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Paper Code : PC- EE403/PC-EE 403/PC-EEE 403 Electrical and Electronics Measurement

UPID : 004413

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(i) LVDT generally is used to measure displacement.
(ii) Define sensitivity of an instrument
(iii) What is phase angle error of a PT?
(iv) What is standardization for a wattmeter?
(v) What are essential components in a CRT?
(vi) What is a transducer?
(vii) How can the range of a voltmeter be increased?
(viii) What is phantom loading?
(ix) What is megger?
(x) What is meant by deflection sensitivity and deflection factor of a CRO?
(xi) Find the Dimension of Inductance using L,M,T,I method
(xii) In the measurement of a three phase power using two wattmeter method the readings of two wattmeters are equal. what is the power factor of the circuit?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. Derive the equation for deflection of a PMMC instrument if the instrument is spring controlled. [5]
3. Discuss the major sources of error in a current transformer. What is the major problem of this error in CT? [5]
4. Draw a schematic diagram showing construction details of an induction-type energy meter and label its different parts. Comment on the different materials used for the different internal components. [5]
5. Derive the condition for balancing a generalized ac bridge [5]
6. Derive an expression for the correction factor necessary to be incorporated in wattmeter readings to rectify phase angle error in instrument transformers while used for measurement of power. [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) Discuss in brief the constructional details of an induction-type wattmeter. [8]
   (b) Show how the deflecting torque in induction type instrument can be made proportional to the power in ac circuits. [7]
8. (a) How can a potentiometer be used to calibrate a voltmeter and a wattmeter? [8]
   (b) The emf of a standard cell is measured with a potentiometer which gives a value of 1.0186 V. When a 1 MΩ resistor is connected across the standard cell, the potentiometer reading drops to 1.0181 V. Find the internal resistance of the cell. [4]
   (c) Briefly explain how a low resistance can be measured. [3]
9. (a) Derive an expression for the driving torque in a single phase induction type meter. [8]
   (b) Show that the driving torque is maximum when the phase angle between the two fluxes is 90° and the rotating disc is purely non-inductive. [5]
   (c) Explain creeping. [2]
10. (a) How an unknown voltage can be measured with the help of a potentiometer? Explain why a potentiometer does not load the voltage source whose voltage is being measured. [7]
    (b) [6]

List the sources of errors in a Wheatstone bridge that may affect its precision while measuring medium range resistances. Explain how these effects are eliminated/minimised? [2]

(c) Which instrument is known as transfer instrument and why? [5]

11. (a) Write down the comparison between analog and digital multimeters [5]

(b) Briefly describe the performance characteristics of digital measurement. [5]

(c) Write a short note on integrating type DVM

*** END OF PAPER ***