GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
ELECTRICAL AND ELECTRONIC MEASUREMENT
EE302

TIME ALLOTTED: 3Hours **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: **10×1=10**

		Marks	CO No
1. (i)	A meggar is used for measurement of a) low value resistances b) medium value resistances c) high value, particularly insulation resistances d) all of the above	1	CO2
(ii)	Frequency can be measured by using a) Maxwell's bridge b) Schering bridge c) Kelvin double bridge d) Wien's bridge	1	CO3
(iii)	In 2-wattmeter method for measurement of power in a star-connected 3 phase load, magnitude of the two wattmeter readings will be equal a) at zero power factor b) at unity power factor c) at 0.5 power factor d) readings of the two wattmeters will never be equal	1	CO2
(iv)	Anderson bridge is used to measure of a) Capacitance b) Time period c) Resistance and capacitance d) Inductance	1	CO3
(v)	The secondary winding of a CT is always kept a) open circuited b) short circuited c) shorted with ammeter d) shorted with voltmeter	1	CO2

(vi)	If the secondary winding of a current transformer is open circuited when connected in a line a) low currents are induced in the secondary b) high voltages are induced in the secondary c) low voltages are induced in the secondary d) high currents are induced in the secondary	1	CO1
(vii)	The example of integrating instrument is a) moving coil meter b) moving iron meter c) tangent galvanometer d) energy meter	1	CO4
(viii)	Which bridge is preferred for measurement of inductance having high Q factor? a) Maxwell bridge b) Hey's Bridge c) Owen's bridge d) De Sauty Bridge	1	CO4
(ix)	The instrument, which gives the value of the quantity to be measured in terms of instrument constant & its deflection, is called the a) absolute instrument b) secondary instrument c) recording instrument d) integrating instrument	1	CO1,CO3
(x)	In measurement systems, which of the following static characteristic(s) is/are desirable? a) Accuracy b) Sensitivity c) Reproducibility d) All of these	1	CO2,CO3
(xi)	A 1mA ammeter has a resistance of 100 ohms. It is to be converted to a 1A ammeter. The value of shunt resistance is a) 0.001ohm b) 0.1001 ohm c) 100000 ohm d) 100 ohm	1	CO4
(xii)	A 1mA d'Arsonval galvanometer has a resistance of 100ohm. It is to be converted to a 10V voltmeter. The value of multiplier resistance is a) 999Ω b) 9999Ω c) 9900Ω d) 990Ω	1	CO3

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following) 3 x 5 = 15

		Marks	CO No
2.	Derive an expression for torque in a moving iron instrument.	5	CO3
3.	Derive torque equation of single phase induction type energy meter with the help of phasor diagram.	5	CO1
4.	Describe the function of a time-base generator in a CRO.	5	CO2
5.	Derive the balance equations for Schering Bridge for measurement of capacitance?	5	CO2
6.	A 230 V, 5 A energy meter on full load unity power factor test makes 60 revolutions in 360 seconds. If the designed speed of the disc is 520 revolutions per kWh, find the percentage error.	5	CO3

GROUP – C
(Long Answer Type Questions)
(Answer any *three* of the following) 3 x 15 = 45

		Marks	CO No
7. a)	Draw the circuit diagram of Kelvin's double bridge. Derive the expression for unknown resistance with usual notations.	10	CO1
b)	Two wattmeters are connected to measure the power consumed by a 3 phase load with power factor 0.4. Total power consumed by the load, as indicated by the two wattmeters is 30 kW. Find the individual wattmeter readings.	5	CO3
8. a)	Define the term "Speed of Response"	5	CO2
b)	Explain the operations of RAMP type digital voltmeter.	5	CO1
c)	The four arms of a bridge supplied from a sinusoidal source are configured as follows: Arm AB: A resistance of 100 Ω in parallel with a capacitance of 0.5 μF Arm BC: A 200 Ω noninductive resistance Arm CD: A 800 Ω noninductive resistance Arm DA: A resistance Rx in series with a 1 μF capacitance Determine the value of Rx and the frequency at which the bridge will balance.	5	CO3
9. a)	Draw and explain different blocks of a CRO.	4	CO4
b)	Write the operating principle of a CRT.	6	CO4
c)	What are the difference between dual trace and dual beam oscilloscopes?	5	CO4

10. a)	Describe the constructional details of an Electrodynamometer type wattmeter.	8	CO3
b)	Explain the working of Maxwell bridge. Why it is limited to the measurement of medium Q coils?	7	CO3
11.	Write short notes on any three of the following:	3x5=15	
a)	DVM	5	CO2
b)	PMMC instrtument	5	CO1
c)	Calibration of ammeter and voltmeter by potentiometer	5	CO2
d)	Strain Gauge	5	CO2
e)	Energy meter	5	CO2