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

2024

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 are the advantages of an electronic voltmeter over the electrical voltmeter? How can a high current be measured with an ammeter of low current capacity? What modification is required in an ohmmeter to compensate the effect of reduced battery voltage? Draw the circuit diagram.	2+2+3=7
	b)	Explain how the capacitance of a coil is measured by an OPAMP-based electronic meter.	3
	c)	Explain the operation of a vector voltmeter with the help of block diagram.	10
2	a)	What is a varactor diode? How does a voltage controlled oscillator work?	1+5=6
	b)	Draw a circuit diagram for generating a square wave and explain its operation.	6
	c)	What is a Schmitt trigger circuit? Derive the expression of lower and upper threshold voltage of a Schmitt trigger circuit.	2+6=8
3.	a)	Describe how a sweep frequency generator works?	5
	b)	Explain the circuit operation of a function generator in producing the triangular and pulse wave.	8
	c)	What do you mean by harmonic distortion? Give the mathematical definition of total harmonic distortion. Derive the expression of output frequency of Wien bridge oscillator.	1+1+5=7
4	a)	Explain the roles of grid, focusing anode, vertical deflection and horizontal deflection plates in the display of a signal in CRO.	4
	b)	Draw the equivalent diagram of the signal source, coaxial cable and oscilloscope. Also obtain the expression of the output voltage across the oscilloscope. Why frequency signals are attenuated in the oscilloscope? How this issue	2+2+2+2=8

		can be resolved?	
4	c)	A 250 Hz triangular wave with a peak amplitude of 30 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 0.1 cm/V and a horizontal deflection sensitivity of 0.08 cm/V. Assuming that the two inputs are synchronized, determine the waveform displayed on the screen.	8
5	a)	What is the primary function of a sampling oscilloscope? Describe the operation of bistable storage oscilloscope.	2+5=7
	b)	Draw the Lissajous pattern for a vertical input of sine wave and horizontal input of 90° phase shifted sine wave.	3
	c)	How is the analog voltage stored digitally in the DSO? Explain the operation of ramp type ADC.	6+4=10
6	a)	What is the resolution of 3 bit ADC if the scale range is 10 V. What are the applications of ADC? Explain the working principle of a successive approximation type ADC.	2+2+5=9
	b)	How does a digital frequency meter work? Explain with the help of block diagram.	7
	c)	What are the different types of display devices used for indicating readings? Give a brief description. Explain the operation of galvanometric strip chart recorder based on PMMC instrument.	4
7	a)	Explain the working principle of mirror type galvanometric strip chart recorder. What is the primary difference between strip chart recorder and X-Y recorder? Explain the operation of a strip chart recorder.	5+1+6=12
	b)	Write short notes on any two of the following i) Magnetic tap recorder ii) IEEE 488 bus iii) Ramp type Digital voltmeter	2 x 4=8