

$$pn = n_i^2$$

$$n + N_A = p + N_D$$

$$\sigma = q(p\mu_p + n\mu_n)$$

Semiconductor Conductivity

$$\frac{D_n}{\mu_n} = \frac{D_p}{\mu_p} = V_T = \frac{KT}{q}$$

Einstein Relationship

$$J_n = qn\mu_n E + qD_n \frac{dn}{dx}$$

Drift-Diffusion Current Density

$$J_p = qp\mu_p E - qD_p \frac{dp}{dx}$$

Drift-Diffusion Current Density

$$V_o = V_T \ln \left(\frac{N_A N_D}{n_i^2} \right)$$

pn-Junction Built-in Voltage

$$W = \sqrt{\frac{2\epsilon_s}{q} \left(\frac{1}{N_A} + \frac{1}{N_D} \right) (V_o + V_R)}$$

Depletion Layer Width in pn Junction

$$I = I_s (e^{\frac{V}{V_T}} - 1)$$

i-v Characteristic Equation of a Diode

$$r_d = \frac{V_T}{I_D}$$

Small Signal Resistance of a Forward Biased Diode

$$V_r = \frac{V_P}{fCR}$$

Ripple Voltage of a Half-Wave Rectifier

$$V_r = \frac{V_P}{2fCR}$$

Ripple Voltage of a Full-Wave Rectifier