CBCS Scheme

USN ☐☐☐☐☐☐☐☐☐☐ 15EE36

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Electrical & Electronic Measurement

Time: 3 hrs. Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

1 a. Derive the dimensions of resistance, inductance and capacitance in LMTI systems. **(06 Marks)**
   b. Define the sensitivity of wheat stone's bridge, with the necessary circuit diagram. Hence deduce the expression for sensitivity of the bridge 'SB'. **(06 Marks)**
   c. Explain sources and detectors used in AC bridges. **(04 Marks)**

OR

2 a. Expression for mean torque of an electrodynamometer type of wattmeter is given by $T_d \alpha M^a E^b Z^c$.
   M – Mutual inductance between fixed and moving coil.
   E – applied voltage
   Z – Impedance of load circuit.
   Determine value of a, b and c using dimensional analysis. **(05 Marks)**
   b. Derive the balancing equation for Kelvin's double bridge. **(06 Marks)**
   c. A sheet of Bakelite 4.5 mm thick is tested at 50 Hz between electrodes 0.12 m in diameter. The schering bridge employs a standard air capacitor C_2 of 106 p.f. capacitance, a non reactive resistance R_4 of $\frac{1000}{\pi} \Omega$ in parallel with a variable capacitor C_4 and non-inductive variable resistance R_3. Balance is obtained with $C_4 = 0.5$ μF and $R_3 = 260$ Ω. Calculate the capacitance, power factor and relative permittivity of the sheet. **(05 Marks)**

Module-2

3 a. Derive the torque equation of single phase electrodynamometer type wattmeter. **(06 Marks)**
   b. Explain the principle of operation of 10 W power factor wattmeter. **(06 Marks)**
   c. If the reading on two wattmeters in 3-phase balanced load are 836 and 224 W, the latter reading being obtained after the reversal of current coil connections, calculate the power p.f. of the load. **(04 Marks)**

OR

4 a. Discuss the various adjustments required in energy meter for the accurate reading. **(06 Marks)**
   b. A single phase kwhr meter makes 500 revolutions per kwhr. It is found on testing as making 40 revolutions in 58.1 seconds at 5 kw full load. Find out the percentage error. **(04 Marks)**
   c. With the help of neat sketch, explain the construction and working of Weston frequency meter. **(06 Marks)**

Module-3

5 a. What is shunt? How it is used to extend the range of an ammeter? **(05 Marks)**
   b. A moving coil meter gives a full scale deflection with a current of 5 mA. If the coil of the instrument has the resistance of 10 Ω, how it can be adopted to work as, (i) Ammeter of range 0 – 10 A   (ii) Voltmeter of range (0 – 10 V). **(06 Marks)**
   c. Write a note on turns compensation used in instrument transformers. **(05 Marks)**

OR

6 a. With neat circuit diagram, explain Silsbee's method of testing C.T. (06 Marks)
   b. Explain the wattmeter method of measuring the iron loss. (05 Marks)
   c. Explain Hop Kinson's permeameter. (05 Marks)

Module-4

7 a. With a block diagram, explain the working of a true R.M.S responding voltmeter. (06 Marks)
   b. With a neat diagram, explain the working of an electronic multimeter. (06 Marks)
   c. What are the errors in the measurement of Q-factor of a coil? Explain. (04 Marks)

OR

8 a. With a block diagram, explain the working of a Ramp type DVM. (06 Marks)
   b. A coil with a resistance of 12 Ω is connected in the direct connection mode of Q meter. Resonance occurs when the oscillator frequency is 1 MHz and the resonating capacitor is set at 75 pf. Calculate the % error introduced in the calculated value of Q by the 0.02 Ω insertion resistance. (05 Marks)
   c. With a neat block diagram, explain the principle of working of electronic energy meter. (05 Marks)

Module-5

9 a. Explain LED and LCD displays. (08 Marks)
   b. Write a short note on nixie tube. (04 Marks)
   c. Write a short note on stripchart recorder. (04 Marks)

OR

10 a. With a neat sketch, explain the working of a X-Y recorder. (06 Marks)
   b. With the help of neat block diagram, explain ECG machine. Write important features of ECG machine. (08 Marks)
   c. Write the features of EEG. (02 Marks)

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