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Question Paper Code: 41364

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

Third Semester

Instrumentation and Control Engineering

14UIC304 - MEASUREMENTS AND INSTRUMENTATION

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. A ballistic galvanometer is used for the measurement of

    (a) voltage   (b) current
    (c) frequency   (d) electrical charge

2. The deflecting torque in a moving iron instrument is a function of

    (a) current   (b) inverse of current
    (c) square of current   (d) cube of current

3. In an electrodynamometer type of wattmeter

    (a) the current coil is made fixed   (b) the pressure coil is fixed
    (c) any of the two can be made fixed   (d) both the coils should be movable

4. Phantom loading for testing of energy meter is used

    (a) to isolate the current and potential circuits
    (b) to reduce power loss during testing
    (c) for meters having low current ratings
    (d) to test meters having a large current rating for which loads may not be available
        and to reduce power loss during testing

5. The standardization of potentiometers is done in order that, they become

    (a) accurate   (b) precise

    (c) accurate and direct reading   (d) accurate and precise

6. The nominal ratio of a current transformer is

    (a) primary winding current x secondary winding current

    (b) rated primary winding current/ rated secondary winding current

    (c) number of secondary winding turns/ primary winding turns

    (d) primary winding voltage/ secondary winding voltage

7. A megger is basically a

    (a) moving iron type instrument   (b) moving coil type instrument

    (c) hotwire instrument   (d) electrolytic instrument

8. The value of resistance of an earthing electrode depends upon

    (a) shape and material of electrode

    (b) depth which electrode is driven into earth

    (c) specific resistance of soil

    (d) all the above

9. Maxwell's inductance-capacitance bridge is used for measurement of inductance of

    (a) low Q coils   (b) medium Q coils

    (c) high Q coils   (d) low and medium Q coils

10. The bridge used for the precise measurement of inductances over a wide range is

    (a) Maxwell bridge   (b) Wein's bridge

    (c) Anderson bridge   (d) Hay's bridge

<center>PART - B (5 x 2 = 10 Marks)</center>

11. Compare moving coil instrument and moving iron instrument.

12. Define creeping in energy meters and how it can be minimized?

13. List various applications of AC potentiometer.

14. Define sensitivity of Wheatstone bridge.

15. Sketch the circuit of Wein's bridge and write its balance equation.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain the construction and operation of ballistic galvanometer. (10)

    (ii) The coil of a ballistic galvanometer has 115 turns of mean area 25 x 40 mm^2. The flux density in the airgap is 0.12 wb/m^2 and the moment of inertia is 0.5 x 10^{-6} kg-m^2. The stiffness constant of springs is 45 x 10^{-6} Nm/rad. What current must be passed to give deflection of 100° and what resistance must be added in series with the movement to give ciritical damping? (6)

Or

    (b) Explain the construction and working principle of PMMC type ammeter. Also derive the torque equation for PMMC type instruments. (16)

17. (a) (i) With a neat diagram, explain the construction, working principle of single phase wattmeter. Also write the importance of deflection torque in these instruments. (12)

    (ii) Explain the special features incorporated in electrodynamometer type wattmeter to make it as low power factor meters. (4)

Or

    (b) Explain the construction and working principle of single phase energy meter with neat diagram. (16)

18. (a) (i) Explain in detail about the laboratory type DC potentiometer. (10)

    (ii) Compare DC potentiometer and AC potentiometers. (6)

Or

    (b) (i) With neat sketch, describe the principle of operation of current transformer. (10)

    (ii) Discuss the use of current transformer for current and power measurement. (6)

19. (a) (i) Discuss in detail the construction and working principle of wheatstone bridge. (12)

    (ii) A wheatstone bridge consists of the following parameters: $R1 = 10$ $kΩ$, $R2 = 2$ $kΩ$, $R3 = 5$ $kΩ$. Calculate the value of unknown resistance. (4)

Or

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(b) Explain the following methods of high resistance measurement:

    (i) Direct deflection method   (8)

    (ii) Loss of charge method   (8)

20. (a) Discuss the operation of schering bridge to determine unknown capacitance. Derive the relevant equations and explain the computation procedure using phasor diagram.

(16)

Or

(b) (i) Explain in detail about the Campbell's bridge for measuring mutual inductance.

(12)

    (ii) Explain about the various types of detectors used for AC bridges.   (4)

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