IT35

USN

NEW SCHEME

Third Semester B.E. Degree Examination, July 2006
BM / EC / EE / TE / ML / IT
Electrical and Electronics Measurements

Time: 3 hrs.] [Max. Marks:100

Note: 1. ***Answer any FIVE full questions.***

1 a. Derive the dimensions of Resistance, Inductance, Capacitance and Permeability in LMTI system. (08 Marks)

b. The energy stored in a parallel plate capacitor per unit volume is given by,

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

where, $\in$ = Permittivity of medium
d = Distance between plates
V = Voltage between plates
K = Constant.

Find the value of a, b and c by dimensional analysis. (06 Marks)

c. Explain how a megger is used for the measurement of earth resistance. (06 Marks)

2 a. Define voltage sensitivity of a galvanometer and hence obtain an expression for wheatstone's bridge sensitivity, S_B. When will be S_B maximum? (08 Marks)

b. Explain the method of measurement of reactive power in a three phase circuit using a single wattmeter. (04 Marks)

c. A wheatstone's bridge has ratio arms : P = 1000 Ω and Q = 100 Ω, standard resistance S = 200 Ω, test resistance R = 2005 Ω. The battery has an emf of 5 V and negligible internal resistance. The galvanometer has a current sensitivity of 10 mm/μA and an internal resistance of 100 Ω. Calculate the deflection of galvanometer and the sensitivity of the bridge in terms of deflection per unit change in resistance. (08 Marks)

3 a. Obtain the balance equation for Schering bridge used for measurement of capacitance and hence arrive at the expression for loss angle of the test capacitor. Draw phasor diagram at balance. (08 Marks)

b. Write a note on 'Sources and Detectors' used for AC bridges. (04 Marks)

c. A 1000/5 A, 50 Hz current transformer has a secondary burden comprising of a non-inductive impedance of 1.6 Ω. The primary winding has one turn. Calculate ratio error and phase angle error at full load. Neglect leakage reactance and assume the iron loss in the core to be 1.5 W at full load and magnetizing mmf is 100 AT. (08 Marks)

4 a. Discuss with a block diagram the principle of operation of electronic energy meter. (06 Marks)

b. Explain the construction and working of a Weston frequency meter. (06 Marks)

c. A 2 mA meter with an internal resistance of 100 Ω is to be converted to 0-150 mA ammeter. Calculate the value of shunt resistance required. Also find the power consumption of the new meter. (08 Marks)

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5 a. Draw equivalent circuit and phasor diagram of a current transformer. Thus derive the expression for its ratio and phase angle error. **(08 Marks)**

b. Explain the principle of operation of a static type of phase sequence indicator. **(06 Marks)**

c. An energy meter is designed to make 100 revolutions of the disc for one unit of energy. Calculate the number of revolutions made by it, when connected to a load carrying 40 A at 230 V and 0.4 pf for one hour. If it actually makes 360 revolutions. Find the percentage error. **(06 Marks)**

6 a. What are the advantages of Electronic voltmeter? Explain with block diagram the working of RMS responding voltmeter. **(08 Marks)**

b. Explain with block diagram any one type of digital voltmeter. **(06 Marks)**

c. What is the working principle of Q-meter? How can the distributed capacitance of the coil be measured using Q-meter? **(06 Marks)**

7 a. Explain how fiber optic power measurement it made. **(07 Marks)**

b. Write a note on sources and detectors used in fiber optic measurement. **(07 Marks)**

c. Explain with block diagram the essential functional operation of a digital data acquisition system. **(06 Marks)**

8 a. Explain the timing relationship of signal in a IEEE-488 bus. **(06 Marks)**

b. Explain the classification of electrical transducers. **(06 Marks)**

c. Explain the working of a LVDT used for displacement measurements. What are its advantages? **(08 Marks)**

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