

EE-213
 Time: 3hrs

Subject: Electrical and Electronic Measurements
 Maximum Marks 50

Write steps and formula used in the calculation

- Q.1 (a) A moving coil instrument has full scale deflection at 50mV and 10mA. Calculate the value of shunt resistance in Ohm required to be connected to convert it into a (0-5A) ammeter.
- (b) Two wattmeters are used to measure the power in a 3-phase balanced system. Calculate the power factor of the load when one wattmeter reads twice the other.
- (c) One single phase energy meter operating on 230 V and 5 A for 5 hours makes 1940 revolutions. Meter constant in revolution is 400. Calculate the power factor of the load.
- (d) In the circuit shown in Figure 1. In which the Wattmeter current coil is connected through Current Transformer (CT). Compute the power measured by the wattmeter.

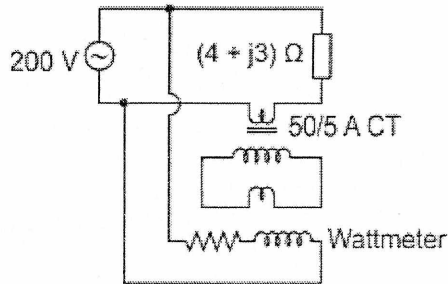


Figure 1

- (e) A simple slide wire potentiometer is used for measurement of current in a circuit. The voltage drop across a standard resistor of 0.1Ω is balanced at 75 cm. Find the magnitude of current if the standard cell emf 1.45 volt is balanced at 50 cm.
- (f) In the bridge circuit shown in Figure 2, the capacitors are loss free. At balance, calculate the value of capacitance C_1 .

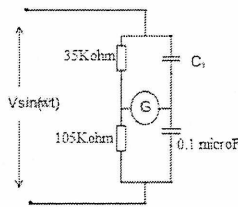


Figure 2

- (g) Prove that the total reactive power in 3 phase balanced circuit is $\sqrt{3}$ times the reading of the single wattmeter connected as shown in Figure. 3

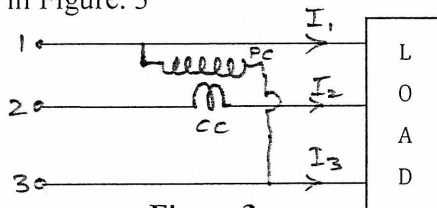


Figure 3

- (h) In Voltmeter-Ammeter method for measurement of medium resistance. The ammeter and voltmeter has internal resistances 10 Ω and 100kΩ respectively. If the unknown resistance to be measured is in the range of 5kΩ. Draw the configuration which results less error.

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Q.2 In AC bridge as shown in Figure 4, derive the balanced condition to determine C_1 and R_1 and associate loss angle, if balanced is obtained at 400Hz with $C_2 = C_3 = 0.01\mu\text{F}$, $R_3 = 4.0\text{ k}\Omega$, and $R_4 = 11.5\text{ k}\Omega$. Also draw the phasor diagram of the bridge under balanced condition.

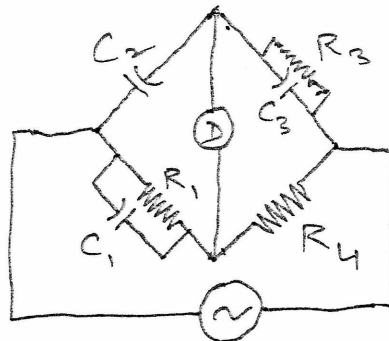


Figure 4

(7)

Q.3 Derive the equations for balance in the case of Carey Foster Bridge (Heydeweiller Bridge). Draw the phasor diagram for balance condition.

(7)

Q.4 Derive the expression for Ratio error in Current Transformer (CT). Also draw the equivalent circuit and Phasor diagram

(7)

Q.5 Write short notes on any *two* of the following:

- (a) Determination of B-H curve.
- (b) Rotating Field type three phase power factor meter.
- (c) Ratio meter type frequency meter

(2×4.5=9)

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