

**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
<b>Q.1</b>	<b>Short Questions</b>	<b>14</b>
	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?	
<b>Q.2</b>	(a) Differentiate between spring control and gravity control methods used to produce the controlling torque in an indicating instrument.	<b>03</b>
	(b) Discuss the gross and systematic errors with the help of some examples from your study of electrical measurements.	<b>04</b>
	(c) Explain the construction, working and torque equation of PMMC instrument with neat diagram.	<b>07</b>
	<b>OR</b>	
	(c) Prove that deflection of electrodyamometer type wattmeter is proportional to power consumed.	<b>07</b>
<b>Q.3</b>	(a) Describe the construction and working of thermocouple instrument.	<b>03</b>
	(b) Draw the possible methods of connecting the pressure coil of a wattmeter and compare the errors.	<b>04</b>
	(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.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Define the terms “Indicating instruments”, “Recording instruments” and “Integrating instruments”. Give suitable example for each case.	<b>03</b>
	(b) Explain the construction and working of the weston type frequency meter.	<b>04</b>
	(c) Explain the loss of charge method for measurements of insulation resistance.	<b>07</b>
<b>Q.4</b>	(a) Derive a general equation for deflection for a spring controlled electrostatic instrument.	<b>03</b>
	(b) Describe how to make extension of range of ammeter.	<b>04</b>

- (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**

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