

Department of Electrical Engineering
Sessional Assignment
Course Details

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

Student Details

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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?

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Subject:- EMI

* Assignment *

Q1:- A voltmeter has two 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 $100W$ & the reading on the ammeter connected in series with the current coil is $3A$
Calculate:-
a) Power loss in wattmeter
b) True load Power
c) Percentage error due to wattmeter.

* Given data:-

$$R_1 = 0.7\Omega$$

$$R_2 = 0.7\Omega$$

$$P = \text{Power} = 100W$$

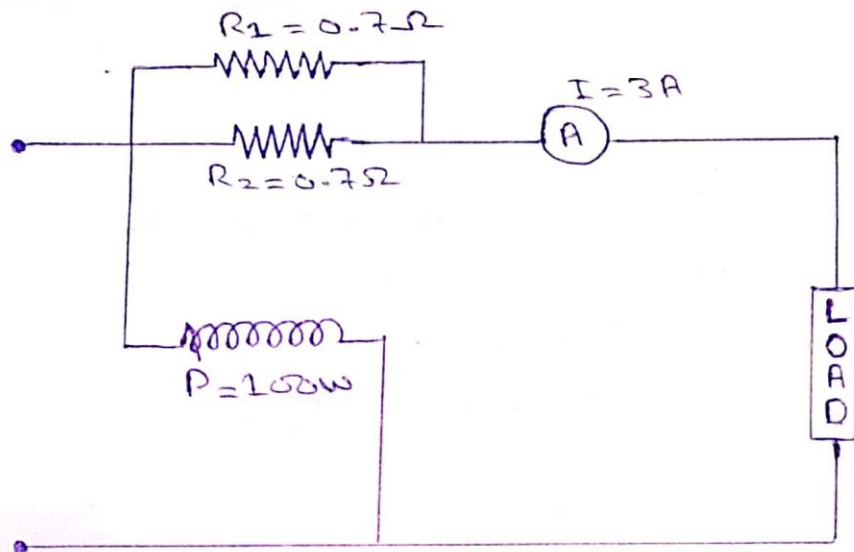
$$I = 3A$$

1

★ Required :-

- Power loss in wattmeter = ?
- True load power = ?
- Percentage error due to wattmeter.

★ Circuit Diagram :-



★ Solution :-



Resistance of current coils

$$R_c = \frac{R_1 R_2}{R_1 + R_2} \quad \text{put values}$$

$$R_c = \frac{0.7 \times 0.7}{0.7 + 0.7} = \frac{0.49}{1.4}$$

$$R_c = 0.35 \Omega$$

Power loss in wattmeter = $I^2 R_c$

$$\text{So, } I^2 R_c = (3)^2 (0.35)$$

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$$= 9 \times 0.35$$

$$= 3.15 \text{ W}$$

So, Power loss in wattmeter = 3.15 W

b)

$$\begin{aligned} \text{True Load Power} &= 100 - 3.15 \\ &= 96.85 \text{ W} \end{aligned}$$

c)

$$\text{Percentage error} = \frac{P - \text{True Load}}{\text{True Load Power}} \times 100$$

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

$$= \frac{3.15}{96.85} \times 100$$

So, Percentage error = 3.252%

Q2:-

* Given data:-

Two voltmeter range = 0-500V

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

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

Total voltage = $V_T = 700 \text{ V}$

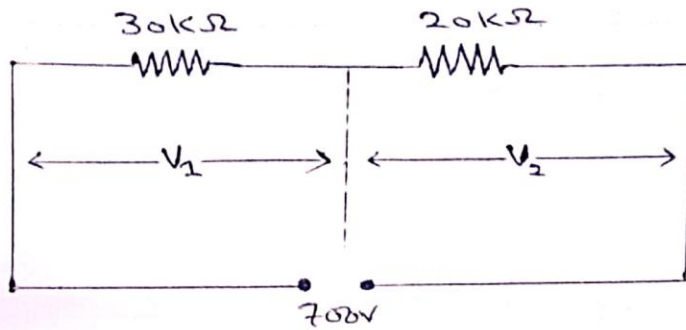
* Required:-

Voltage reading in 1st

$$\text{Voltmeter} = V_1 = ?$$

Voltage reading in 2nd Voltmeter = $V_2 = ?$

3



* Solution:-

By voltage divider rule
the reading of two voltmeter
will be

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

$$V_1 = 420V$$

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

$$V_2 = 280V$$

* Result:-

→ Voltage reading in 1st

$$\text{Voltmeter} = V_1 = 420V$$

→ Voltage reading in 2nd

$$\text{Voltmeter} = V_2 = 280V$$