Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

T 3265

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Fourth Semester

(Regulation 2004)

Electronics and Instrumentation Engineering

EI 1251 — ELECTRICAL MEASUREMENTS AND INSTRUMENTS

(Common to Instrumentation and Control Engineering)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why the M.I meter has non uniform scale?

2. What is Residual error?

3. Two wattmeters are connected to measure the input of a balance 3 phase circuit, indicates 1000 W(+ve) and 125 W(+ve) respectively. Find the power factor of the circuit.

4. What is the need for light load compensation in Watt Hour Meter?

5. Write down the applications of D.C. Potentiometer.

6. Define the Nominal ratio for C.T. and Turns ratio for P.T.

7. Define the following terms "low resistance" and "high resistance".

8. What is the need of a battery in ohm meters?

9. Define Q of a coil?

10. Name the bridge used for measurement of unknown mutual inductance. Write down its relevant equation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Write the merits and demerits of PMMC and PMMI Instruments. (8)

    (ii) Explain in detail about the working principle of D' Arsonval Galvanometer (8)

Or

    (b) (i) A moving coil ammeter has a fixed shunt of 0.02 Ω with a coil resistance of R = 1000 Ω and a potential difference of 500 mV across it. Full scale deflection is obtained.

        (1) To what shunt current does this correspond to?

        (2) Calculate the value of R to give full scale deflection when shunted current I is 10 A. (case1) and 75 A (case2) and

        (3) With what value of R is 40% deflection obtained with I = 100A. (10)

    (ii) Write short notes on thermo-electric instruments with an example. (6)

12. (a) (i) What are the errors in electrodynamometer wattmeter and discuss its compensation methods? (8)

    (ii) A wattmeter has a current coil of 0.03 Ω resistances and a pressure coil of 6000 Ω resistance. Calculate the % of error if the wattmeter is so connected that

        (1) The current coil is on the Load side

        (2) The pressure coil is on the load side

            (A) If the load takes 20 A at a voltage of 220 V and 0.6 power factor in each case?

            (B) What load current would give equal error with two connection? (8)

Or

    (b) Explain the construction and theory of operation of a single phase induction type Energy meter. (16)

13. (a) Explain the principle of operation of Drysdale phase shifting transformer. How it is used in polar type A.C. Potentiometer to measure the unknown e.m.f? (16)

Or

(b) Derive the expression for ratio error and phase angle error in C.T. (16)

14. (a) (i) Explain the theory of operation of Kelvin's double bridge. (6)

(ii) Design a series type ohm meter. The movement to be used required 0.5 mA for full scale deflection and has an internal resistance of $50\,\Omega$. The internal batter has a voltage of 3 V. the desired value of half scale resistance is 3000 Ω. Calculate

(1) The values of series (R1) and parallel resistance (R2).

(2) The range of values of R2 if the battery voltage may vary from 2.7 V to 3.1 V. Use the value of R 1 calculated in (1). (10)

Or

(b) (i) Explain the construction and working principle of Megger. (8)

(ii) Explain the fall of potential method to measure the earth resistance. (8)

15. (a) (i) Derive the expression for unknown inductance in Anderson's Bridge and also Draw its vector diagram. (12)

(ii) What are the advantages and disadvantages of Hay's Bridge? (4)

Or

(b) (i) Explain the construction and working principle of vibration galvanometer. (10)

(ii) Explain with neat sketch about located a short circuit fault in a cable by Murray test. (6)

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