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 30KΩ and 20KΩ respectively. If they are connected in series and 700V be applied across them, what will be their readings?

Question # 1:

Given data:

Two Current Coils Resistance = R_1 = 0.7Ω
also = R_2 = 0.7Ω
Power = P = 100W
Current = I = 3A

Required:

1. Power Loss in a wattmeter = ?
2. True Load power = ?
3. Percentage error due to wattmeter Connection ?

Formulas:

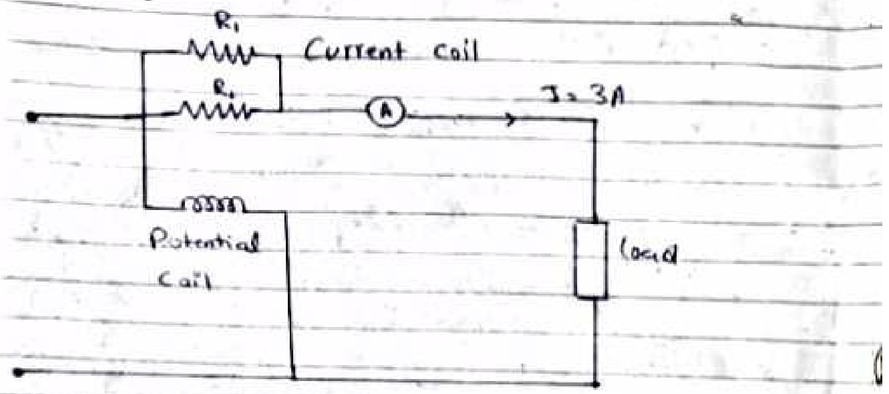
$$R_c = \frac{R_1 R_2}{R_1 + R_2}$$

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

$$\%\text{age error} = \frac{P - \text{True load Power}}{\text{True Load Power}} \times 100$$

Qubais Afridi ID #13686 P#2

Diagram:



Solution:

Effective Resistance of Current Coils

$$R_c = \frac{R_1 R_2}{R_1 + R_2} = \frac{0.7 \times 0.7}{0.7 + 0.7} = 0.35\,\Omega$$

1. power loss in Wattmeter $I^2 R_c$
$= (3)^2 (0.35)$
$= 3.15\,W$

2. True load power $= 100 - 3.15$
$= 96.85\,W$

3 %age error $= \frac{100 - 96.85}{96.85} \times 100$
$= 3.25\%$

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Question # 02

Given data:

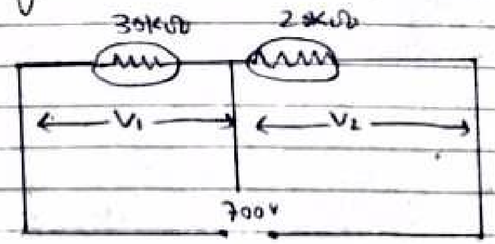
Two Voltmeters range: V= 0-500V
Internal Resistance = R_1 = 30KΩ
Internal Resistance = R_2 = 20KΩ
Total Voltage across them = V_t = 700V

Required:

Voltage reading in 1st Voltmeter = V_1 = ?

Voltage reading in 2nd Voltmeter = V_2 = ?

Diagram:



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Solution

Voltage divider Rule

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

$$V_1 = 420V$$

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

$$= 280V$$