Seat No.: _____ Enrolment No._____

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 electrodynamometer 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**

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