Electromagnetism

f) effective resistance of circuit = \( \frac{GS}{G+S} \)

g) If the range of galvanometer is increased to \( n \) times, \( 1/n^{th} \) of main current passes through galvanometer. Hence sensitiveness decrease by \( n \) times.

48. **Ammeter**:
   
a) It is a device used to measure current in electrical circuits.
   
b) Galvanometer can be converted in to Ammeter by connecting low resistance parallel to it.
   
c) To increase the range by ‘\( n \)’ times or to decrease the Sensitiveness by ‘\( n \)’ times, shunt to be connected across Galvanometer.
   
   \[
   S = \frac{ig(G)}{i - ig} = \frac{G}{(n - 1)}
   \]

   Here \( n = \frac{i_g}{i} = \frac{\text{new range}}{\text{old range}} \cdot \frac{\text{old divisions} / \text{A}}{\text{new divisions} / \text{A}} \)

   d) Resistance of Ammeter = \( \frac{GS}{G+S} \)

   e) Resistance of ideal Ammeter is zero and its conductivity is infinity

   f) Ammeter must be always connected in series to the conductor.

   g) Among low range and high range Ammeter, low range Ammeter has more resistance.

   h) As shunt value decreases sensitivity decreases, accuracy increases.

49. **Voltmeter**:

   a) Voltmeter is a device used to measure P.D. across the conductor in electric circuits.

   b) Galvanometer is converted into voltmeter by connecting high resistance in parallel to it.

   c) Voltmeter is always connected in parallel to the conductor [P.D. across which is to be measured]

   d) Resistance of voltmeter = \( G + R \)

   e) Here ‘\( V \)’ is range of voltmeter (e) resistance of ideal voltmeter is infinity and conductivity is zero.

   f) Among low range and high range voltmeters, high range voltmeter has more resistance.

   g) P.D. across the ends of voltmeter is, \( V = i_g(G+R) \)

   h) Resistance to be connected in series to galvanometer to convert into voltmeter is \( R = \frac{V}{i_g} - G \).

   i) To increase the range by \( n \) times,

   \[
   n = \frac{\text{new range}V_2}{\text{old range}V_1} = \frac{i_g(G+R)}{i_g(G)} = 1 + \frac{R}{G}
   \]

   Hence resistance to be connected in series to galvanometer is \( R = G(n-1) \).

   j) As series resistor value increases sensitivity decreases, accuracy increases