

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

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

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**Student Details**

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**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
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**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?



# " SESSIONAL ASSIGNMENT "

NAME :- Muhammad Karim I.D :- 13752

SUBJECT :- EMI

SUBMITTED TO: SIR WAJED

## QUESTIONS: 1

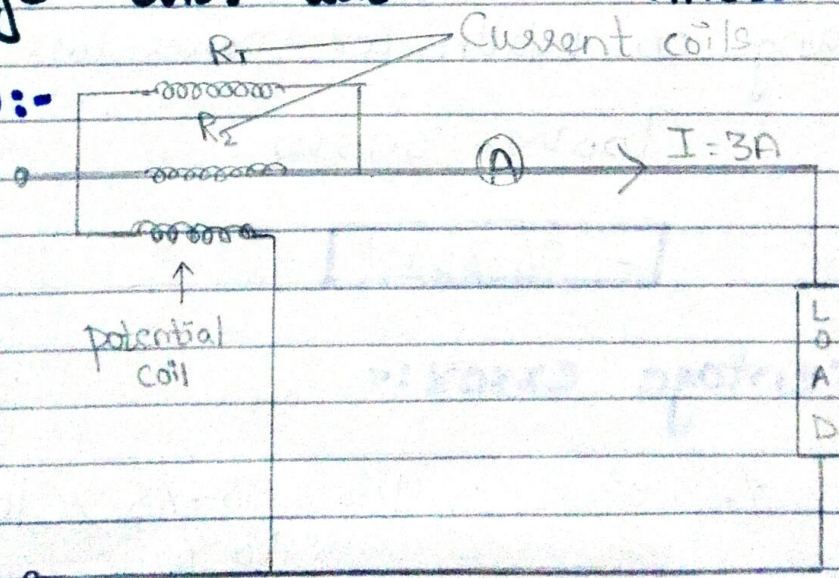
A wattmeter has 2 coils connected in parallel, each having a resistance of  $0.7\ \Omega$ . The wattmeter is connected in a circuit to measure power with its potential coil on the supply side. The reading on the wattmeter is  $100\text{ W}$ .

The reading on the wattmeter is  $100\text{ W}$ . The reading on the ammeter connected in series with the current coil is  $3\text{ A}$ .

Calculate:-

- Power loss in the wattmeter
- True load power
- Percentage error due to wattmeter connected

**Solution:-**





Find we find effective resistance of current

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

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

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

$$R_e = 0.35 \Omega$$

a) Power loss in wattmeter :-

$$P = I^2 R_e$$

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

$$= 9 (0.35)$$

$$P = 3.15 \text{ W}$$

True load power :-

Reading on wattmeter - power loss in wattmeter

$$100 \text{ W} - 3.15 \text{ W}$$

$$= 96.85 \text{ W}$$

c) Percentage error :-

$$\% \text{ error} = \frac{100 - 96.85}{96.85} \times 100$$

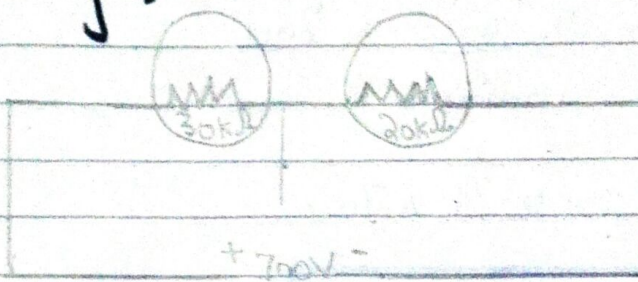
$$\% \text{ error} = 3.25\%$$



**QUESTION: 2:**

Two voltmeters have the same range 0-500 V. The internal resistance are  $30k\Omega$  and  $20k\Omega$  respectively. If they are connected in series and 700V be applied across them, what will be their reading?

Solution:-



So, By voltage divider rule:-

Readings of voltmeter is :-

$$V_1 = \frac{R_1}{R_1 + R_2} \times 700$$

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

$$V_1 = \frac{30,000}{30,000 + 20,000} \times 700$$

$$V_1 = \frac{30,000 \times 700}{50,000}$$

$$V_1 = 0.6 \times 700$$

$$V_1 = 420V$$



Similarly,

$$V_2 = \frac{R_2}{R_1 + R_2} \times 700$$

$$= \frac{20,000}{30,000 + 20,000} \times 700$$

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

$$= 0.4 \times 700$$

$$V_2 = 280V$$

# THE END