

Lecture-2 Drift Velocity and resistance

$$\star \bar{v}_d = -\frac{eE\tau}{m}$$

$$I\Delta t = \frac{e^2 A \tau n \Delta t |E|}{m}$$

$$I = |j| A \quad \text{where } j \rightarrow \text{Current density}$$

$$\therefore |j| = \frac{ne^2 \tau |E|}{m}$$

$$\vec{j} = \frac{ne^2 \tau}{m} \vec{E}$$

\star Conductivity (σ)

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

\star Ohm's Law

$$V \propto I \quad \text{where } V \rightarrow \text{Voltage}$$

$I \rightarrow \text{Current}$

$$V = RI$$

$R \rightarrow \text{Resistance}$

$$R \propto \frac{l}{A}$$

$A \rightarrow \text{Area}$

$$R \propto \frac{l}{A}$$

$l \rightarrow \text{Length}$

$\rho \rightarrow \text{Resistivity}$

$$\therefore R = \frac{\rho l}{A}$$

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