Chapter-5(The Measurement Medium Resistance)
Lecture:1

Presented by

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Introduction:

- Medium Resistance: This category includes Resistance from 1Ω to 0.1 MΩ. High Resistance: Resistance of the order of 0.1 MΩ and above is classified as High resistance.

The measurement of Method Resistance by the Wheatstone Bridge Method:

- The Wheatstone bridge is an electrical bridge circuit used to measure resistance. It consists of a common source of electrical current (such as a battery) and a galvanometer or a multimeter that connects two parallel branches, containing four resistors, three of which are known.

- Wheatstone bridge is a very important device used in the measurement of medium resistances. A Wheatstone bridge has been in use longer than almost, any electrical measuring instrument. It is still an accurate and reliable instrument and is extensively used in the industry. Wheatstone bridge is an instrument for making comparison measurements and operates upon a null indication principle.

- This means the indication is independent of the calibration of the null indicating instrument or any of its characteristics. For this reason, very high degrees of accuracy can be achieved using a Wheatstone bridge. The accuracy of 0.1% is quite common with a Wheatstone bridge as opposed to accuracies of 3% to 5% with the ordinary ohmmeter for measurement of medium resistances.

- The figure below shows the basic circuit of a Wheatstone bridge. It has four resistive arms, consisting of resistances P, Q R and S together with a source of emf (a battery) and a null detector, usually a galvanometer G or other sensitive current meter. The current through the galvanometer depends on the potential difference between points c and d.

- The bridge is said to be balanced when there is no current through the galvanometer or when the potential difference across galvanometer is zero. This occurs when the voltage from point b to point a equals the voltage from point d to point b or by referring to the other battery terminal when the voltage from point d to point c equals the voltage from point b to point c.

- Must Read:

- Measurement of Resistance | Ammeter-Voltmeter Method

- Measurement of Medium Resistance by Substitution Method

- Kelvin Double Bridge Method for Low Resistance Measurement

For a balanced condition, we can write,

- $\qquad$ I1 P = I2 R

- The figure below shows the circuit for the Wheatstone bridge for resistance.

$$\frac{P}{P+Q} = \frac{R}{R+S}$$
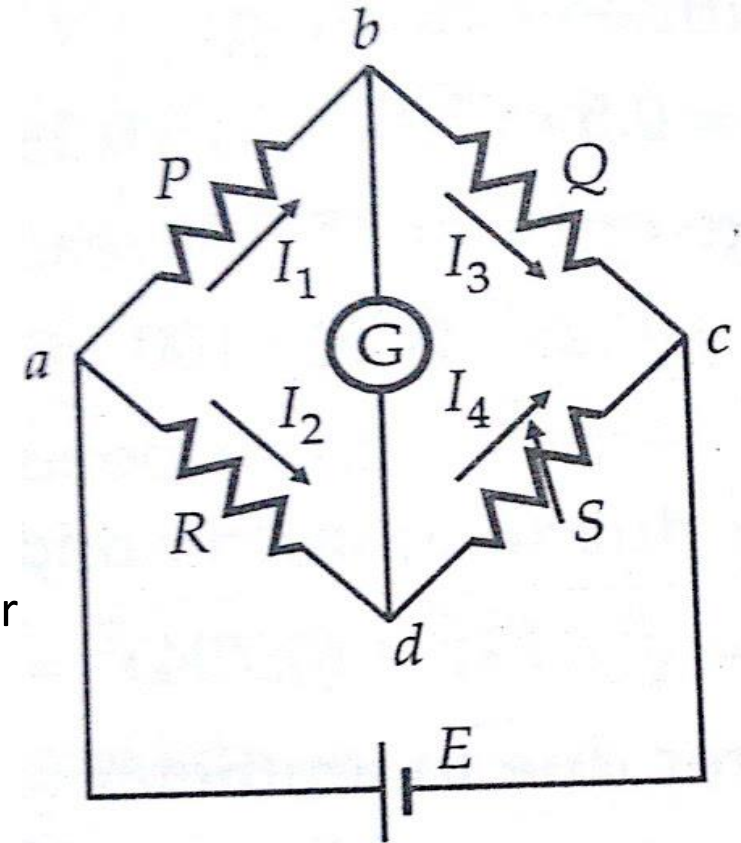
- measurement-of-medium-resistance-wheatstone-bridge , sensitivity-of-wheatstone-bridge

- For the galvanometer current to be zero, the following conditions also exist:

- measurement-of-medium-resistance-wheatstone-bridge , sensitivity-of-wheatstone-bridge

- where E = emf of the battery

- Combining the above three equations we get,

- measurement-of-medium-resistance-wheatstone-bridge , sensitivity-of-wheatstone-bridge