(3 Hours)   [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
      (2) Attempt any **four** questions from **remaining** questions.
      (3) **Figures** to the **right** indicate **full** marks.
      (4) Use **suitable** data.

1. Solve the following :–
    (a) Derive the dimension of the following quantities on L, M, T, I system :–   **10**
        (i) Magnetic flux
        (ii) Resistance
        (iii) Capacitance
        (iv) Electric flux
        (v) mmf.
    (b) Explain with neat circuit diagram the applications of dc potentiometer.   **10**

2. (a) A 4 – dial decade box has :–   **10**
        decade a of 10 × 1000 W ± 0·1 %
        decade b of 10 × 100 W ± 0·1 %
        decade c of 10 × 10 Ω ± 0·5 %
        decade d of 10 × 1 0hm(Ω) ± 1·0 %
      It is set at 4639 Ω (ohm). Find the percentage limiting error and the range of resistance value.
    (b) Draw the circuit diagram of a Crompton's potentiometer and explain its working. **10**
      Describe the steps used when measuring an unknown resistance ?

3. (a) Describe construction and working of a ballistic galvanometer. Explain the **12**
      difference in constructional details of a d' Arsonval galvanometer ?
    (b) Derive the equations of balance for an Anderson's bridge. Draw the phasor **8**
      diagram for conditions under balance ?

4. (a) Describe the working of a low voltage Schering bridge. Derive the equations **10**
      for capacitance and dissipation factor. Draw the phasor diagram also.
    (b) Explain diamagnetism, paramagnetism and ferromagnetism in connection with **10**
      magnetic measurements.

5. (a) Explain the construction and working of single phase Induction type energy **10**
      meter ?
    (b) Describe the working and construction detail of an attraction type moving iron **10**
      instument. Discuss its advantage and dis-advantages.

[**TURN OVER**

6. (a) Explain CT for measurement of current and power. Also define ratio and phase **10** angle error for C.T ?

   (b) A moving coil ammeter has a fixed shunt of 0.02 ohms. With a coil resistance **10** of R = 1000 Ω (ohms) and a potential difference of 500 mV across it, full scale deflection is obtained.

   (i) To what shunted current does this correspond ?

   (ii) Calculate the value of 'R' to give full scale deflection when shunted current I is (i) 10 Amp, (ii) 75 Amp.

   (c) With what value of R is 40%, deflection obtained with I = 100 Amps.   **10**

7. Write short notes on any **three** :–   **20**

   (a) Power factormeter

   (b) PMMC Instrument

   (c) A.C. Vibration galvanometer

   (d) Maxwell's Inductance Bridge.

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