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10EE35

Third Semester B.E. Degree Examination, June/July 2015
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 dimensions of Resistance, Inductance and Capacitance in LMT and I system of units. (04 Marks)
 - b. Derive an expression for bridge sensitivity for a wheat stone bridge. (08 Marks)
 - c. A very small resistance of approximately $50 \mu\Omega$ is measured using Kelvin's double bridge. At balance, the value of the standard resistance is $100.05\mu\Omega$. resistance of the inner ratio arms are 100.51Ω and 200Ω respectively, the resistance of the outer ratio arms are 100.4Ω and 200Ω respectively. The resistance of the interlink is $800\mu\Omega$. Calculate the magnitude of the error in the measurement. (04 Marks)
 - d. What are the advantages of SI over other system of units? (04 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. Explain the fall of potential method used for the measurement of earth resistance. (06 Marks)
 - c. Mention types of sources and detectors used in AC bridges. (04 Marks)

3.
 - a. Compare Current Transformer and Potential Transformer. (05 Marks)
 - b. A current transformer with a bar primary has 500 turns in the secondary winding. The secondary circuit burden is $(2+j1)\Omega$ with 5A flowing in the secondary winding. The magnetizing m.m.f is 80A and the iron loss is 1.6W. Determine the ratio and phase angle errors. Find also the maximum value of the flux density in the core. (10 Marks)
 - c. What are the advantages of Instrument transformer? (05 Marks)

4.
 - a. Explain with a neat figure, construction and working of dynamometer type Wattmeter. (08 Marks)
 - b. Explain with the help of neat sketch, construction of induction type energy meter. (08 Marks)
 - c. The name plate of a single phase energy meter reads as 250V, 20A, 1800 rev/kwh. The meter is tested at $3/4^{\text{th}}$ load and U.P.F. The meter makes 20 Revolutions in 10 seconds. Determine the % error in the reading of the energy meter. (04 Marks)

PART – B

5.
 - a. With the help of a neat diagram, explain the construction of Weston frequency meter. (08 Marks)
 - b. With the help of block diagram, explain the Ramp – type digital voltmeter. (06 Marks)
 - c. With the block diagram, explain TRUE RMS reading voltmeter. (06 Marks)

- 6 a. Explain with the help of block diagram, working of digital storage oscilloscope and what are its advantages. (10 Marks)
- b. Explain in brief front panel details of a dual trace oscilloscope. (06 Marks)
- c. Calculate the sampling rate for 1KHz and the 10KHz signal if the time base setting is adjusted to display 10 cycles on the screen. (04 Marks)
- 7 a. Prove that gauge factor of strain gauge is given by $K = 1 + 2\mu$, where ' μ ' is the Poisson's ratio. (08 Marks)
- b. Explain Photo Voltaic cells. (04 Marks)
- c. Explain the principle and working of LVDT. (08 Marks)
- 8 a. Explain with the help of diagram, the operation of X – Y recorders. (06 Marks)
- b. Explain the working of function generator with the help of neat diagram. (07 Marks)
- c. Explain briefly Data acquisition system. (07 Marks)
