Part I

INSTRUMENTS MEASURING VARIOUS ELECTRICAL QUANTITIES

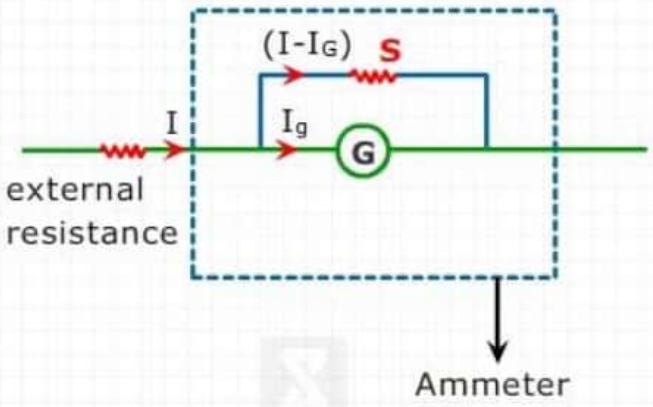
01 AMMETER

A shunt (small resistance) is connected is parallel with galvanometer to convert it into ammeter.

I_G = Current through galvanometer

R_G = Resistance of galvanometer

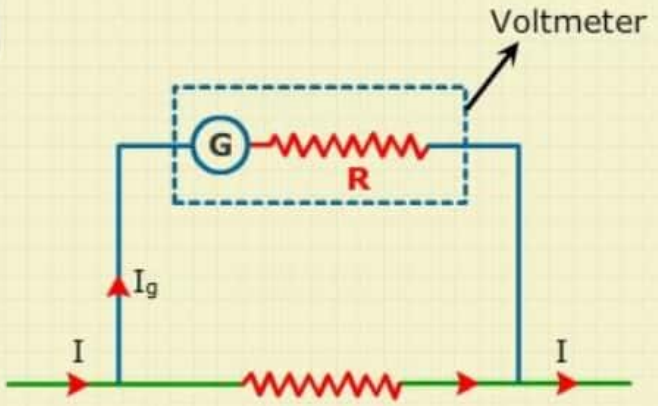
$$S = \frac{I_G R_G}{I - I_G}$$



02 VOLTMETER

A high resistance is put in series with galvanometer. It is used to measure potential difference across a resistor in a circuit.

$$I_G = \frac{V}{R_G + R}$$

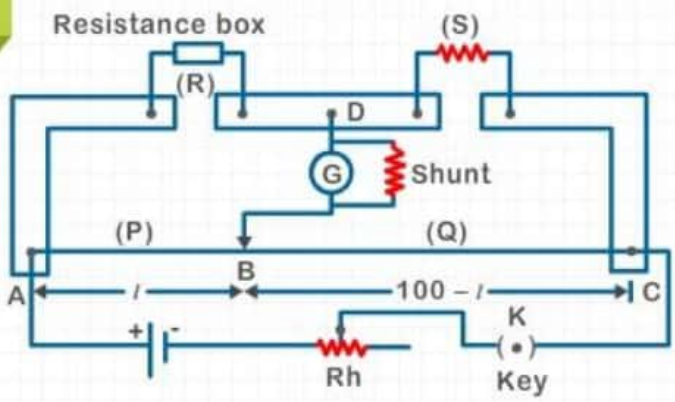


03 METRE-BRIDGE

$$S = \frac{R(100 - l)}{l}$$

R = Resistance taken in the resistance box

l = Length measured



Part II

POTENTIOMETER

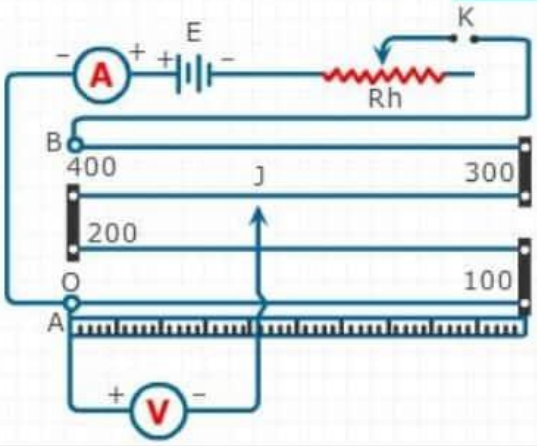
l = Length

A = Area of cross-section

ρ = Resistivity of material

I = Current

$$V = I\rho\frac{l}{A}$$



APPLICATION OF POTENTIOMETER

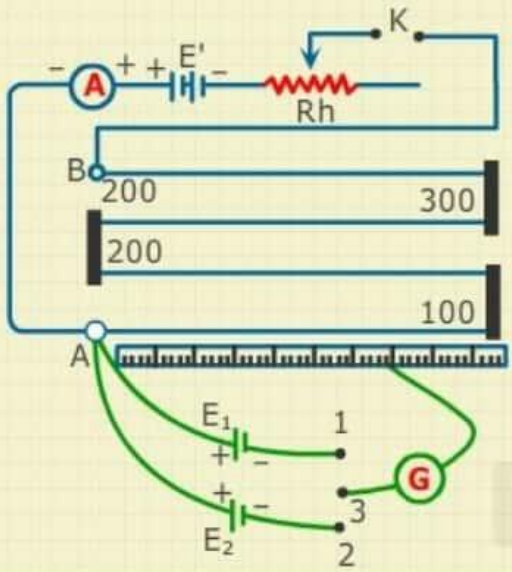
APPLICATION-01

To find EMF of an unknown cell and compare EMF of two cells

$$\frac{E_1}{E_2} = \frac{\ell_1}{\ell_2}$$

ℓ_1 = Balancing length when key is between gaps of terminal 1 and 2

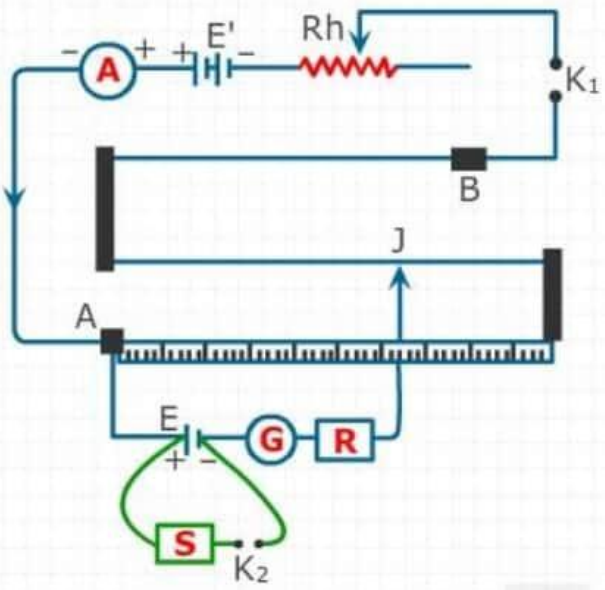
ℓ_2 = Balancing length when key is between gaps of terminal 2 and 3



APPLICATION-02

To find the internal resistance of a cell

$$r' = \left[\frac{\ell_1 - \ell_2}{\ell_2}\right]$$



APPLICATION-03

To find current if resistance is known

$$I = \frac{X\ell_1}{R_1}$$