Name Zia Ur Rehman. (1)

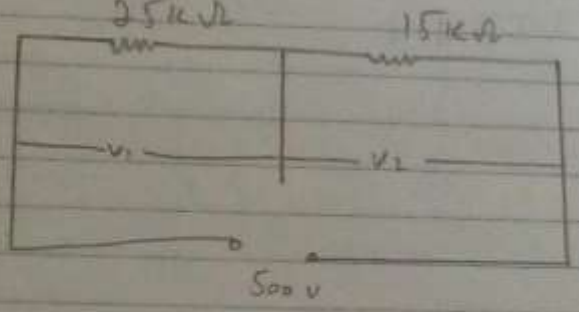
ID 11473.

Instrumentation and measurment.

Q1

A student has connected two voltmeters in series and have applied 500V across them.

Fig



The figure shows the conditions of the problem

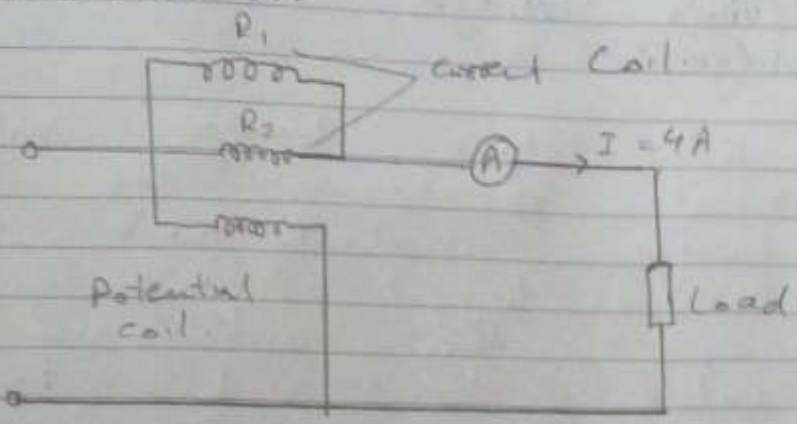
Hence by voltage divider rule the reading of the two voltmeters are

$$V_1 = \frac{25k\Omega}{25k + 15k\Omega} \times 500 = 312.5\,kV$$

$$V_2 = \frac{15}{25+15} \times 500 = 187.5\,kV$$

(2)

Q2 A dynamometer type wattmeter has two current coils .....



Sol:- Effective resistive of the current Coil.

$$R_c = \frac{R_1 R_2}{R_1 + R_2} = \frac{0.5 \times 0.5}{0.5 + 0.5} = \frac{0.25}{1} = 0.25\Omega$$

i) Power Loss in wattmeter $= I^2 R_c = 4^2 (0.25)$

Power Loss in wattmeter = 4 w

2) True load Power = 800 w - 4 w = 196 w

3) % age error $= \frac{200 - 196}{196} \times 100$

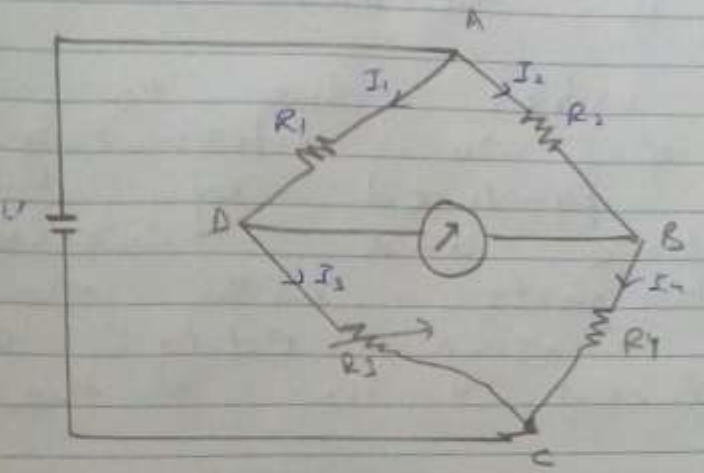
$= 2.04\%$

What is the difference b/w kelvin's bridge and wheatstone bridge.

A wheatstone bridge measures electrical resistance by balancing a bridge circuit. The circuit has two legs of which one containing the unknown resistance of value b/w 1Ω to 10Ω A part from the resistance, this setup can also measure impedence capacitance and inductance.

While the kelvin bridge is more advanced and helps in measur resistance less then 1Ω. However it has two more resistors then the wheatstone bridge.

3 (b) Explain how the potential on the upper (top) node in a DC bridge is equal to the potential on the lower (bottom) node? (4)



The above circuit, the arms AB, BC, CD, DA together form a rhombus or square shape. They consist of resistors R_2, R_4, R_3, and R_4 respectively. Let the current flowing through these resistor arms is I_3, I_4, I_3 and I_1 respectively and the directions of these currents are shown in the figure.

The diagonal arms DB and AC consists of galvanometer and DC voltage source of V volts respectively. Here the resistor R_3 is a standard variable resistor and the resistor R_4 is an unknown resistor. We can balance the bridge by varying the resistance value of resistor R_3.

Q4. Why the energy meters designed for DC circuit cannot be used for AC circuit?

Ans: It is because AC energy meter works due to the involvement of two alternating magnetic fields produced by AC quantities (voltage and current respectively) that interacts with an aluminium disk causing eddy current to induced in the disk.

Q4(b) what will be happen if the phase difference b/w two alternating fluxes in an induction type energy meter is zero degree?

Ans: When the Phase difference b/w two alternating fluxes in an induction type energy meter is zero degree. The current legs behind the circuit voltage by 90°. Therefore, the current flowing through pressure coil B will be in phase with the current in current coils FF, both ~~behind~~ legging behind the circuit voltage by 90°.

Q5 (a) Why the series magnet is wound with a wire of few turns as compared to shunt magnet in an induction type energy meter.

Ans: The basic principal of induction type energy meter is electromagnetic induction. when alternating current flow through two suitably located coils produces rotating magnetic field which is cut by the metallic disc suspended near to the coil thus emf induce in the disc which is circulates eddy current in it. by interaction of rotating magnetic field and eddy currents torque is developed and cause the disc rotate.

Q6 (b) What is the significage of meter constant in an energy meter?

Ans: The Constant which is shown on the meter nameplate for example. A Constant "Kh = 7.2" means that for each revolution of the disk, 7.2 watt-hours has been used (Constants will vary with different meters). To determine how much electrical energy is used by counting meter disk revolutions.