

# GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2020-2021

## ELECTRICAL AND ELECTRONIC MEASUREMENT AND INSTRUMENTATION

EI304

TIME ALLOTTED: 3 Hours

FULL MARKS: 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question:  $10 \times 1 = 10$

		Marks	CO No
1	(i) The electrodynamicometer type instruments have a. Linear scale b. Nonlinear scale c. Logarithmic scale d. Semi-logarithmic scale	1	CO1
	(ii) Kelvin's double bridge is used to measure a. Low resistance b. Medium resistance c. High resistance d. All of the above	1	CO1
	(iii) An aquadag is used for display in CRTs to a. Collect primary electrons b. Collect secondary emission electrons c. Both primary and secondary emission electrons d. None of the above	1	CO1
	(iv) Meggar is used to measure a. Low resistance b. Medium resistance c. High resistance d. All of the above	1	CO4
	(v) Which one of the following instruments can be used for AC-DC both a. Electrostatic b. Moving Iron c. Electrodynamicometer d. All of the above	1	CO3
	(vi) In CRO, during the sweep time the electron beam moves from a. Right to left of the screen b. Left to right of the screen c. bottom to top of the screen d. Top to bottom of the screen	1	CO1
	(vii) The gain of the charge amplifier is given as a. Voltage/Charge b. Charge/Current c. Charge/voltage	1	CO3

	d. Current/Charge		
(viii)	In PLL, when no input is given in the circuit then the PLL is in a. Free Running Mode b. Capture Range c. Locked Mode d. None of the above	1	CO1
(ix)	Which of the following is the most accurate DVM a. Flash type b. Successive Approximation c. Ramp Type d. Dual Slope type	1	CO2
(x)	The applications of Q meter are a. Self inductance Measurement b. Circuit resistance measurement c. Distributed capacitance measurement d. All of the above	1	CO1
(xi)	For measurement of ratio of frequencies of two signals a. low frequency signal acts as time base b. high frequency signal acts as time base c. any of the two signals can act as time base d. low frequency signal is fed to the counter	1	CO3
(xii)	Which one of the following instruments is a transfer type instrument a. PMMC b. Moving Iron c. Electrodynamometer d. Electrostatic	1	CO1

**GROUP – B**

**(Short Answer Type Questions)**

Answer any *three* from the following: **3×5=15**

		Marks	CO No
2.	Define the following terms for a measuring instrument: i. Accuracy ii. Linearity iii. Hysteresis iv. Dynamic error v. Sensitivity	5	CO1
3.	a) Define Q of a coil	1	CO1
	b) In a series Q meter circuit, the frequency is 500 kHz, the resistance is $0.5\Omega$ and the variable capacitor is 350pF. Calculate the effective inductance and resistance of the coil, if the Q meter indicates 90.	4	CO3
4.	Show that the power of a three phase network can be measured using 2 watt meters. (Consider star connected resistive loads).	5	CO4

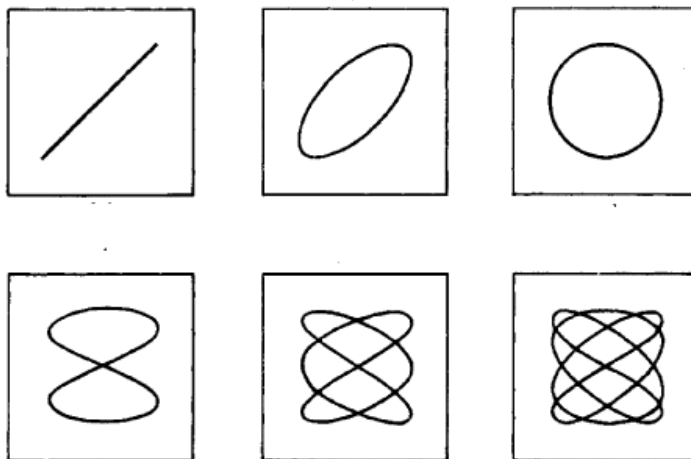
5. A PMMC ammeter has internal resistance of  $50\Omega$  and full scale deflection current is  $I_m = 1 \text{ mA}$ . Calculate the values of shunt resistances if the full scale deflection currents are to be extended upto
- 10mA
  - 50 mA
  - 100 mA
  - 500 mA.

6. Explain the process of localization of Short circuit cable fault using Varlay Loop method.

**GROUP – C**  
**(Long Answer Type Questions)**

Answer any *three* from the following:  $3 \times 15 = 45$

- |    |   | Marks | CO No |   |    |    |    |    |   |   |   |   |   |   |    |  |  |
|----|---|-------|-------|---|----|----|----|----|---|---|---|---|---|---|----|--|--|
| 7. | a) Find out the best probable straight line for the following data using method of extended difference:   | 10    | CO2   |   |    |    |    |    |   |   |   |   |   |   |    |  |  |
|    | <table border="1" style="border-collapse: collapse; text-align: center; width: 50%;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">11</td> <td style="padding: 5px;">14</td> </tr> <tr> <td style="padding: 5px;">y</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">10</td> </tr> </table> | x     | 1     | 3 | 4  | 6  | 11 | 14 | y | 1 | 2 | 4 | 5 | 8 | 10 |  |  |
| x  | 1   | 3     | 4     | 6 | 11 | 14 |    |    |   |   |   |   |   |   |    |  |  |
| y  | 1   | 2     | 4     | 5 | 8  | 10 |    |    |   |   |   |   |   |   |    |  |  |
|    | b) Describe the method for measuring permittivity of a material using Schering bridge   | 5     | CO4   |   |    |    |    |    |   |   |   |   |   |   |    |  |  |
| 8. | a) Show that how a potentiometer circuit can be converted into a multi-range potentiometer?   | 5     | CO2   |   |    |    |    |    |   |   |   |   |   |   |    |  |  |
|    | b) Prove that PMMC type instrument cannot be used for AC measurements.  | 5     | CO1   |   |    |    |    |    |   |   |   |   |   |   |    |  |  |
|    | c) What is Lissajous pattern in CRO? Find out the ratio of frequencies in horizontal and vertical deflection plates from the following patterns:  | 5     | CO1   |   |    |    |    |    |   |   |   |   |   |   |    |  |  |



9. a) Show the steps of successive approximation type DMV for 4 bit representation, where starting the output from 1000 to 0000 and from 1000 to 1111.
- b) Explain the three modes of operation of Phase Locked Loop.
- c) What is Bath-Tub curve? Explain with the schematic diagram.

**B. TECH/AEIE/ODD/SEM-III/EI304/R18/2020-2021**

<b>10</b>	a)	Derive the bridge balance equation of a modified De-Sauty's and draw the phasor diagram also.	<b>8</b>	<b>CO1</b>
	b)	Describe the electrostatic focusing method used in CRO for focusing the electron beam.	<b>7</b>	<b>CO1</b>
<b>11.</b>		Write short notes on any three of the followings:	<b>5x3=15</b>	<b>-</b>
	a)	Screen of a CRO	<b>5</b>	<b>CO1</b>
	b)	Dual-slope integration type DVM	<b>5</b>	<b>CO1</b>
	c)	Frequency multiplication or division using PLL	<b>5</b>	<b>CO4</b>
	d)	Voltage to Frequency Converter	<b>5</b>	<b>CO3</b>