Department of Electrical Engineering
Sessional Assignment
Course Details

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

Student Details

Name: ADNAN SHAH **Student ID:** 13692

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?

Ans 1:

Given data:-

coils = 2

$R_1 = 0.7\,\Omega$

$R_2 = 0.7\,\Omega$

wattmeter reading = 100W

Ammeter reading = 3 A

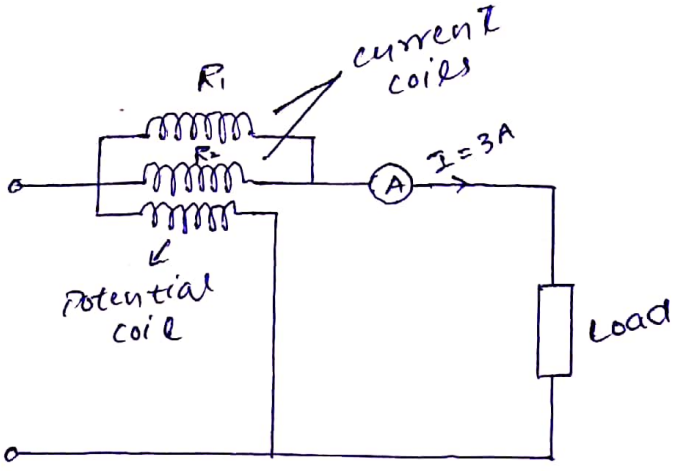
Required:

(a) Power loss in wattmeter

(b) True load Power

(c) Percentage error due to wattmeter connection

Solution:



(a) Power loss:

$= I^2 R_c$

The formula to find R_c is;

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

∴ R_c = effective resistance of current coil

$$= \frac{0.7 \times 0.7}{0.7 + 0.7}$$

$$= \frac{0.49}{1.4}$$

$$R_c = 0.35\,\Omega$$

So power loss in wattmeter will be;

$= I^2 R_c$
$= (3)^2 (0.35)$
$= 3.15W$

(b) True load power:

= Wattmeter reading − power loss in wattmeter

$= 100 - 3.15$
$= 96.85W$

(c) Percentage error due to wattmeter connection:

$$= \frac{\text{Total Power} - \text{True load power}}{\text{True load power}} \times 100$$

$$= \frac{100 - 96.85}{96.85} \times 100 \Rightarrow 0.0325 \times 100$$

$= 3.25\%$

Ans (2)

Given data:

voltmeters range = 0 - 500V

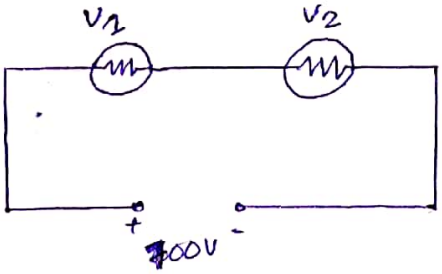
initial resistance = 30KΩ, 20KΩ

V = 700V

Required:

reading of voltmeters if both are connected in series and voltage applied = 700V

Solution:



By VDR (voltage divider rule);

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

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

So both voltmeters readings will be 420V and 280V