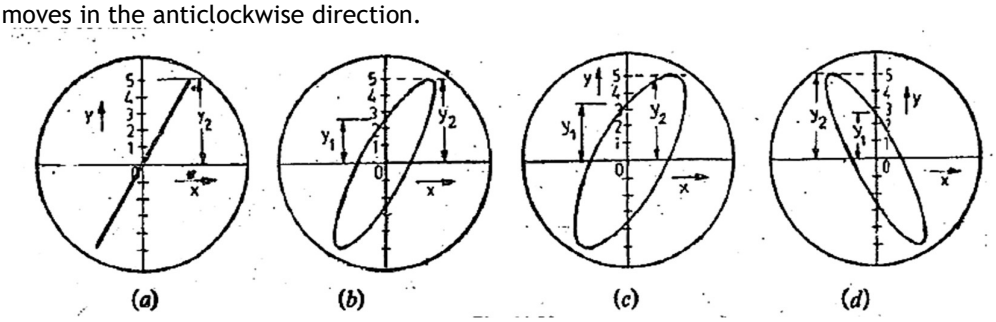
BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER: IIIrd/ADD**
BRANCH: EEE **SESSION: MO/2025**
SUBJECT: EE24201 ELECTRICAL MEASUREMENT AND INSTRUMENTATION
TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Describe the basic blocks of a generalized Instrumentation System? Draw the various blocks and explain their functions.	[5]	1	1
Q.1(b)	A 160pF capacitor, and inductor of 160μH and a resistor of 1200Ω are connected in series. (a) If all the three components have ±0% error, compute the resonant frequency of the combination. (b) If all the three components have +10% errors compute the expected resonance frequency of the combination and the percentage error when compared to the result of part (a) (c) If all the three components are –10%, compute the expected resonant frequency and the percentage error when compared to the result of part (a).	[5]	1	6
Q.2(a)	Describe the constructional details and principle of operation of a d'Arsonval galvanometer. Derive the expression for steady state deflection.	[5]	2	2
Q.2(b)	A moving coil ammeter has a fixed shunt of 0.02Ω. With a coil resistance of R = 1000Ω and a potential difference of 500mV across it, full scale deflection is obtained. (a) To what shunted current does this correspond? (b) Calculate the value of R to give full scale deflection when shunted current I is 10A. (c) With what value of R is 40% deflection obtained with I = 100A?	[5]	2	3
Q.3(a)	The arms of a four arms bridge ABCD, supplied with sinusoidal voltage, have the following values: Arm AB: A resistor of 200Ω in parallel with a capacitor 1μF. Arm BC: 400Ω resistor; Arm CD: A 1000Ω resistor; Arm DA: A resistor of R_2 in series with a 2 μF capacitor. Determine the value of R_2 and the frequency at which the bridge will balance.	[5]	3	3
Q.3(b)	Describe the Varley loop test used for localization of cable faults. How is this method different from Murray loop test?	[5]	3	2
Q.4(a)	Draw the block diagram of a general purpose CRO and explain the function of focus control and synchronization control.	[5]	4	1
Q.4(b)	The sketches shown in figure below display Lissajous patterns for cases where voltages of same frequency but having phase difference are connected to Y and X plates of the oscilloscope. Find the phase difference in each case. The spot generating the patterns moves in a clockwise direction. Calculate the angles if the spot generating the patterns moves in the anticlockwise direction.	[5]	4	3



PTO

Q.5(a)	Differentiate between the following citing suitable examples: (a) Active and passive transducers (b) Primary and Secondary transducers (c) Analog and digital transducers.	[5]	5	2
Q.5(b)	Describe the working principle of linear variable differential transformer. Why is the word “differential” used in Linear Variable Differential Transformer”? Why is it called as “Transformer”?	[5]	5	2

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