Total number of printed pages: **2** **Programme(UG)/Sixth Semester/UIE602**

2025

ELECTRONIC INSTRUMENTATION

Full Marks: 100

Time: Three hours

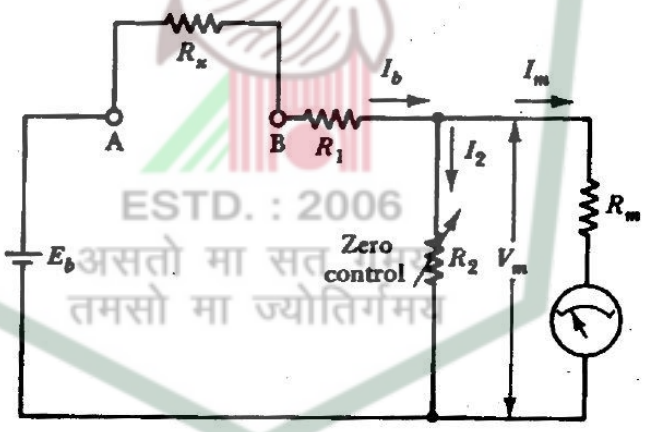
The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) What do you mean by loading effects of an instrument? Explain the operation of a transistor-based electronic DC voltmeter. (2+5=7)

   b) How can you measure a very small ac voltage using an OPAMP-based electronic voltmeter-explain with the help of circuit diagram (6)

   c) An ohmmeter circuit has E_b=1.5 V, R_1=15kΩ, R_m=50Ω, R_2=50Ω and meter FSD=50μA. Determine the ohmmeter scale reading at 0.5 FSD and the new resistance value of R_2 to compensate when the E drops to 1.3 V. (7)



2 a) Explain the operation of an electronic meter for the measurement of inductance? (5)

   b) Draw a circuit diagram for generating a triangular wave and explain its operation. (5)

   c) Explain how a PLL generates signals of desired frequency? (6)

   d) What are the different types of noises found in electronic systems? Write a few applications of Schmitt trigger circuit. (2+2=4)

3	a)	Explain how a sweep frequency generator works?	(6)
	b)	What are the functions of a signal analyzer? Explain the working principle of spectrum analyzer.	(1+6=7)
	c)	With the help of schematic diagram explain how a cathode ray tube works?	(7)
4	a)	How does a sawtooth signal generator provide the time base in a CRO? Explain with the help of circuit diagram.	(6)
	b)	Which voltages are applied in the horizontal and vertical deflection plates? Draw the equivalent circuit diagram of 10:1 oscilloscope probe when connected to source and CRO. Also obtain the expression of output voltage at the CRO.	(2+2+2=6)
	c)	A 250 Hz triangular wave with a peak amplitude of 20 V is applied to the vertical deflecting plates of a CRT. A 500 Hz sawtooth wave with a peak amplitude of 40 V is applied to the horizontal deflecting plates. The CRT has a vertical deflection sensitivity of 0.2 cm/V and a horizontal deflection sensitivity of 0.1 cm/V. Determine the waveform displayed on the screen.	(8)
5	a)	Explain how a sampling oscilloscope works?	(5)
	b)	What is a Lissajous pattern or curve? Draw the Lissajous pattern for two signals with the frequency ratio of 2:1 in themselves.	(1+2=3)
	c)	What qualities are desired in a CRO in terms of input impedance, frequency and display time? What are the differences between a CRO and a DSO? How is the analog voltage stored digitally in the DSO? Explain the working principle of a DSO.	(2+2+8=12)
6	a)	What is a quantization error? What will be the quantization error for a 2 bit ADC? What are the different types of ADC? Explain the working principle of a ramp type digital voltmeter (DVM) with the help of block diagram.	(1+2+2+6=11)
	b)	What are the advantages of digital instruments over analog instruments? With the help of block diagram explain how a digital frequency meter work?	(2+7=9)
7	a)	Give a brief illustration about dot matrix and 7 segment display. Explain the operation of a pen type strip chart recorder.	(2+2+6=10)
	b)	Write short notes on any two of the following	(2 x 5=10)
		i) X-Y recorder	
		ii) IEEE 488 bus	
		iii) Magnetic tape recorder	
		iv) Interference and screening	