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Question Paper Code: 41355

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

Third Semester

Electronics and Instrumentation Engineering

14UEI305 - ELECTRICAL MEASUREMENTS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Air friction damping should not be used where the deflecting torque in the instrument is produced due to
 - magnetic field
 - electrostatic field
 - thermo-electric emf
 - none of these
- The relative damping in a galvanometer is 0.8. Its logarithmic decrement is approximately
 - 0.48
 - 1.25
 - 4.19
 - 4.19
- In an Electrodynamometer type of watt meter
 - current coil is fixed
 - pressure coil is fixed
 - any one of the coils can be a fixed one
 - both the coils are movable
- In an induction type of meter, maximum torque is produced when the phase angle between two fluxes is
 - 0°
 - 45°
 - 60°
 - 90°

5. A Potentiometer is basically _____ of instrument.
- (a) deflection type (b) null type
(c) deflection as well as null type (d) digital type
6. Turns compensation is used in current transformers primarily for the reduction of
- (a) phase angle error
(b) both ratio and phase angle errors
(c) ratio error, reduction in phase angle error is incidental
(d) none of these
7. Equal resistances of 100Ω each are connected in each arm of a Wheatstone bridge supplied with a $2 V$ battery source. The Galvanometer of negligible resistance connected to the bridge can sense as low current as $1 \mu A$. The smallest value of resistance that can be measured is
- (a) $20 \mu\Omega$ (b) $2 \mu\Omega$ (c) $200 \mu\Omega$ (d) none of these
8. In a Kelvin double bridge two sets of readings are taken while measuring a low resistance. This is done to
- (a) eliminate the effect of contact resistance
(b) eliminate the effect of lead resistances
(c) correct for changes in battery voltages
(d) eliminate the effect of thermo-electric emfs
9. Maxwell bridge is used for the measurement of inductances of
- (a) low Q coils (b) medium Q coils
(c) high Q coils (d) low and medium Q coils
10. Frequency is measured using
- (a) Maxwell's Bridge (b) Schering Bridge
(c) Kelvin Bridge (d) Wein Bridge

PART - B (5 x 2 = 10 Marks)

11. What are the sources of errors in MI instruments?
12. A 3ϕ $500 V$ motor load has a pf of 0.4. Two watt meters are connected to measure the input. They show the input to be $30 kW$. Find the reading of each instrument.

13. Define the burden of an instrument transformer.
14. List the applications of megger.
15. State the two conditions for balancing an AC bridge.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain in detail about the working principle of D'Arsonval galvanometer and derive its torque equation. (16)

Or

- (b) Give a detailed account of PMMC type instruments. (16)

17. (a) Explain in detail about electro-dynamometer watt meters. (16)

Or

- (b) Explain the construction, theory and operation of single phase induction type energy meters with neat diagrams. (16)

18. (a) (i) Explain the term "standardization" of a potentiometer. Describe the procedure of standardization of a DC potentiometer. (4)

- (ii) Explain the applications of DC potentiometers in detail. (12)

Or

- (b) Discuss the major sources of errors in current transformers. Describe the design and constructional features used in current transformers to reduce the errors. (16)

19. (a) Write short notes on the following methods of measuring resistances:

- (i) Ammeter-Voltmeter method

- (ii) Substitution method (16)

Or

- (b) What is the importance of the value of earth resistance? What are the factors influencing it? Discuss the methods used for measurement of earth resistance. (16)

20. (a) (i) Derive the equations for balance in a Maxwell bridge. Draw the phasor diagram for balance conditions. (8)

(ii) Explain how Wein's bridge can be used for experimental determination of frequency. Derive the expression for frequency in terms of bridge parameters. (8)

Or

(b) Give a detailed account of vibration galvanometers. (16)
