

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-III(New) EXAMINATION – SUMMER 2016

Subject Code:2130903

Date:04/06/2016

Subject Name:Electrical Measurement and Measuring Instruments

Time:10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	Short Questions	14
	1 Define reproducibility.	
	2 Define linearity.	
	3 Define dead time.	
	4 Define accuracy.	
	5 Define instrument transformer.	
	6 State the limitations of wheatstone bridge.	
	7 List out different errors in energy meter	
	8 Define quality factor (Q) with reference to inductance.	
	9 State methods for measurement of power in 3-phase circuit.	
	10 Give the essential component of single phase energy meter.	
	11 State application of strip chart recorder.	
	12 What is a wave analyzer?	
	13 What do you mean by term “harmonic distortion”.	
	14 What is a transducer?	
Q.2	(a) Differentiate between spring control and gravity control methods used to produce the controlling torque in an indicating instrument.	03
	(b) Discuss the gross and systematic errors with the help of some examples from your study of electrical measurements.	04
	(c) Explain the construction, working and torque equation of PMMC instrument with neat diagram.	07
	OR	
	(c) Prove that deflection of electrodynamic type wattmeter is proportional to power consumed.	07
Q.3	(a) Describe the construction and working of thermocouple instrument.	03
	(b) Draw the possible methods of connecting the pressure coil of a wattmeter and compare the errors.	04
	(c) How the effect of contact resistance and resistance of the connecting leads are eliminated in the measurement of resistance by kelvin’s double bridge? Derive the condition for balance.	07
	OR	
Q.3	(a) Define the terms “Indicating instruments”, “Recording instruments” and “Integrating instruments”. Give suitable example for each case.	03
	(b) Explain the construction and working of the weston type frequency meter.	04
	(c) Explain the loss of charge method for measurements of insulation resistance.	07
Q.4	(a) Derive a general equation for deflection for a spring controlled electrostatic instrument.	03
	(b) Describe how to make extension of range of ammeter.	04

	(c)	Derive the equation of balance for maxwell's inductance – capacitance bridge. Discuss suitability of maxwell's inductance – capacitance bridge for determination of inductance having $1 < Q < 10$.	07
		OR	
Q.4	(a)	Explain with diagram, the bonded type of strain gauge.	03
	(b)	Using expression for torque in single phase induction type meter, Show that the total no of revolutions made by its disc during a particular time is proportional to the energy consumed.	04
	(c)	Derive the equation of balance for modified d'Sauty's bridge. Draw the phasor diagram of the bridge under conditions of balance.	07
Q.5	(a)	Describe the working of a digital frequency meter with schematic block diagram.	03
	(b)	What are the different types of telemetry system? Explain any one system.	04
	(c)	Explain the construction and principle of working of a linear variable differential transformer (L.V.D.T).	07
		OR	
Q.5	(a)	Describe digital storage oscilloscope with schematic block diagram.	03
	(b)	Explain Heterodyne wave analyzer with necessary block diagram.	04
	(c)	Describe the working and construction of resistance thermometers. Describe materials used for RTDs and Sketch their typical characteristics.	07
