

Third Semester B.E. Degree Examination, June/July 2016

Electrical & Electronic Measurements & Instrumentation

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- a. The energy stored in a parallel plate capacitor per unit volume (energy density) is given by,

$$W = K \epsilon^a V^b d^c$$

where ϵ = permittivity of medium

d = distance between plates

V = voltage between plates

K = constant of proportionality

Determine the values of a, b and c using LMTI system for the dimensional analysis.

(10 Marks)

- b. A Wheatstone's bridge circuit has ratio arms: 100Ω and 10Ω , standard resistance 4Ω and the test-resistance 50Ω . Calculate the unbalanced current in the galvanometer of internal resistance 20Ω , when the supply voltage is 10 volts. Also find the value of unknown resistance corresponding to the null reading by galvanometer.

(10 Marks)

- 2 a. Explain the method of measuring self inductance interms of a standard capacitor using Anderson bridge.

(10 Marks)

- b. A Bakelite sheet of 5 mm thickness is tested at 50 Hz between the electrodes 12 cm diameter. The Schering shown in Fig. Q2 (b) has an air capacitor C_2 of 106 pF, a non reactive resistance of R_4 of $\left(\frac{1000}{\pi}\right) \Omega$ in parallel with a variable capacitor C_4 and a non variable resistance R_3 . Balance is obtained with $C_4 = 0.55 \mu\text{F}$ and $R_3 = 270 \Omega$. Determine the following: i) Capacitance, ii) Power factor, iii) Relative-permittivity of the sheet. (10 Marks)

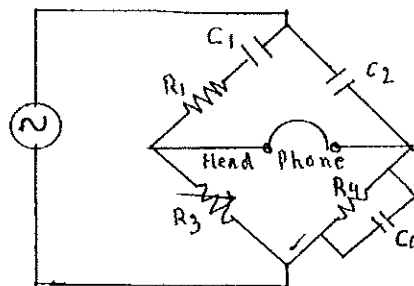
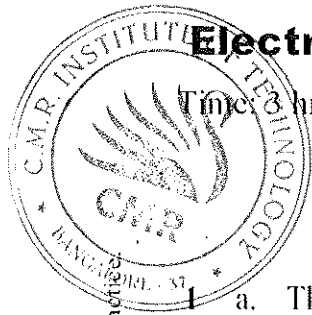


Fig. Q2 (b)

- 3 a. Draw the equivalent circuit and phasor diagram of a current transformer. (08 Marks)
- b. Draw the equivalent circuit and phasor diagram of a potential transformer. (08 Marks)
- c. Define actual ratio and nominal ratio for P.T. (04 Marks)

- 4 a. With a neat block diagram, explain the electronic energy meter and also enumerate its advantages. (10 Marks)
- b. Explain the method of measuring three phase power using two wattmeter for star connected load (balanced). (10 Marks)



PART – B

- 5 a. Classify the frequency meter based on the principle of operation and explain any one of those with a neat sketch. (10 Marks)
- b. Draw the comparison between electronic meters and conventional analog meters. (06 Marks)
- c. What are the advantages and disadvantages of an electronic multiplier? (04 Marks)
- 6 a. Draw the Lissajous patterns for same frequency different phase shifts and on what factors the shape of Lissajous figures depends on. Explain how frequency can be measured. (10 Marks)
- b. Draw the front panel controls of dual trace oscilloscope and explain the various controls group. (10 Marks)
- 7 a. Explain the construction and working of LVDT. List the advantages and disadvantages of LVDT. (12 Marks)
- b. With neat sketches, explain in brief the following:
- i) Photo conductive cell.
- ii) Photo voltaic cell. (08 Marks)
- 8 a. What are the objectives of data acquisition system and how are they classified? (06 Marks)
- b. Explain the operation, basic construction, advantages and applications of X-Y recorders. (14 Marks)
