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ID - 13876

Subject - EMI

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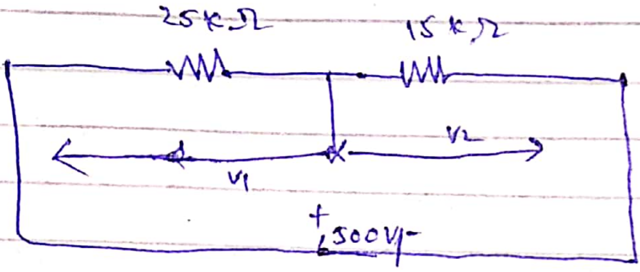
Question = 1

Ans-



the figure shows the conditions of the problem.

Thence by voltage devider rule, the readings of the voltmeter are.

$$V_1 = \frac{25k\Omega}{25k\Omega + 15k\Omega} \times 500 =$$

$$V_1 = \frac{25k \times 500}{40k} v$$

$$V_2 = \frac{15k}{15k + 25k} \times 500$$

$$V_2 = \frac{15k}{40k} \times 500V$$

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$V_1 = \frac{5k}{8k} \times 500V = 0.625 \times 500V.$

$V_1 = 312.5.$

$V_2 = \frac{15k}{40k} \times 500V = \frac{3k}{8k} \times 500V.$

$V_2 = 0.375 \times 500V$

$V_2 = 187.5V$

$V = V_1 + V_2.$

$500 = 312.5 + 187.5$

$500 = 500.$

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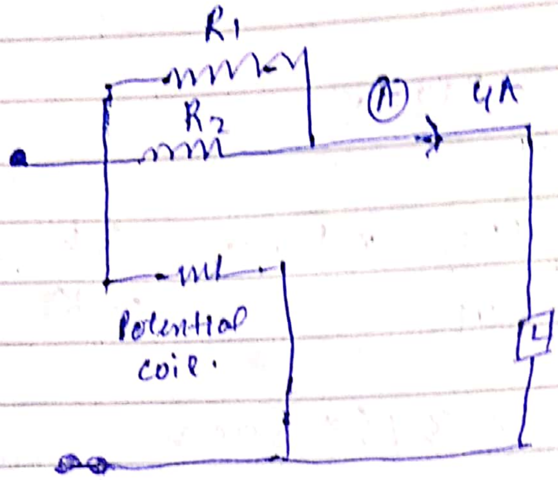
Question (2)

Ans:



Effective resistance the current coil.

$$RC = \frac{R_1 \times R_2}{R_1 + R_2} = \frac{0.5 \times 0.5}{0.5 + 0.5}$$

$$RC = \frac{0.25}{1} = \boxed{0.25}$$

(1) power dissipated in the Wall meter.

$$I^2 RC = (4)^2 (0.25)$$
$$= 16(0.25)$$
$$= 4w.$$

$$\boxed{I^2 RC = 4w}$$

(2) True load Power.

$$200 - 4 = 196w.$$

$$\boxed{196w.}$$

(3) Percentage error due to the connection of wallmeter.

$$= \frac{200-196}{196} \times 100 =$$

$$= \boxed{2.04\%}$$

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Part (a)

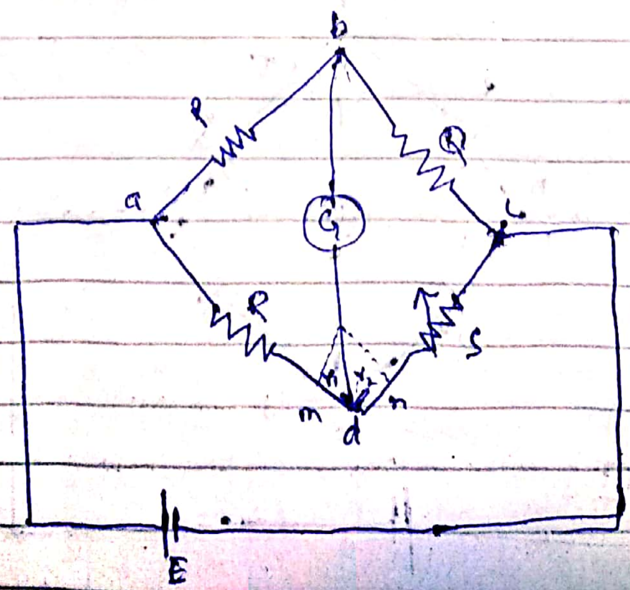
Question = (3)

Ans:

= the Kelvin Bridge:

The kelvin bridge is more advanced and helps in measuring resistances less than 1 ohm. However, it has two more ~~resistances~~ resistors than the wheatstone bridge.

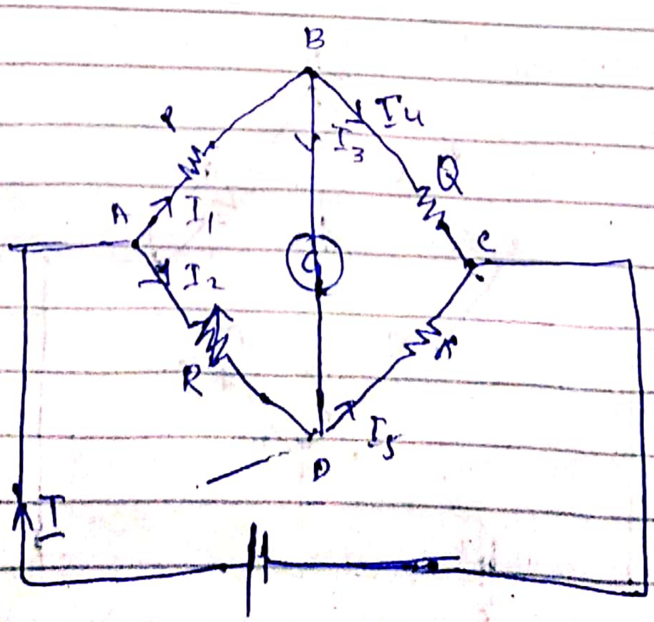
A Kelvin double bridge is a variant of wheatstone bridge and used for measuring very low ~~to~~ resistances.



Wheatstone Bridge.

A wheatstone brigde measures electrical resistance by balancing a bridge circuit. The Circuit has two legs, of which one contains the unknows resistance of value b/w 1 ohm to 10 ohm. Apart from resistance, this setup can also measures impendence, capacitance and Inductance.

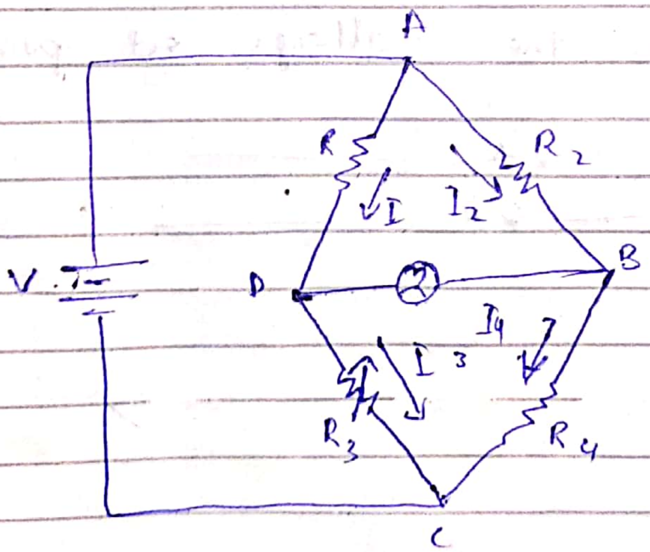
A wheatstone bridge can be used to measure resistance by camparing an unknown resistor by camparing an unknown resistor against precision resistor of known value.

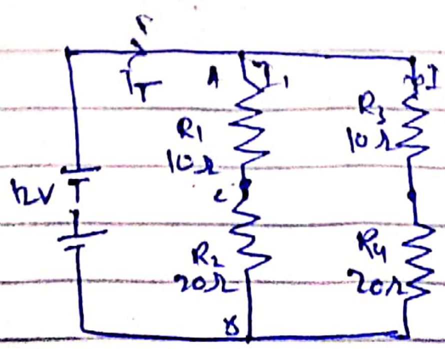


Question no 3.
part (b)
Ans:

Bridge circuit are particularly useful in converting resistance changes into voltage bridge that can be input directly into automatic control systems.

The difference in potential is crucial for current flow - not the value of the potential to ground of end points.





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$I_1 = V/R = 12 / (10\Omega + 20\Omega) = 0.4A$.

$V_{R2} = I \times R_2 = 0.4A \times 20\Omega = 8$ volts.

$V_{R1} = 4V$ and $V_{R2} = 8V$.

both points have same value of 8 volts. C = 8 D = 8 volts

the difference is 0 volts.
when this happens, both sides of the parallel network are said to be balanced because the voltage at point C is the same value as the voltage at point D.

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Question no 4.

Part (A)

Ans.

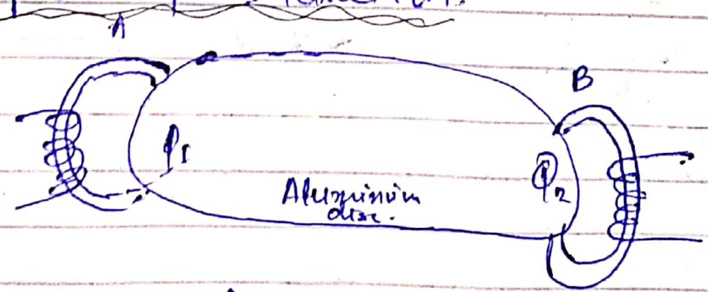
Energy Meter:-

An instrument which measures electrical energy is called an energy meter. or watt hour meter,

Since electrical energy consumed by a load adds up as the time goes on (Watt-hour = watts x hours), it is evident that watt hour meter is an integrity type instrument.

→ It should be noted that the energy meter designed for DC circuits can be used on AC circuits. but the reverse is not true.

Principle of Induction.



the above fig show the working principle of Induction type energy meters.

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Question (4).

Part (b).

→ It should be noted that when $\theta = 0°$ (i.e the two fluxes are in phase), then deflecting torque is zero.

→ The deflecting torque will be Maximum when $\theta = 90°$ i.e when the affecting flux has a phase difference of 90°.

→ The deflecting torque is the same at every instant since ϕ_m, ϕ_2, m & θ are fixed for a given condition.

→ The direction of deflecting torque depends upon which flux is leading the other.

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Question No 5

part (c).

The shunt magnet is wound with a wire of many turns as is connected ~~proportional to~~ across the supply so that it carries current proportional to the supply voltage. Due to large no of turns, the coil of shunt meter is highly inductive. ~~Hence~~ Hence the current (and the flux) passing through it lags the supply voltage by 90°.

The series magnet is wound with a wire of few turns as is connected is series with the load so that it carries the load current. The coil of this magnet is highly non-inductive.

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Question No 5.
part (d)

Eenergy meter Constant is the amount of KWH used in its low voltage circuit for each revolution of the the Induction disc.

The unit of energy meter constant is rev per kilo watt hour (rev/KWh)

It is constant value.
If an energy meter has energy meter constant value of 150 rev/KWh.

It will consume the energy of 1KWh (1 unit) in every 150 revolution.

If it rotates 300 revolution, it will consume 2KWh energy.

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