

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?

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 wattmeter is 100W and the reading on 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.

~~Req~~ Required:

The current coil = 3 Amp

wattmeter is = 100W

having resistance = 0.7Ω

Solution:

Effective resistance of the current coil.

~~coil~~

$$R_c = \frac{R_1 R_2}{R_1 + R_2} = \frac{0.7 \times 0.7}{0.7 + 0.7} = \frac{0.49}{1.4}$$

$$= 0.35 \Omega$$

Page 1

(i) Powerless in the wattmeter = $I^2 R_C$

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

$$= 9 \times 0.35^2$$

$$= 3.15^2 \text{ W}$$

(ii) True Load power = $100 - 3.15^2$

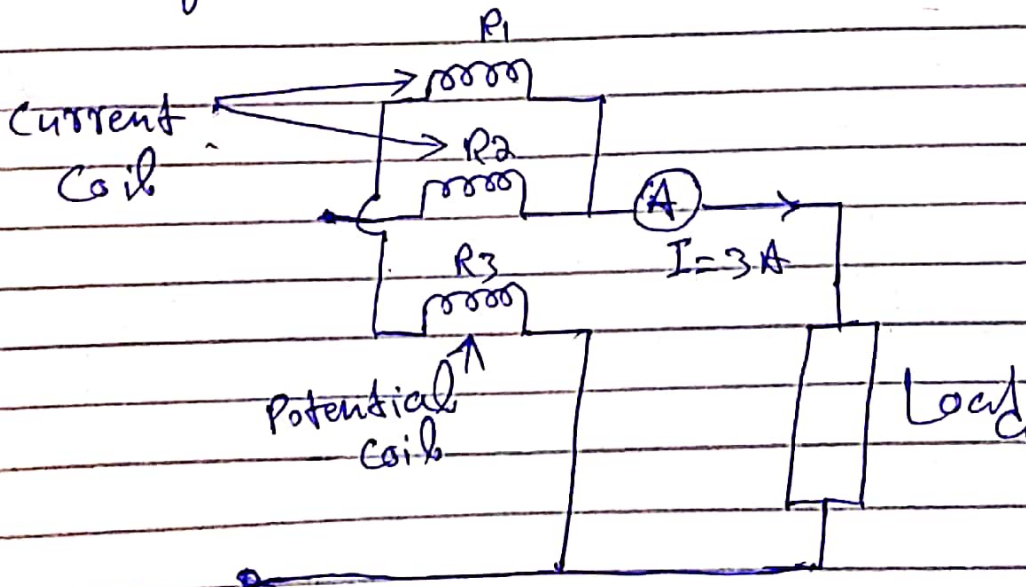
$$= 96.85^2 \text{ W}$$

(iii) percentage error due to wattmeter connection

$$= \frac{\text{Wattmeter} - \text{True Load power}}{\text{True Load power}} \times 100$$

$$= \frac{100 - 96.85^2}{96.85^2} \times 100 = 3.25^2$$

Percentage error = 3.25% Ans.



Page 2

Q. Two voltmeter have the same range 0-500V.
The initial 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?

A

Required:

voltmeter range = 500V
initial resistance = $30K\Omega$ and $20K\Omega$

Applied Across = 700V

Solution:

Find:

reading of the Two voltmeter.

page 3

Solution:

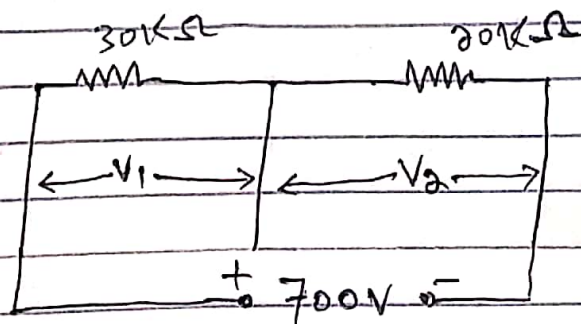


Figure shows the condition of the problem.

Hence by voltage divider rule,
the readings of the two voltmeter are.

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

$$V_2 = \frac{20k\Omega}{30k + 20k} \times 700 = 280V$$

Page 4