



Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Electrical Measurements

3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

- a. Derive the dimensions of MMF, EMF, Magnetising force and flux density in LMTI system. (08 Marks)
 - b. Show that the product $\frac{1}{\sqrt{\mu\epsilon}}$ has the dimension of velocity, when μ = permeability and ϵ = permittivity. (08 Marks)
 - c. State and explain sensitivity of Wheatstone Bridge. (04 Marks)
 - a. 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 in between terminal A and C and the detector is connected between B and D. At balance $R_2 = 4.8 \Omega$, $R_3 = 200 \Omega$, $R_4 = 2850 \Omega$, $C_2 = 0.5 \mu\text{F}$, $r_2 = 0.4 \Omega$.
 Calculate the value of C_1 and r_1 and also of the dissipating factor of this capacitor. (10 Marks)
 - b. With a neat sketch describe the measurement of earth resistance by fall of potential method. (10 Marks)
 - a. Explain the purpose of shielding of bridges. Describe with sketch Wagner's ground connection for shielding of bridges. (08 Marks)
 - b. Obtain the balance equation for Schering Bridge used for measurement of capacitance. Derive the expression for loss angle and dissipation factor. (08 Marks)
 - c. Explain the principle of range extension of ammeter. (04 Marks)
 - a. Explain the construction and working principle of Potential Transformer (PT). Mention its application. (08 Marks)
 - b. A current transformer with five primary turns has a secondary burden consisting of a resistance of 0.16Ω and an inductive reactance of 0.12Ω . When the primary current is 200 A, the magnetizing current is 1.5 A and the iron loss current is 0.4 A. Find the number of secondary turns needed to make the current ratio 100:1 and the phase angle. (08 Marks)
 - c. Explain the causes of ratio and phase angle errors. (04 Marks)
 - a. With a neat sketch describe single-phase induction type energy meter. (08 Marks)
 - b. Discuss the adjustment required in energy meter for accurate reading. (06 Marks)
 - c. A 230 volt, single phase, watt hour meter has a constant load of 5 Ampere passing through it for 8 hours at 0.9 p.f. If the meter disc makes 4968 revolutions during this period, find the meter constant in the revolutions per kilowatt-hour. Calculate the power factor of the load if the number of revolutions made are 2100, when operating at 230 volt and 6 Ampere for 5 hours. (06 Marks)
 - a. With a neat sketch describe true R.M.S. responding voltmeter. (08 Marks)
 - b. With a neat block diagram, explain the working of a digital storage oscilloscope. (08 Marks)
 - c. Explain the significance of Lissajous pattern. (04 Marks)
 - a. Explain with a neat sketch the construction and working of a linear variable differential transformer. (08 Marks)
 - b. With a neat sketch, explain the working of a X-Y recorder. (06 Marks)
 - c. Explain the advantage of electrical transducer. Also describe the classification of transducer. (06 Marks)
- Write short notes on the following:
- a. Low power factor wattmeter
 - b. Objective of DATA Acquisition system
 - c. LCD display
 - d. Strain gauges.

(20 Marks)