



**Third Semester B.E. Degree Examination, Dec.08/Jan.09**  
**Electrical Measurements**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

- 1 a. Mention the uses and limitations of dimensional analysis (05 Marks)  
 b. The expression for mean torque of electro-dynamometer type wattmeter may be written as  

$$T_d \propto M^a E^b Z^c$$
 Where M = mutual inductance between fixed & moving coils.  
 E = applied voltage  
 Z = impedance of load circuit.  
 Determine the values of a, b & c after deriving the dimensions of  $T_d$ , M, E & Z and write the equation for  $T_d$ . (10 Marks)  
 c. Explain with a neat sketch working of earth tester. (05 Marks)
- 2 a. Write a note on sources & detectors used for a.c. bridges. (04 Marks)  
 b. With neat sketch explain Kelvin double bridge. Obtain an expression for the unknown low resistances. (08 Marks)  
 c. The four arms of a bridge are :  
 AB = an imperfect capacitor  $c_1$  with an equivalent series resistance of  $r_1$ .  
 BC = a non inductive resistance  $R_3$ .  
 CD = a non inductive resistance  $R_4$ .  
 DA = an imperfect capacitor  $c_2$  with an equivalent series resistance of  $r_2$  in series with a resistance  $R_2$ .  
 A supply of 450 Hz is given between terminal A & C and the detector is connected between B & D. At balance  $R_2 = 4.8 \Omega$ ,  $R_3 = 200 \Omega$ ,  $R_4 = 2850 \Omega$ ,  $c_2 = 0.5 \mu F$ ,  $r_2 = 0.4 \Omega$ . Calculate the value of  $c_1$  &  $r_1$  and also dissipating factor of this capacitor. (08 Marks)
- 3 a. What are shunts and multipliers? Derive an expression for both, with reference to the meters used in electrical circuits. (06 Marks)  
 b. Write the comparison of C.T. and P.T. (04 Marks)  
 c. A current transformer has a bar primary & 300 secondary turns. The secondary supplies a current of 5A to a non inductive burden of  $2\Omega$ . The primary exciting AT are 100. The frequency of the supply is 50Hz. The net cross sectional area of the core is  $12 \text{ cm}^2$ . Calculate the actual ratio and phase angle of the C.T. Neglect the effects of leakage reactance, iron losses & Cu losses. (10 Marks)
- 4 a. With a neat diagram explain the construction and operation of the electro-dynamometer type wattmeter. (06 Marks)  
 b. Describe the construction and working principle of a single phase induction type energy meter. (08 Marks)  
 c. The constant of energy meter is 750 revolutions/kWh. Calculate the number of revolutions made by it, when connected to a load carrying 100A at 230V and 0.8 p.f. in 30 seconds. If it makes 110 revolutions in 30 seconds, find the percentage error. (06 Marks)

## PART - B

- 5 a. With a neat sketch explain the construction & working of western frequency meter. (08 Marks)  
b. With a neat sketch explain the construction & working of electro-dynamometer type single phase power factor meter. (08 Marks)  
c. What is creep in energy meter and how it is prevented? (04 Marks)
- 6 a. What is a transducer? Briefly explain the procedure for selecting a transducer. (06 Marks)  
b. Briefly explain photo conductive and photo voltaic cells. (06 Marks)  
c. With a block diagram, explain the working of a true r.m.s. responding voltmeter. (08 Marks)
- 7 a. Explain with block diagram the essential functional operation of a digital data acquisition system. (10 Marks)  
b. Explain with a block diagram electronic energy meter. (10 Marks)
- 8 a. Write merits and demerits of LVDT. (10 Marks)  
b. Briefly explain the rotating type phase indicator. (05 Marks)  
c. Write a note on cathode ray oscilloscope and its applications. (05 Marks)

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