USN [| | | | | | | | |] 10EE35

Third Semester B.E. Degree Examination, June/July 2017
Electrical and Electronic Measurements and Instrumentation

Time: 3 hrs.
Max. Marks:100

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

PART – A

1 a. Derive the expression for the measurement of unknown resistance using Kelvin's double bridge. How the effect of connecting lead resistance is eliminated in this arrangement?
(10 Marks)

 b. The expression for the mean torque of an electro dynamometer 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 and 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)

2 a. Obtain the balance equation for Maxwell's inductance–capacitance bridge used for measurement of unknown inductance. Draw the phasor diagram at balance condition.
(10 Marks)

 b. The four arms of a bridge are :
 Arm ab : an imperfect capacitor C_1 with an equivalent series resistance of r_1
 Amr 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 the dissipating factor of this capacitor.
(10 Marks)

3 a. Derive an expression for ratio and phase angle errors of C.T. with neat sketch. (10 Marks)

 b. A CT has turns ratio 1 : 399 and is rated as 2000/5 A. The core loss component is 3A and magnetizing component is 8A, under full load conditions. Find the phase and ratio errors under full load conditions, if secondary circuit pf is 0.8 leading.
(10 Marks)

4 a. Explain with the help of neat sketch, the construction, theory and working principle of an energy meter.
(10 Marks)

 b. With neat phasor diagram, explain the measurement of real power in 3ϕ circuits. (08 Marks)

 c. What is creeping? (02 Marks)

PART – B

5 a. Explain with neat figure, Weston frequency meter. (10 Marks)

 b. Explain with block diagram the true RMS voltmeter. (08 Marks)

 c. What is Q meter? (02 Marks)

6 a. Explain with block diagram, the working of dual trace oscilloscope. (10 Marks)

 b. Explain with block diagram, the working of digital storage oscilloscope. (10 Marks)

7 a. What is transducer? Briefly explain the procedure for selecting a transducer. **(06 Marks)**
   b. Explain the principle of operating of LVDT in translating a linear motion into an electrical signal. **(08 Marks)**
   c. Briefly explain photo conductive and photo voltaic cells. **(06 Marks)**

8 a. Explain with block diagram, the essential functional operations of a digital data acquisition system. Compare the digital and analog forms of data acquisition systems. **(08 Marks)**
   b. Explain the working and application of an x-y recorder. **(08 Marks)**
   c. Write a note on display devices. **(04 Marks)**

* * * * *