NEW SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

Third Semester B.E. Degree Examination, July/August 2004

Common to BM/EC/EE/TE/ML/IT

Electrical & Electronic Measurements

Time: 3 hrs.]   [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Explain the term 'Dimensions of a physical quantity' and the significance of the dimensional equations. **(4 Marks)**

   (b) The expression for mean torque of our electrodynamometr type wattmeter may be written as

   $$T \alpha M^p E^q Z^t$$

   Where   M= Mutual inductance between fixed and moving coils

   E= applied voltage

   Z= impedance of the load circuit

   Determine the values of p, q and t after deriving the dimensions of T,M,E and Z. **(10 Marks)**

   (c) With a neat sketch explain the working of a megger. **(6 Marks)**

2. (a) With a neat sketch explain the working of a Kelvin double bridge. Obtain an expression for the unknown low resistance. **(8 Marks)**

   (b) 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 series resistance of r_2 in series with a resistance R_2

   A supply of 450 HZ is given between terminal a and c and the detector is connected between b and 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 and r_1 and also of the dissipating factor of this capacitor. **(8 Marks)**

   (c) Write a short note on the Wagner earthing device. **(4 Marks)**

3. (a) Discuss the various methods generally adopted for range extension of ammeters and voltmeters. **(7 Marks)**

   (b) At its rated load of 25vA, a 100/5 current transformer has an iron loss of 0.2W and a magnetising current of 1.5A. Calculate its ratio error and phase angle when supplying rated output to a meter having a ratio of resistance to reactance of 5. **(8 Marks)**

   (c) Briefly explain the design features of a CT. **(5 Marks)**

4. (a) With a neat diagram explain the construction and operation of an electrodynamometer type wattmeter. (8 Marks)

(b) Describe the construction and working principle of a single phase induction type energy meter. (8 Marks)

(c) The meter constant of a 230V, 10A watthour meter is 1800 revolutions per kWH. The meter is tested at half load and rated voltage at UPF. The meter is found to make 80 revolutions in 138 seconds. Determine the meter error at half load. (4 Marks)

5. (a) With a neat sketch explain the construction and working of a electrodynamometer type single phase PF meter. (8 Marks)

(b) With a neat sketch explain the construction and working of a Weston frequency meter. (8 Marks)

(c) What is "Creep" in energy meters? How is it prevented? (4 Marks)

6. (a) With a block diagram explain the working of a true rms-responding voltmeter. (8 Marks)

(b) With a block diagram explain the working of a Ramp type DVM. (8 Marks)

(c) List the elements of the basic circuit of an electronic multimeter. (4 Marks)

7. (a) What is a transducer? Briefly explain the procedure for selecting a transducer. (6 Marks)

(b) Briefly explain photoconductive and photovoltaic cells. (6 Marks)

(c) Explain with block diagram the essential functional operations of a digital data acquisition system. Compare the digital and analog forms of data acquisition systems. (8 Marks)

8. (a) With a neat diagram explain the working of a fiber optic power meter. (8 Marks)

(b) Write a note on the sources and detectors used for fiber optic measurements. (8 Marks)

(c) Write a note on digital to analog multiplexing. (4 Marks)

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