

22433

12425

03 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 answer 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) State the importance of differential amplifier.
 - b) Draw symbol and Pin diagram of IC741.
 - c) Draw circuit diagram of precision rectifier using OP-AMP.
 - d) Draw astable multi vibrator circuit using IC555.
 - e) Describe virtual ground concept with reference to OP-AMP.
 - f) Draw circuit diagram of V to I convertor using OP-AMP.
 - g) Draw circuit diagram of antilog amplifier.

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- 2. Attempt any THREE of the following:** **12**
- a) Design the first order low pass butter worth filter with high cut off frequency 10 kHz and pass band gain DF 11.
 - b) Draw block diagram of OP-AMP. State function of level shifter and output stage.
 - c) Draw bistable multi vibrator using IC555 and explain its working.
 - d) For RC phase shift oscillator using OP-AMP, the components used are $R = 8.2 \text{ k}\Omega$, $C = 0.01 \text{ }\mu\text{F}$, $R_1 = 1.2 \text{ k}\Omega$, $R_f = 39\text{k}\Omega$. Determine the frequency of oscillation. Can it get sustained oscillations.
- 3. Attempt any THREE of the following:** **12**
- a) Draw the OP-AMP based circuit diagram to provide output $V_o = 5\text{V}$, if $V_{in} = -1\text{V}$ applied.
 - b) Draw circuit diagram of log and antilog amplifiers using OP-AMP and explain it.
 - c) Draw block diagram at IC555. Write function of pin Trigger, Reset, Discharge, Threshold.
 - d) With neat sketch, derive the expression for output voltage of non-inverting amplifier.
- 4. Attempt any THREE of the following:** **12**
- a) Draw the circuit diagram of Schmitt trigger using OP-AMP. Describe its working with input and output waveforms.
 - b) Draw and explain the working principle of wein bridge oscillator using IC741.
 - c) Write any six advantages of active filter over passive filter.
 - d) Draw and explain circuit diagram of single input unbalanced output differential amplifier.
 - e) Compare linear and non-linear OP-AMP (Any four points).

5. Attempt any TWO of the following: 12
- a) Describe wide band pass filter with circuit diagram.
 - b) Draw comparator circuit using OP-AMP to detect 2V dc signal.
 - c) Design second order butter worth high pass filter. If passband gain is 2, $R = 20 \text{ k}\Omega$, $C = 0.05 \text{ }\mu\text{f}$ and draw the designed circuit diagram.
6. Attempt any TWO of the following: 12
- a) Draw circuit diagram of instrumentation amplifier using 3 OP-AMPs and state its output voltage expression.
 - b) For an Instrumentation amplifier, calculate the output voltage for $V_1 = 2\text{mV}$ and $V_2 = 1 \text{ mV}$ if $R_1 = 10 \text{ k}\Omega$, $R_g = 1\text{k}\Omega$, $R_3 = 10 \text{ k}\Omega$, $R_2 = 10 \text{ k}\Omega$.
 - c) Draw the circuit diagram of butter worth band pass filter using combination of butter worth high pass filter and butter worth low pass filter. Give the condition of cut-off frequency of both. Sketch the frequency response.
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