**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?

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SUBJECT: Instrumentation & Measurement

ASSIGNMENT: Sessional Assignment

DEPARTMENT: Electrical Engineering

SEMESTER: 6th

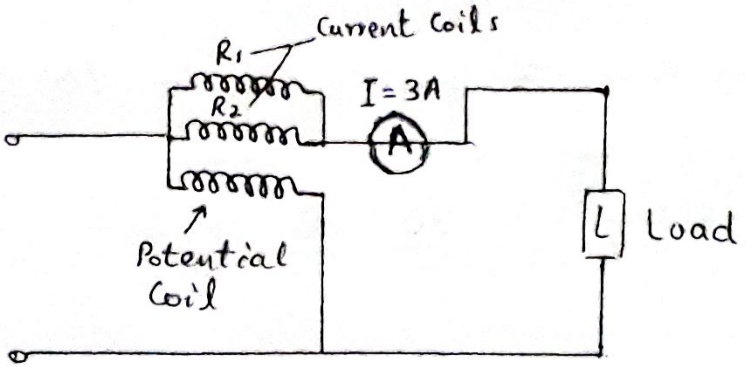
DATE: 18th May 2020

SUBMITTED TO:

Sir. Engr. Waleed Jan

Q 1 Ans

## DIAGRAM:




## GIVEN DATA:

Each Current Coils "R1 & R2" Resistance = 0.7Ω
The Reading On the Wattmeter is = 100 w
The Reading On the Ammeter is = 3A

## REQUIRED:

(1) Power loss in the Wattmeter.
(2) True load Power.
(3) % Error due to Wattmeter Connection.

## Solution:

Effective Resistance of Current coil:

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

$$\boxed{R_c = 0.35\Omega}$$

(1) Power loss in the wattmeter:

$$I^2 R_c = 3^2 (0.35) = 3.15 \text{ w}$$

$$\boxed{\text{P.loss} = I^2 R_c = 3.15 \text{ w}}$$

Q2 Ans/ CONTINUE/

(2) True load Power :

$$\text{True load Power} = 100 - 3.15 = 96.85\ \text{W}$$

$$\boxed{\text{True load Power} = 96.85\ \text{W}}$$

(3) %age Error :

$$\text{Percentage Error} = \frac{100 - 96.85}{96.85} \times 100$$

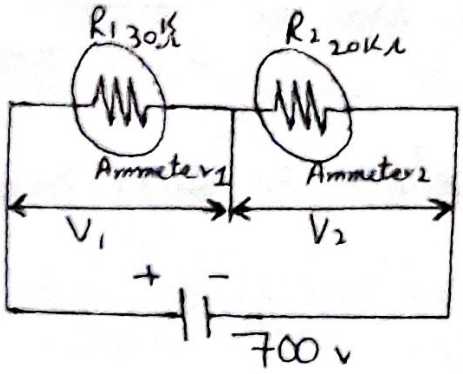
$$= \frac{3.15}{96.85} \times 100$$

$$= 0.0325 \times 100$$

$$\boxed{\text{Percentage Error} = 3.25\ \%}$$

Q 2 Ans

## DIAGRAM:




## GIVE DATA:

→ Two voltmeter have same Range = 0-500 V
→ The internal Resistance s "$R_1$ & $R_2$" = 30KΩ & 20KΩ
→ Applied Voltage = 700 V

## REQUIRED:

→ Reading Of voltmeters = ?
($V_1$ & $V_2$)

## Solution:

Here by voltage divider rule, the ~~voltage~~ readings of the two voltmeter are:

$$V_1 = \frac{R_1}{R_1+R_2} \times V \Rightarrow \frac{30,000}{30,000+20,000} \times 700$$

$$= \frac{30,000}{50,000} \times 700 \Rightarrow 0.6 \times 700$$

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

$$V_2 = \frac{R_2}{R_1 + R_2} \times 700 \Rightarrow \frac{20,000}{30,000 + 20,000} \times 700$$

$$= \frac{20,000}{50,000} \times 700 \Rightarrow 0.4 \times 700$$

$$\boxed{V_2 = 280\,V}$$

Now, **Appling "KVL" :**

$$V = V_1 + V_2$$

where "V" is applied voltage, "$V_1$" voltage across Voltmete 1 & "$V_2$" voltage across Voltmeter 2

$$V = V_1 + V_2$$

$$700 = 420 + 280$$

$$\boxed{700_V = 700_V}$$

"Hence proved that Ans is correct"

THE END