycle.
- 5. Attempt any TWO of the following:** **12**
- a) Sketch the output signal along with input signal as sine wave of 5V peak to peak for following op-amp based circuit with ideal condition.
 - i) Inverting amplifier with gain '5'
 - ii) Positive peak detector
 - iii) Active Integrator
 - iv) Non Inverting Zero Crossing detector
 - v) Non inverting unity gain amplifier
 - vi) Active differentiator
 - b) Design a bandpass filter for $F_L = 100 \text{ Hz}$ and $F_H = 1 \text{ kHz}$ and passband gain 4.
 - c) Describe the operation of Inverting and non inverting operation of ZCD with neat neat circuit diagram and input output waveforms.

6. Attempt any TWO of the following:

12

- a) The op-amp is used in Inverting and non-inverting mode with $R_1 = 2 \text{ k}\Omega$, $R_F = 100 \text{ k}\Omega$. If $V_{CC} = \pm 15 \text{ V}$ and rms input voltage $V_1 = 20 \text{ mv}$. Calculate output voltage in each case. Draw circuit diagram for both modes.
- b) Identify the following waveforms label the circuit name and draw circuit diagram for the same.



- c) Draw Circuit diagram of Notch filter. Draw its frequency response. Also state the formula for Notch frequency.
