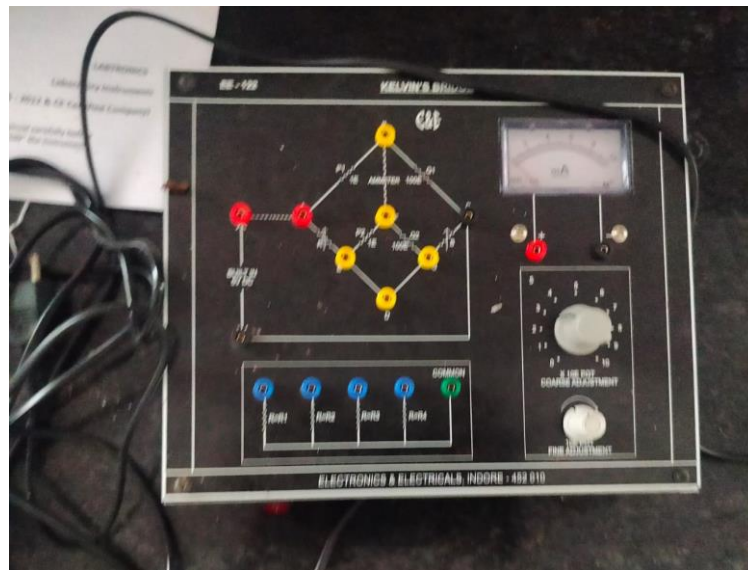


- **Quality Control in Manufacturing:** Newton's rings are used in industrial applications to ensure the **flatness and surface accuracy** of optical components, such as lenses and mirrors.



KELVIN BRIDGE

The **Kelvin Bridge**, also known as the **Kelvin Double Bridge**, is an electrical circuit used to measure very low resistances (in the micro-ohm to milli-ohm range) with high accuracy. It is a modified version of the Wheatstone bridge, optimized to eliminate the effects of lead and contact resistances. This makes it particularly important in precision measurements where such parasitic resistances can cause significant errors.

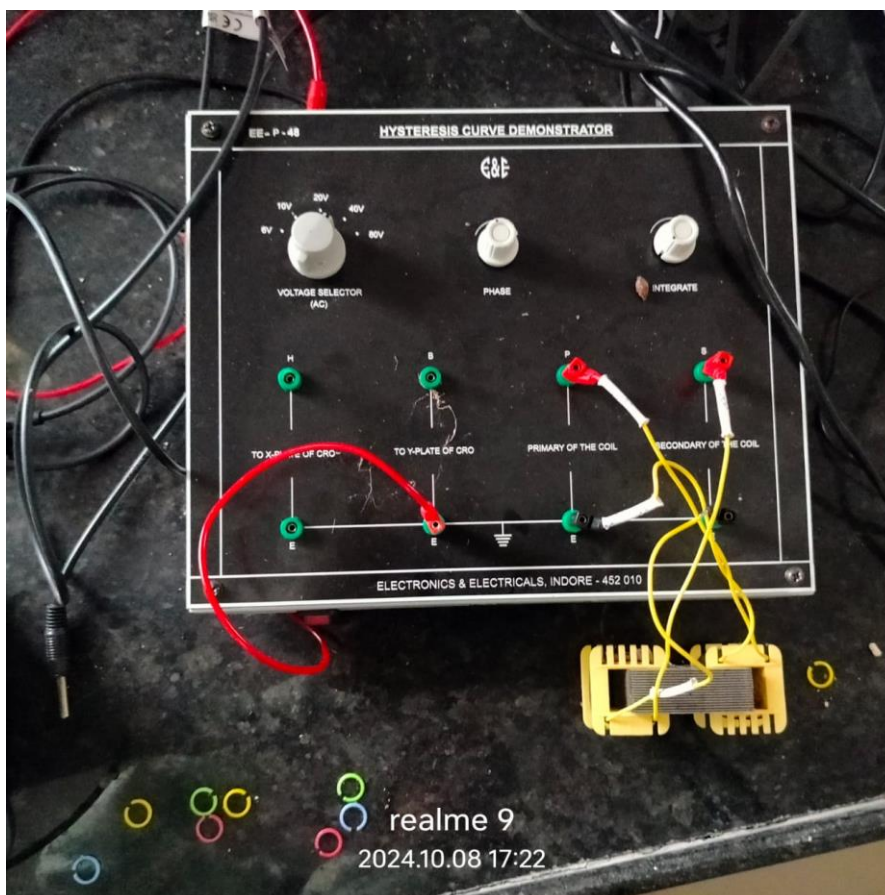
Function of the Kelvin Bridge:

1. **Measurement of Low Resistances:**
 - The primary function of the Kelvin Bridge is to measure very low resistances accurately, which is useful in testing materials such as metals, where low resistance is expected.
2. **Eliminating Lead and Contact Resistance Effects:**
 - In low resistance measurements, the resistance of the connecting wires (leads) and contact points can introduce significant errors. The Kelvin Bridge design separates the current and voltage paths, minimizing the influence of these unwanted resistances.
3. **Working Principle:**
 - It uses a current source to drive a known current through the unknown resistor and a precision reference resistor.
 - A sensitive null detector (typically a galvanometer) is used to balance the bridge by adjusting known resistances until the potential difference across the detector is zero, which indicates the point of balance.
4. **Two Sets of Ratios:**
 - The bridge has two sets of ratio arms: one set for the main circuit and another set for the auxiliary circuit. The auxiliary set is used to correct for the potential

drop across the leads, ensuring that the final measurement reflects only the unknown resistance.

Significance in a Physics Lab:

- 1. High Precision in Low Resistance Measurement:**
 - Accurate measurement of low resistances is critical in physics experiments involving conductors, superconductors, and other low-resistance materials.
- 2. Materials Testing:**
 - It is often used to test the purity and quality of conductive materials (e.g., copper, aluminum) in industrial applications, and also to characterize materials in research labs.
- 3. Eliminating Systematic Errors:**
 - The Kelvin Bridge provides a method to minimize systematic errors caused by lead resistance, ensuring that the measured value corresponds to the true resistance of the sample.
- 4. Use in Calibration:**
 - It can also be used to calibrate low resistance standards or reference resistors, which are critical for maintaining accuracy in electrical measurements.



HYSTERYSIS DEMO

A **hysteresis demonstration** in a physics lab typically involves illustrating the phenomenon of **magnetic hysteresis** using ferromagnetic materials, such as iron. Hysteresis refers to the