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

Third Semester B.E. Degree Examination, Dec.2013/Jan.2014
Electrical and Electronic Measurements and Instrumentation

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Derive the dimensional equation for:
   i) EMF
   ii) Magnetizing force
   iii) Capacitance in the SI units.   **(06 Marks)**

   b. Expression for mean torque of an electrodynamometer type of wattmeter is given by
   $T_d \propto M^a E^b Z^c$
   M = Mutual inductance between fixed and moving coils.
   E = Applied voltage.
   Z = Impedance of load circuit.
   Determine values of a, b and c using dimensional analysis.   **(06 Marks)**

   c. Derive the balancing equation for Kelvin's bridge.   **(08 Marks)**

2 a. Explain sources and detectors used in A.C. bridges.   **(04 Marks)**

   b. Derive the balance equation for Anderson bridge.   **(08 Marks)**

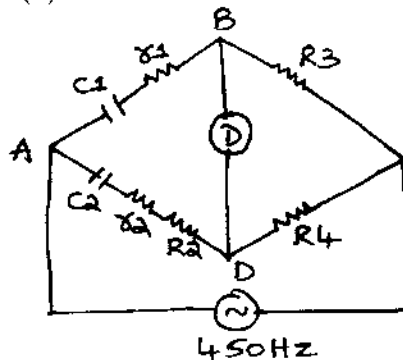   c. The bridge is shown in Fig.Q.2(c).

Fig.Q.2(c)

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. Explain clearly how shunts and multipliers are used to extend the range of instruments.
                                                                  (04 Marks)

   b. A 1000/5A, 50Hz current transformer has a bar primary and a rated secondary burden of 15VA. The secondary winding has 195 turns and a leakage reactance of 0.96mH. The load burden is purely resistive. At rated load, the magnetization mmf is 20A and core loss excitation is 12A. Find the ratio and phase angle errors.   **(10 Marks)**

   c. What are the advantages of instrument transformer? Explain in brief.   **(06 Marks)**

4 a. Explain with a neat figure, construction and working of dynamometer type wattmeter.

(10 Marks)

b. Explain with the help of neat sketch, construction of induction type energy meter. (06 Marks)

c. Write a short note on electronic energy meter. (04 Marks)

PART – B

5 a. Explain the construction and working of electrodynamometer type single phase power factor meter. (10 Marks)

b. Write a note on true RMS reading voltmeter. (04 Marks)

c. Explain the operation of successive approximation type of digital voltmeter. (06 Marks)

6 a. Explain with the help of block diagram, working of digital storage oscilloscope. (08 Marks)

b. Explain the measurement of phase and frequency using Lissajous patterns. (06 Marks)

c. Explain in brief front panel details of a dual trace oscilloscope. (06 Marks)

7 a. Explain with a neat sketch, the construction and working of a linear variable differential transformer (LVDT). (08 Marks)

b. Explain photoconductive and photovoltaic cells. (06 Marks)

c. What are the selection criteria for the transducer? (06 Marks)

8 a. Explain with a block diagram, functional operation of digital data acquisition system.

(08 Marks)

b. With a neat sketch, explain the working of a x-y recorder. (06 Marks)

c. Explain with a neat diagram, the working of function generator. (06 Marks)

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