Code: 13A02501 **R13**

B.Tech III Year I Semester (R13) Regular & Supplementary Examinations November/December 2016

ELECTRICAL MEASUREMENTS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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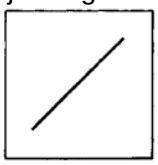
1 Answer the following: (10 X 02 = 20 Marks)

(a) List the sources of errors in Permanent Magnet Moving Coil type of Instruments.

(b) What is the ratio of vertical to horizontal voltage signal frequencies and their amplitudes for an oscilloscope which displays the following Lissajous figure?



(c) List some of the problems associated in measurement of low resistance values.

(d) How is the effect of Thermo-Electric EMFs eliminated when taking the readings with Kelvin's double bridge?

(e) How can the error caused by the inductance of the pressure coil, compensated in a low power factor Electrodynamometer type wattmeter?

(f) What are the main components of an Induction type of Energy meter?

(g) What is the burden of current transformer expressed in terms of?

(h) 'Phase angle error' in a Potential transformer is negative in a particular measuring scenario. What does it mean?

(i) List the different ways used for measuring Iron losses.

(j) What are ballistic tests used in magnetic measurements for?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Explain principle of operation of an Electrodynamometer type of Instrument and derive the expression for Torque equation for the same.

OR

3 (a) Describe how the following measurements can be made with the use of CRO:
(i) Phase Angle. (ii) Frequency.

(b) How is deflection sensitivity and Deflection factor of a CRO defined as?

UNIT – II

4 Anderson's Bridge is used for precise measurement of self Inductance of a Coil. With the help of a circuit and its phasor diagram derive and expression for and explain how its self inductance and the associated resistance can be measured

OR

5 A student is trying to compare the storage factor of an inductor at f_1 = 1000 Hz and f_2 = 2000 Hz. He is using Maxwell's capacitance bridge. The values of the components in the bridge are R_2 = 400 Ω; R_3 = 600 Ω; R_4 = 1000 Ω; C_4 = 0.5 μF. Calculate the values of the Inductance and its associated resistance and storage factor of the coil at both the frequencies and comment on the results.

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UNIT – III

6 Why is the measurement of power in circuits with low power factor by ordinary electrodynamometer wattmeters is difficult and inaccurate? What special features are to be incorporated in the above type of wattmeters to make it a 'low power factor type wattmeter'? Explain.

OR

7 Explain the purpose of lag adjustment devices in an Induction type of energy meter. Explain the different ways of achieving it.

UNIT – IV

8 What is the transformation ratio of a Potential Transformer? Explain the design considerations that are to be taken to minimize the errors in Potential transformer.

OR

9 Explain the principle and operation of DC Crompton's potentiometer.

UNIT – V

10 Describe the construction and working principle of a Ballistic galvanometer. Prove that in a Ballistic Galvanometer, the charge is proportional to the first swing of the moving coil.

OR

11 A ballistic galvanometer of resistance 1500 Ω gives a throw of 75 divisions when the flux through the search coil to which it is connected, is reversed. If the flux density is 0.1 Wb/m^2, the search coil has 1400 turns, a mean area of 5500 mm^2 and a resistance of 200 Ω, calculate the galvanometer constant in terms of coulomb per scale division.

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