Reg. No.																

Question Paper Code	14012

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Electronic Instrumentation and Control Engineering

24IXPC302 - ELECTRICAL AND ELECTRONIC MEASUREMENTS

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	A dynamometer-type instrument shows fluctuating readings when used for current measurement. The most effective solution is: (a) Increase spring stiffness (b) Connect a damping resistor in parallel (c) Use a permanent magnet (d) Use a moving iron instrument	1	K1	CO1
2.	In range extension of an ammeter using a shunt, current division is based on (a) Capacitance ratio (b) Resistance ratio (c) Inductance ratio (d) Temperature coefficient	1	K1	CO1
3.	In a Wheatstone bridge, R1 = 100 Ω, R2 = 150 Ω, R3 = 200 Ω. R4 for balance is: (a) 133.3Ω (b) 300Ω (c) 150Ω (d)250Ω	1	K2	CO2
4.	Schering bridge is mainly used to measure: (a) low resistance (b) electric loss and capacitance (c) Coil inductance (d) Power factor	1	K1	CO2
5.	Which type of potentiometer provides the highest accuracy? (a) Student type (b) Crompton's potentiometer (c) Slide wire potentiometer (d) Simple voltmeter	1	K1	CO3
6.	A current transformer (CT) is always connected in (a) Parallel with the load (b)Series with the load (c) across the supply (d) from the supply	1	K1	CO3
7.	Wave analyzers are used to measure: (a) Harmonic distortion (b) DC resistance (c) Capacitance (d) Power factor	1	K1	CO4
8.	Digital multimeters are less suitable for (a) Measuring DC voltage (b) Measuring resistance (c) Measuring rapidly changing signals (d) Measuring AC voltage	1	K1	CO4
9.	A common-cathode seven-segment display means: (a) All cathodes are separate (b) All cathodes are connected together (c) All anodes are connected together (d) No cathodes are used	1	K1	CO5
10.	A magnetic recorder stores signals in (a) Paper chart (b) phosphor screen (c) Magnetic tape (d) Dot matrix	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Interpret why Electrodynamometer is called as "Transfer Instrument".	2	K2	CO1
12.	Explain how a shunt resistor helps in extending the range of an ammeter.	2	K2	CO1
13.	Give the principle of how high-Q coils are measured using a typical impedance bridge.	2	K2	CO2
14.	In a Wheatstone bridge, R1 = 100 Ω, R2 = 150 Ω, R3 = 200 Ω. Compute R4 for balance.	2	K2	CO2
15.	A voltage of 100 V (rms) with phase angle 30° is measured by a polar potentiometer. Write its coordinate form.	2	K2	CO3
16.	Label the Turns ratio in the instrument transformer.	2	K1	CO3
17.	List the methods available in Frequency measurements.	2	K1	CO4
18.	Analyze the automatic ranging in DVM.	2	K2	CO4
19.	Differentiate between dual trace and dual beam CRO.	2	K2	CO5

20.	Compare and contrast the key difference between Function generator and Sine wave Generator.		*2*	*K3*	*CO5*
21.	Mention the two advantages of XY recorders.		*2*	*K1*	*CO6*
22.	Choose a suitable display for showing alphanumeric data on a portable device and State why?		*2*	*K2*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Interpret how MI instruments can be used for both AC and DC measurement using construction diagrams with different vane arrangements. Interpret why MI instruments cannot be accurate for DC measurement.	*11*	*K3*	*CO1*
		OR			
	b)	Develop the torque equation for a PMMC instrument. Show that its scale is linear if spring control is employed and list out the advantages.	*11*	*K3*	*CO1*
24.	a) (i)	A Maxwell's capacitance bridge is used to measure an unknown Inductance in comparison with capacitance. R2 = 200 Ω, R3 = 300 Ω, R4 = 500 Ω, C4 = 0.25 μF. Calculate the values of R1 and L1.	*6*	*K3*	*CO2*
	(ii)	Describe the different difficulties encountered in the measurement of high resistances.	*5*	*K2*	*CO2*
		OR			
	b) (i)	In a Wheatstone bridge circuit, the four arms have the following resistances: Arm AB = 100 Ω, Arm BC = 200 Ω, Arm CD = 150 Ω, Arm DA = R (unknown). A galvanometer is connected between points B and D, and the bridge is balanced when the resistances are connected as above. Compute the value of the unknown resistance R.	*6*	*K3*	*CO2*
	(ii)	Discuss how the Schering bridge is used for the measurement of capacitance with a neat diagram.	*5*	*K3*	*CO2*
25.	a)	Illustrate the working of Precision – Crompton's DC potentiometer and with neat sketch. Describe the steps used when measuring an unknown resistance.	*11*	*K2*	*CO3*
		OR			
	b)	Explain the Potential Transformer with principle, construction and working in detail.	*11*	*K2*	*CO3*
26.	a)	Summarize the working and construction of basic wave analyzer and Heterodyne wave analyzer type.	*11*	*K2*	*CO4*
		OR			
	b)	With neat sketch enumerate the working and construction of Successive Approximate Register DVM.	*11*	*K2*	*CO4*
27.	a)	Construct with a neat diagram the block diagram and working principle of a Dual beam and Dual trace Cathode Ray Oscilloscope (CRO).	*11*	*K3*	*CO5*
		OR			
	b)	Illustrate with neat sketch the operation of Square Wave and AF Sine Wave Generators with diagrams.	*11*	*K3*	*CO5*
28.	a)	Describe the construction and operation of a Seven Segment Display. Give its types and typical applications.	*11*	*K3*	*CO6*
		OR			
	b)	Discuss the factors influencing the selection of display and recording devices for a given instrumentation application.	*11*	*K3*	*CO6*