University Physics, 13/e

Young/Freedman

Chapter 29 Key Equations

$$\varepsilon = -\frac{d\Phi_B}{dt} \quad \text{(Faraday's law of induction)} \tag{29.3}$$

$$\varepsilon = \upsilon BL \quad \text{(motional emf; length and velocity perpendicular to uniform } \vec{\boldsymbol{B}}\text{)} \tag{29.6}$$

$$\varepsilon = \oint (\vec{\upsilon} \times \vec{\boldsymbol{B}}) \cdot d\vec{\boldsymbol{l}} \quad \text{(motional emf; closed conducting loop)} \tag{29.7}$$

$$\oint \vec{\boldsymbol{E}} \cdot d\vec{\boldsymbol{l}} = -\frac{d\Phi_B}{dt} \quad \text{(stationary integration path)} \tag{29.10}$$

$$i_{\mathrm{D}} = \in \frac{d\Phi_E}{dt} \quad \text{(displacement current)} \tag{29.14}$$

$$\oint \boldsymbol{E} \cdot d\boldsymbol{A} = \frac{Q_{\mathrm{encl}}}{\in_0} \quad \text{(Gauss's law for } \boldsymbol{E}\text{)} \tag{29.18}$$

$$\oint \vec{\boldsymbol{B}} \cdot d\vec{\boldsymbol{A}} = 0 \quad \text{(Gauss's law for } \vec{\boldsymbol{B}}\text{)} \tag{29.19}$$

$$\oint \boldsymbol{B} \cdot d\boldsymbol{l} = \mu_0 \left(i_{\mathrm{C}} + \in_0 \frac{d\Phi_E}{dt} \right)_{\mathrm{encl}} \quad \text{(Ampere's law)} \tag{29.20}$$

$$\oint \vec{\boldsymbol{E}} \cdot d\vec{\boldsymbol{l}} = -\frac{d\Phi_B}{dt} \quad \text{(Faraday's law)} \tag{29.21}$$