Lecture-3 Mobility & Temperature dependence of resistivity

✱ Mobility : Mobility μ defined as the magnitude of the drift velocity per unit electrical field

$$\mu = \frac{|\vec{v}_d|}{E}$$

SI unit is m^2/Vs

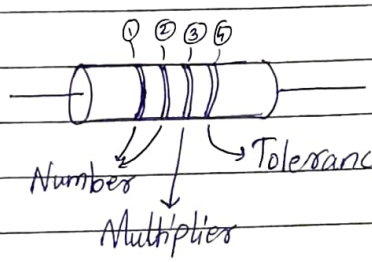
✱ Limitations of Ohm's law

(a) V ceases to be proportional to I

(b) Relation between V and I depends on the sign of V. For example, diode.

(c) The relation between V and I is not unique

✱ Colour Coding of Resistance



- 1st two bands indicate significant figures of resistance in ohms
- 3rd band indicates decimal multiplier
- 4th band stands for tolerance or possible variation

✱ Temperature Dependence of Resistivity

$$\rho_T = \rho_0 [1 + \alpha (T - T_0)]$$

$\alpha \rightarrow$ Coefficient of resistivity

$\alpha \rightarrow (\text{Temperature})^{-1}$

$\rho_T \rightarrow$ Resistivity at temperature T

$\rho_0 \rightarrow$ Resistivity at temperature T_0 (Reference temperature)

$$\rho = \frac{1}{\sigma} = \frac{m}{ne^2\tau}$$

$\sigma \rightarrow$ Conductivity