

Department of Electrical Engineering
Sessional Assignment
Course Details

Course Title: Instrumentation and Measurement **Module:** 6th (BE)

Student Details

Name: ASAD QAZI **Student ID:** 11439

Q1: A wattmeter has 2 current coils connected in parallel, each having a resistance of 0.7Ω . The wattmeter is connected in a circuit to measure power with its potential coil on the supply side. The reading on the wattmeter is 100W and the reading on the ammeter connected in series with the current coil is 3A. Calculate:

- a) Power loss in the wattmeter
 - b) True load power
 - c) Percentage error due to wattmeter connection
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Q2: Two voltmeters have the same range 0-500V. The internal resistances are $30K\Omega$ and $20K\Omega$ respectively. If they are connected in series and 700V be applied across them, what will be their readings?

Ans (1) :

Solution:

Resistance of wattmeter = 0.7Ω

Reading in wattmeter = 100 watt

Current = 3 amp

Find

- a) Power loss in the wattmeter
- b) True load power
- c) Percentage error due to wattmeter connection

Formula of effective resistance of the current coil

$$RC = \frac{R_1 R_2}{R_1 + R_2}$$

$$RC = \frac{0.7 \times 0.7}{0.7 + 0.7} = 0.35\Omega$$

- 1) Power loss in the wattmeter

$$I^2 RC = 3^2 (0.35)$$

$$I^2 RC = 3.15 \text{ watt}$$

- 2) True load Power

$$100 - 3.15 = 96.85$$

- 3) Percentage error due to wattmeter connection

$$\frac{100 - 96.85}{96.85} \times 100 = 3.26\%$$

Ans 2:

Solution:

Given data:

$$R_1 = 30\text{k}\Omega$$

$$R_2 = 20\text{k}\Omega$$

$$V = 700$$

We apply voltage divider rule

The readings of two voltmeter are:

$$V_1 = \frac{30\text{K}\Omega}{30\text{K}\Omega + 20\text{K}\Omega} \times 700$$

$$V_1 = 420\text{v}$$

$$V_2 = \frac{20\text{K}\Omega}{30\text{K}\Omega + 20\text{K}\Omega} \times 700$$

$$V_2 = 280\text{v}$$