

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

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

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Q 1:

Given Data:

Two current coil Resistance $R_1 = 0.700$

$$R_2 = 0.700$$

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

$I = \text{Current} = 3\text{A}$

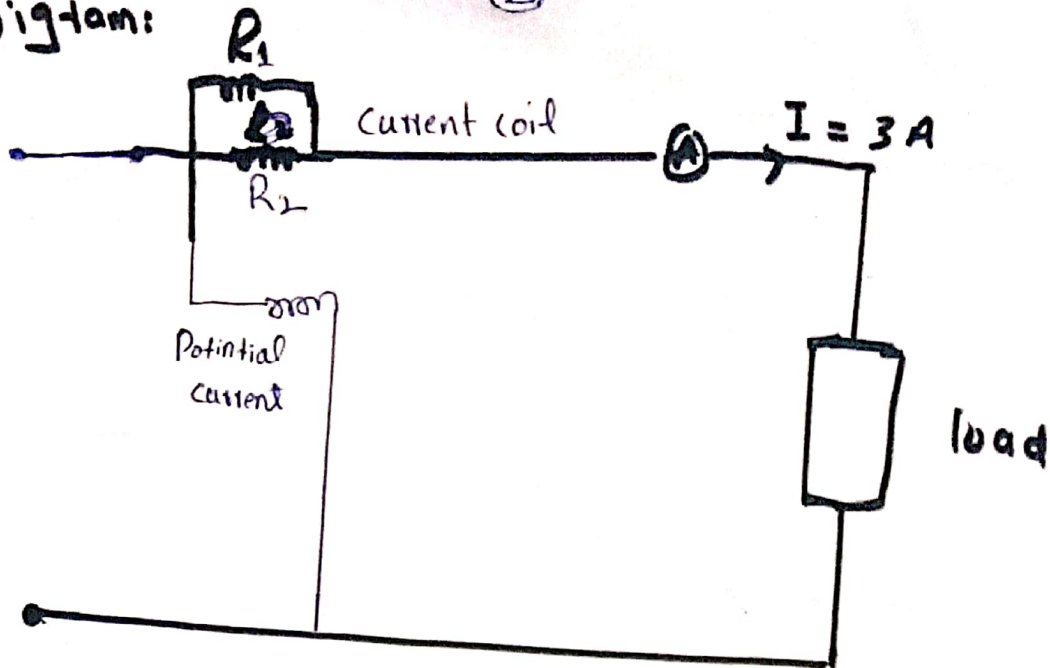
Required:

- 1) Power loss in watt meter ?
- 2) True load power ?
- 3) Percentage error due to wattmeter connection?

P.T.O

Diagram:

(2)



Soll

i) Effect Resistance of current coils

$$R_c = \frac{R_1 R_2}{R_1 + R_2} = 0.$$

$$R_c = \frac{0.700 \times 0.700}{0.700 + 0.700} = 0.35 \Omega$$

ii) Power loss in watt meter = $I^2 R_c$

$$P_{\text{loss}} = I^2 R_c$$

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

$$= 3.15 \text{ W} = 100 - 3.15 = 96.85 \text{ W}$$

iii) Percentage error = $\frac{100 - 96.85}{96.85} \times 100 = 3.25\%$

Q: 2

(3)

Given Data:

Two voltmeters range = 0-500V

Internal Resistance = $R_1 = 30k \Omega$

Internal Resistance = $R_2 = 20k \Omega$

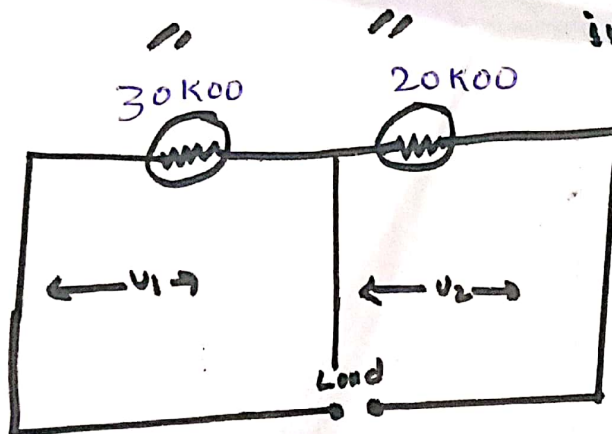
Total voltage across them = $V_1 = 700V$

Required:

Voltage reading in 1st voltmeter?

in 2nd voltmeter = ?

Diagram



Soll:

Voltage division Rule

$$V_1 = \frac{30k\Omega}{30k\Omega + 20k\Omega} \times 700 = \frac{30k\Omega}{30k\Omega + 20k\Omega} \times 700 = \boxed{420V}$$

P.1.0

(4)

$$V_1 = 420V$$

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

$$V_2 = 280V$$

$$V_2 = 280V$$