BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER: III/ADD**
BRANCH: EEE **SESSION: MO/2025**

SUBJECT: EE24201 ELECTRICAL MEASUREMENT AND INSTRUMENTATION

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	For the results of the measurement system to be meaningful enlist the basic requirements.	[2]	1	1
Q.1(b)	Use block diagram of generalized input-output configuration of measurement systems to differentiate between interfering inputs and modifying inputs.	[3]	1	2
Q.2(a)	Which one is best way to express the accuracy of an instruments – Point accuracy, Accuracy as percentage of scale range, and Accuracy as percentage of true value. Write reason in support of your choice.	[2]	1	2
Q.2(b)	A d.c. circuit can be represented by a voltage source of 10 V in series with an output resistance of 1 kΩ. An ammeter of 50 Ω resistance is connected to the source terminals for measurement of current. Calculate the percentage error in measurement and the accuracy.	[3]	1	3
Q.3(a)	Classify errors in a measurement system. Also, give subclassification of systematic errors.	[2]	1	1
Q.3(b)	A 0 – 300 V voltmeter has a guaranteed limiting error of 1 percent. The voltage measured by this instrument is 150 V. Calculate the limiting error and relative limiting error.	[3]	1	3
Q.4(a)	The permanent magnet moving coil instrument is best for measuring d.c. quantity. Why?	[2]	2	2
Q.4(b)	The inductance of a moving iron instrument is given by $L = (10 + 5\theta - \theta^2)\mu H$ where θ is the deflection in radian from zero position. The spring constant is 12×10^{-6} Nm/rad. Estimate the deflection for a current of 5 A.	[3]	2	3
Q.5(a)	A 1mA ammeter has a resistance of 100 Ω. It is to be converted to a 1 A ammeter. Calculate the value of shunt resistance required.	[2]	2	3
Q.5(b)	A moving coil instrument has the following data: number of turns = 100, width of coil = 20mm, depth of coil = 30mm, flux density in the gap = o.1 Wb/m^2. Calculate the deflecting torque when carrying a current 20 mA. Also calculate the deflection if the control spring constant is 2×10^{-6} Nm/degree.	[3]	2	3

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