4E4122

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B. Tech. IV-Sem. (Main/Back) Exam; April-May 2017
Electronics Instrumentation & Control Engg.
4E13A Electrical Measurement

Time : 3 Hours | **Maximum Marks : 80** | **Min. Passing Marks : 24**

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Instructions to Candidates :-

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*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. Nil 2. NIL

UNIT-I

1 (a) What do you mean by phantom loading ? Explain the calibration techniques of single phase energy meter by phantom loading. **8**

(b) The inductance of a moving iron ammeter with a full scale deflection of 90° at 1.3 A, is given by the expression $L=\left(200+35\theta-5\theta^2-\theta^3\right)\mu H$, where θ is the deflection in radian from the zero position. Estimate the angular deflection of the pointer for a current of 1.0 A. **8**

OR

1 (a) A 50 volt range spring controlled electrodynamic voltmeter having a square law scale response takes 0.04A on d.c. for full scale deflection of 90°. The control constant is 0.5×10^{-6} N-m/degree and the initial mutual inductance of the instrument is 0.31 H. Find the true potential difference across the instrument when it reads 50V at 50 Hz.

8

(b) Explain the working of repulsion type moving iron instruments. Discuss about the methods of producing controlling and damping torques in them.

8

UNIT-II

2 (a) Explain the effect of secondary burden on the ratio and phase errors of a current transformer.

8

(b) Explain two wattmeter method of measuring power in three phase circuits.

8

OR

2 (a) Define the following terms used for instrument transformers :

(i) Transformation ratio

(ii) Nominal ratio

(iii) Turns ratio

(iv) Ratio correction factor.

8

(b) Explain the Arnold's method for testing of current transformers.

8

UNIT-III

3 Explain the working of co-ordinate A.C. potentiometer. How is it standardized ? What are the functions of the transfer instrument and the phase shifting transformer.

16

OR

3 (a) Explain the circuit diagram of slide wire potentiometer and explain its applications also. 8

(b) Explain the reasons why d.c. potentiometer cannot be used for a.c. measurement straight way. Explain the modifications that are needed in a d.c. potentiometer to be used for a.c. applications. 8

UNIT-IV

4 (a) Explain the Price's Guard wire method for the measurement of high resistance. 8

(b) Draw and explain the circuit of Kelvin's Double bridge method for the measurement of low resistance. Also derive the conditions for balance. 8

OR

4 (a) Explain the loss of charge method for measurement of insulation resistance of cables. 8

(b) What do you mean by fall of potential method. What are the factors which influence the earth resistance. 8

UNIT-V

5 Explain the following AC bridges with phasor diagram :

(a) Heaviside bridge. 8

(b) Anderson bridge. 8

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OR

5 (a) Derive the balance equations of Hay's bridge. Draw the phasor diagram for balance conditions. 8

(b) What are the various sources of error in bridge measurement and their precautions. 8