Code No. : 3259

FACULTY OF ENGINEERING

B.E. 2/4 (EE/Inst.) I Semester (Main) Examination, December 2010

ELECTRICAL MEASUREMENTS AND INSTRUMENTS

Time : 3 Hours] [Max. Marks : 75

Note : Answer all Questions of Part – A. Answer five Questions from Part – B.

PART – A (25 Marks)

1. A measuring instrument with moving element is underdamped. Sketch the typical response of the moving system. When the measured parameter undergoes a step change in its value. 2
2. Mention any four advantages of digital measurements compared to analog measurements. 2
3. How is friction compensation effected in induction type energy meters ? 3
4. What are the conditions to be statisfied for proper synchronization of two 3-ph alternators ? 3
5. What are the difficulties encountered if wheatstone bridge is used for low resistance measurement ? 3
6. Draw the diagram of a Schering bridge. Mention the applications. 2
7. Mention the distinguishing features between ballistic galvanometer and flux meter. 2
8. Sketch the arrangement for determination of leakage factor in a 2-pole D.C. machine. 3
9. Draw the circuit of a polar type potentiometer. 2
10. How is an ammeter calibrated using potentiometer ? Draw the Circuit and mention the steps. 3

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PART – B (50 Marks)

11. a) Derive the expression for the driving torque in moving coil instrument.

    b) With a neat sketch explain the working of moving iron instrument.

12. a) Explain how the range of moving coil instruments can be extended.

    b) Explain the working of electrostatic instruments.

13. a) Explain the constructional features and working of 1-ph energy meters.

    b) What are the main sources of error in energy meters of induction type ? How can they be compensated ?

14. Explain the construction and principle of working of the following :

    a) Weston synchroscope

    b) Resonance type frequency meter.

15. The four arms of a bridge are :

    arm 'ab' : an imperfect capacitor C_1 with an equivalent series resistance of r_1.
    arm 'bc' : a non-inductive resistance R_3.
    arm 'cd' : a non-inductive resistance R_4.
    arm 'da' : an imperfect capacitor C_2 with an equivalent resistance of r_2 in series with a resistance R_2.
    A supply of 450 Hz is given between terminals 'a' and 'c' and the detector is connected between 'b' and 'd'. At balance :
    $R_2 = 4.8\,\Omega$, $R_3 = 2000\,\Omega$, $R_4 = 2850\,\Omega$, and $C_2 = 0.5\,\mu F$ and $r_2 = 0.4\,\Omega$.
    Calculate the value of C_1 and r_1 and also of the dissipating factor for this capacitor.

16. a) Explain how B-H curve and hysterisis loop are determined using CRO.

    b) Explain how leakage factor is determined.

17. A current transformer having a 1 turn primary is rated at 500/5A, 50 Hz with an output of 15 VA. At rated load with non-inductive burden, the in-phase and quadrature components (referred to the flux) of the exciting mmf are 8 and 10 A respectively. The number of turns in the secondary is 98, and the resistance and leakage reactance of the secondary winding are $0.35\,\Omega$ and $0.3\,\Omega$ respectively. Calculate the ratio and phase angle errors.
