Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Vth Semester–Examination – Nov-Dec- 2011

Subject code: 152402

Subject Name: Electrical Measurements & Electronics Instruments

Date:24/11/2011 **Time: 02:30 pm – 05:30 pm**

Total Marks: 70

Instructions:

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

Q.1 **(a)** Draw the equivalent circuit and Phasor diagram of a current transformer. Drive the expression for ratio and phase angle errors. **07**

(b) Define following terms :- **07**

1) Repeatability, 2) Accuracy, 3) Precision,
4) Resolution , 5) Linearity, 6) Johanson Noise,
7) White noise.

Q.2 **(a)** Explain the principle and operation of d'Arsonval galvanometer. **07**

(b) Describe in detail the successive approximation method of analog to digital (A/D) conversion. **07**

OR

(b) Discuss the measurement of Power in a 3-phase circuit by two watt-meter method with neat diagrams. **07**

Q.3 **(a)** Differentiate Attraction type and Repulsion type Moving Iron instruments. **07**

(b) Calculate the inductance of a coil from the following measurement on an a.c. potentiometer. **07**

1) Voltage drop across a 0.1Ω standard resistor connected in series with the coil = 0.613 $\angle 12^{\circ}6'$
2) Voltage across the test coil through a 100/1 volt-ratio box = 0.781 $\angle 50^{\circ}48'$V.
3) Frequency is 50 Hz.

OR

Q.3 **(a)** Sketch the circuit diagram of a Maxwell bridge. Drive the equations for the resistive and inductive components of the measured inductor. **07**

(b) The constant for a 3-phase 3 element integrating wattmeter is 0.12 revolution of disc/kwh. If the meter is normally used with a potential transformer of a ratio 12000/110V and a current transformer of ratio 500/5A, find the error expressed as a percentage of the correct reading from the following test figures for the instrument only. **07**

1) Line voltage = 100V
2) Current = 5.25A
3) Power factor = 1
4) Time to complete 40 revolutions = 61 sec.

Q.4 **(a)** Describe the construction and working of PMMC instruments. **07**

(b) Explain the constructional details and working of Ferro-dynamic watt meters. Enlist advantages and disadvantages of same. **07**

OR

Q.4 **(a)** Sketch the complete circuit of an emitter follower voltmeter using a FET input stage. Carefully explain the circuit operation and the effect of the FET. **07**

	(b)	Briefly describe a thermocouple. Draw a sketch to show the construction of a basic thermocouple instruments. Explain its operation.	**07**
Q.5	**(a)**	Sketch a range changing circuit for a Digital Volt Meter & explain how it operates.	**07**
	(b)	Explain the source of errors in 1-phase induction type energy meters.	**07**

OR

Q.5	**(a)**	Draw basic block diagram of a digital frequency meter. Discuss each block in details.	**07**
	(b)	Enlist various types of Probes. Explain any two in detail.	**07**

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