**University Physics, 13/e**

**Young/Freedman**

**Chapter 27 Key Equations**

$$\vec{F} = q\vec{v} \times \vec{B} \quad \text{(magnetic force on a moving charged particle)} \qquad (27.2)$$

$$\Phi_B = \int B_\perp \, dA = \int B\cos\phi \, dA = \int \vec{B} \cdot d\vec{A} \quad \text{(magnetic flux through a surface)} \qquad (27.6)$$

$$\oint \vec{B} \cdot d\vec{A} = 0 \quad \text{(magnetic flux through any closed surface)} \qquad (27.8)$$

$$R = \frac{mv}{|q| B} \quad \text{(radius of a circular orbit in a magnetic field)} \qquad (27.11)$$

$$\vec{F} = I\vec{l} \times \vec{B} \quad \text{(magnetic force on a straight wire segment)} \qquad (27.19)$$

$$d\vec{F} = I d\vec{l} \times \vec{B} \quad \text{(magnetic force on an infinitesimal wire section)} \qquad (27.20)$$

$$\tau = IBA\sin\phi \quad \text{(magnitude of torque on a current loop)} \qquad (27.23)$$

$$\vec{\tau} = \vec{\mu} \times \vec{B} \quad \text{(vector torque on a current loop)} \qquad (27.26)$$

$$U = -\vec{\mu} \cdot \boldsymbol{B} = -\mu B\cos\phi \quad \text{(potential energy for a magnetic dipole)} \qquad (27.27)$$

$$nq = \frac{-J_x B_y}{E_z} \quad \text{(Hall effect)} \qquad (27.30)$$