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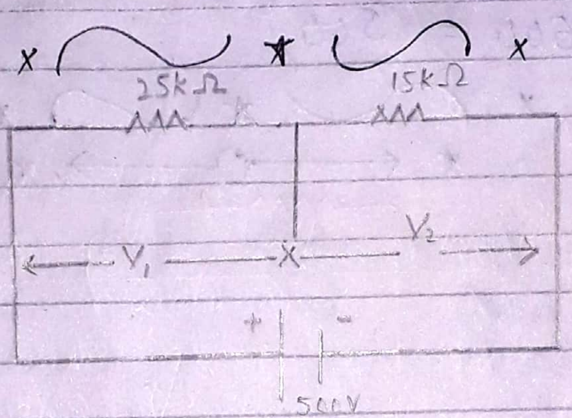
Course :- Instrumentations and measurments.
Module :- 06.
Assignment :- Spring 2020 (F.paper)
Date :- 23/06/2020.



The figure shows the condition of the given problem.
Hence by voltage divider rule, the readings of the voltmeter are :-

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

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

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

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

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

$$(V_1 = 312.5)$$

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

$V_2 = 0.375 \times 500V$

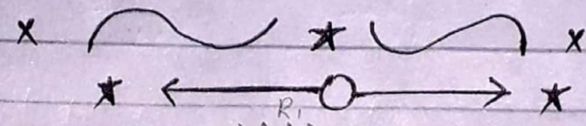
$(V_2 = 187.5V)$

Now:-

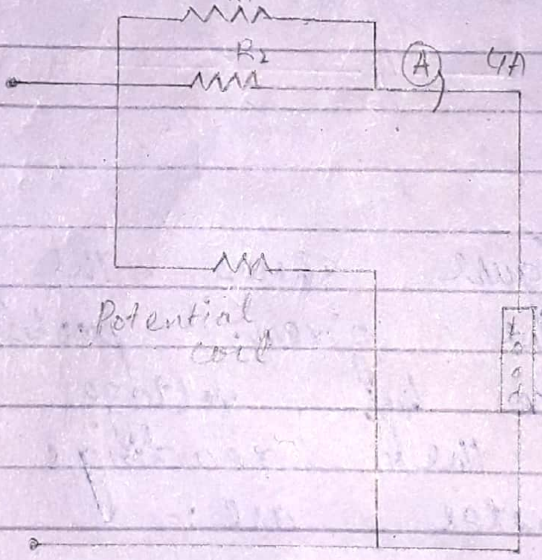
$V_t = V_1 + V_2.$

$500 = 312.5 + 187.5.$

$(500 = 500)$



Q2:-



→ Effective resistance the current coil:-

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

$$R_C = \frac{0.25}{1} = (0.25)$$

1) Power disipated in the watt.meter

$I^2 R_C = (4)^2 (0.25)$

$= (16)(0.25)$

$\{ I^2 R_C = 4W \}$

2). True Load Power :-
200 - 4 = 196 W.

3). Percentage error due to the connection of watt meter.

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

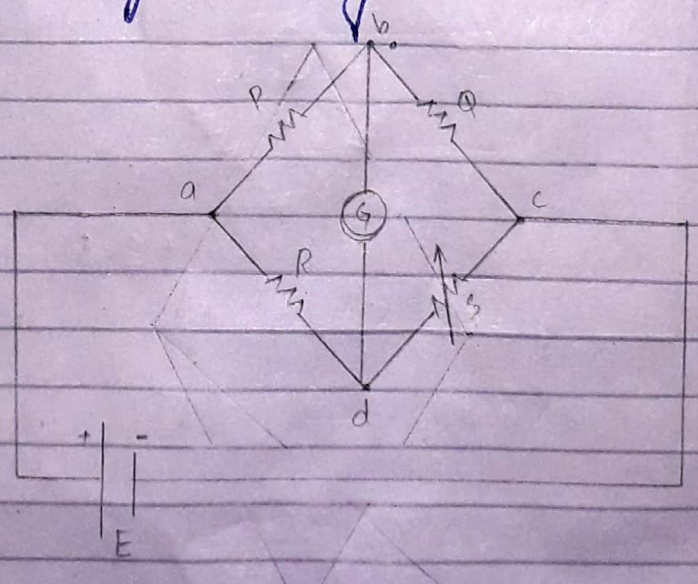
$$= (2.04\ \%)$$

Q3:-

a). Kelvin Bridge :-

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

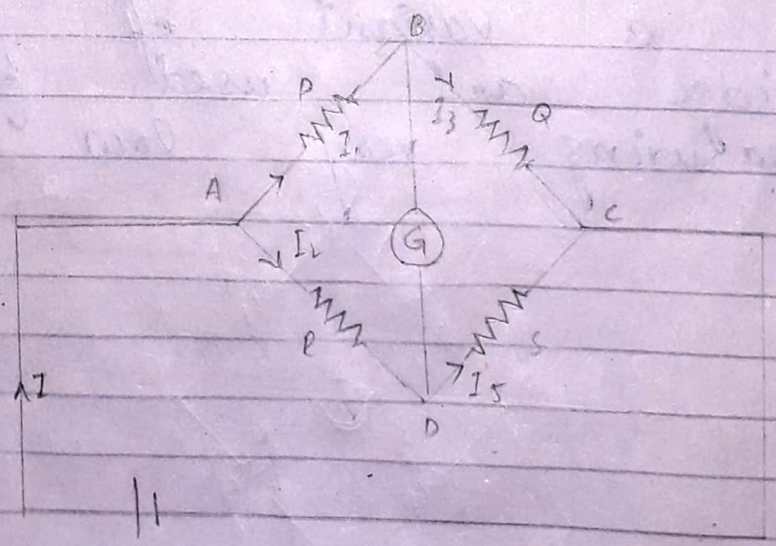
A kelvin double bridge is a variant of wheatstone bridge and used for measuring very low resistances.



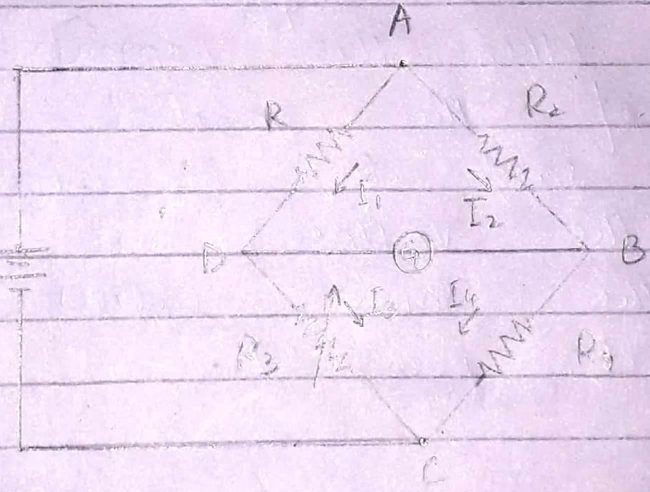
→ Wheatstone Bridge :-

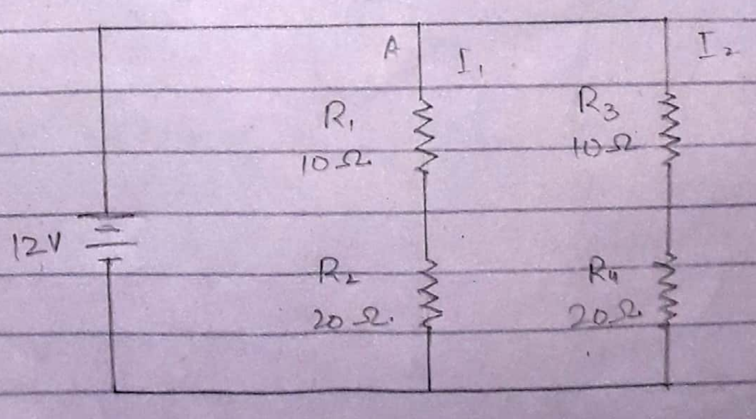
A wheat stone Bridge measures electrical resistance by balancing a bridge circuit, the circuit has two legs, of which one contain the unknown's resistance of value b/w 1 ohm to 10 Ω. Apart from resistance, This setup can also measures impedance, capacitance & inductance.

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



QNo3
b)- Bridge circuit are particullarly useful in connections resistance changes into voltage bridge That can be input directly into autonamic control system.
The difference in potential is crucial for current flow not the value of the potential to ground of end points.





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

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

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

Both points we have same values of 8 volts $C = D = 8$ 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 values as the voltage at point D.

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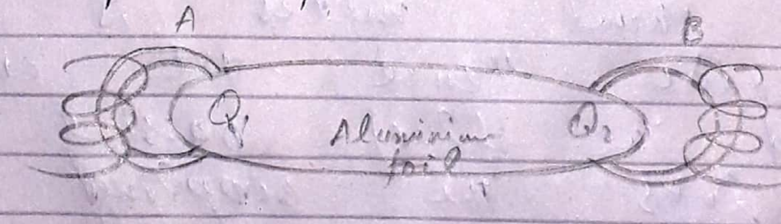
Q4:-
A)- Energy Meter :-
An instrument used for measurment of electrical energy. also called watt hour meter.
Since electrical energy consumed by the load adds up as the time goes on (watt-hour = watts x hours) it is evident that watt hour meter is an integrity type instrument.
It should be noted that the energy meter designed for DC circuits can be used on AC circuits. but the reverse is not true.

→ Principal of Induction :-



The above fig shows the working principal of induction type energy meters.

x ——— x ——— x

Q4
B)-
It should be noted that when $\theta = 0°$ (2 fluxes in same phase) the deflecting torque is zero.

→ The deflecting torque will be maximum when $\theta = 90°$.

→ Deflecting torque is same at every instant since ϕ_m, ϕ, m & ϕ are fixed for a given condition.

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

x —— x —— x

Q5

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

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

x —— x —— x

Question No. 5.

Part (d).

Energy meter constant is the amount of KWH used in its low voltage circuits for each other revolution of the induction disc.

The Unit of the energy meter constant is rev per kilo watt hour (rev/KWH).

It is constant value. Its an energy meter has energy meter constant values of the 150 rev/KWH).

It will consume the energy of 1 KWH (1 Unit) in energy 150 revolutions.

It will rotates 300 revolutions it will consume 2 KWH energy.

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