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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 80015

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025

Fifth Semester

Electrical and Electronics Engineering

U23EE516 – MEASUREMENTS AND INSTRUMENTATION

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Classify the different types of instruments with an example.	2	K1	CO1
2.	An ammeter with FSD of 10 A reads a current of 6.54 A. The observer making measurements records it as 6.45 A. State the type of error committed by the observer.	2	K2	CO1
3.	State the role of controlling force in an analog indicating instrument.	2	K1	CO2
4.	Outline the expression for the steady state deflection of dynamometer type wattmeter.	2	K2	CO2
5.	Specify the advantages and disadvantages of digital instruments.	2	K1	CO3
6.	Interpret the process of measuring DC voltage using a digital voltmeter.	2	K2	CO3
7.	Mention the difficulties in using Wheatstone bridge for measuring low resistances (less than 1 ohm) and very high resistances (more than 100 Mohm).	2	K1	CO4
8.	Narrate the method of measuring self-inductance using Anderson Bridge.	2	K2	CO4
9.	Differentiate between active and passive transducer.	2	K2	CO5
10.	Illustrate the operating principle of Hall effect transducers.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11.	a) The following values are obtained from the measurement of the value of a resistor in ohm: 142.2, 147.4, 147.9, 148.1, 147.1, 147.5, 147.6, 147.4, 147.6, and 147.5. Calculate the (a) arithmetic mean, (b) deviations from mean, and (c) standard deviation (d) Identify the correct value of resistor. Compare the static and dynamic characteristics.	13	K3	CO1
	(OR)			
	b) Analyse the input-output configuration of a measuring system with respect to various inputs it receives during a measurement process and discuss any two methods of correction. Also, classify the standards and calibration of measuring instruments.	13	K3	CO1
12.	a) Prove by suitable analysis that permanent magnet moving coil and moving iron instrument can be used to measure ac and dc quantities with required sketches.	13	K2	CO2
	(OR)			
	b) Explain the construction and working of a single-phase induction type energy meter. Derive the expression for energy recorded by energy meter.	13	K2	CO2
13.	a) Illustrate the operation of a digital multimeter to measure AC/DC voltages and currents with necessary diagrams.	13	K2	CO3
	(OR)			
	b) Elucidate the block diagram of a digital storage oscilloscope and explain the functions of each block.	13	K2	CO3
14.	a) Analyze the working principle of Kelvin's bridge and Kelvin's double bridge with neat diagram. Derive expressions, with necessary diagrams, for unknown quantities when bridge is in balance.	13	K3	CO4
	(OR)			
	b) Draw the circuit diagram of a Maxwell's bridge to measure self-inductance. Explain its operation and derive the bridge balance equations with the phasor diagram.	13	K3	CO4
15.	a) Assess the construction, working and application of LVDT for measuring the linear displacement. State its limitations.	13	K4	CO5
	(OR)			
	b) Examine the requirements of transducers and characteristics of resistive, capacitive, and inductive transducers. Explain the working and derive the constants of Piezoelectric transducer.	13	K4	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Derive the equation for balance condition of Schering bridge and draw its phasor diagram. In a balanced Schering bridge, arm AB has capacitor of $0.4\mu\text{F}$ in parallel with $1.5\text{K}\Omega$, Arm BC has a resistance of $3\text{K}\Omega$, Arm CD has unknown capacitor C_x and R_x in series, and Arm DA has the capacitance of $0.4\mu\text{F}$. Supply frequency is 1kHz . Determine C_x , R_x and dissipation factor.	15	K3	CO4
	(OR)			
b)	Elaborate the different null detectors used in AC bridges to check balance condition. A bridge consists of the following: Arm ab: a choke coil having a resistance R_1 and inductance L_1 , Arm bc: a non-inductive resistance R_3 , Arm cd: a mica condenser C_4 in series with a non-inductive resistance R_4 , Arm da: a non-inductive resistance R_2 . When this bridge is fed from a source of 500Hz , balance is obtained under following conditions: $R_2 = 2410\Omega$; $R_3 = 750\Omega$; $C_4 = 0.35\mu\text{F}$; $R_4 = 64.5\Omega$. Determine the resistance and inductance of the choke coil. The supply is connected between a & c and detector is between b & d.	15	K3	CO4