

**Department of Electrical Engineering**  
**Sessional Assignment**  
**Course Details**

**Course Title:** Instrumentation and Measurement      **Module:** 6<sup>th</sup> (BE)

---

**Student Details**

**Name:** Rafaqatullahkhan      **Student ID:** 14107

---

**Q1:** A wattmeter has 2 current coils connected in parallel, each having a resistance of  $0.7\Omega$ . 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?

Name	Rafiqatullah Khan
ID	14107
Subject	EMI
Date	19-05-2020

Question #1:

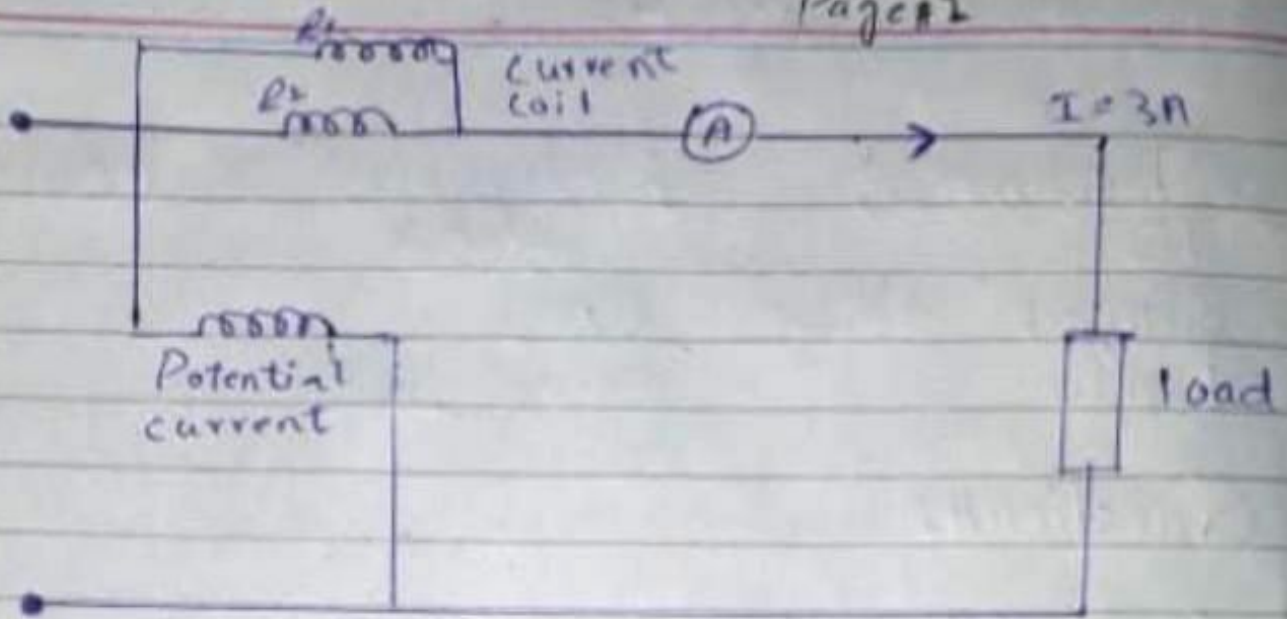
Given data:

Two current coils Resistance =  $R_1 = 0.700$   
also =  $R_2 = 0.700$   
Power =  $P = 100\text{W}$   
Current =  $I = 3\text{A}$

Required:

1. Power loss in a wattmeter?
2. True load power = ?
3. Percentage error due to connect wattmeter connection = ?

Diagram:



Solution:

Effect 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 =  $I^2 R_c$

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

$$= 3.15 \text{ W}$$

2. True load power

$$= 100 - 3.15$$

$$= 96.85 \text{ W}$$

3. % age error

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

$$= 3.25\%$$

Question # 02

Given data:

Two voltmeters range =  $V = 0 - 500 \text{ V}$

Internal Resistance =  $R_1 = 30 \text{ k}\Omega$

Internal Resistance =  $R_2 = 20 \text{ k}\Omega$

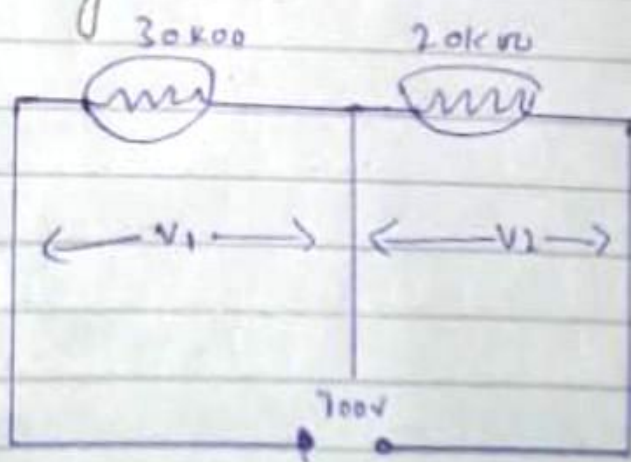
Total voltage across them =  $V_T = 700 \text{ V}$

Required:

Voltage reading in 1st voltmeter = ?

voltage reading in 2nd voltmeter =  $V_2 = ?$

Diagram:



Solution:

P1104

Voltage divider Rule

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

$$V_1 = 420V$$

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

$$= 280V$$