Formula Sheet

$$\oint_C \mathbf{B} \cdot d\mathbf{l} = \mu_0 \int_S J \cdot da = \mu_0 I_{net}$$

$$\oint_C \mathbf{E} \cdot d\mathbf{l} = -\frac{d}{dt} \int_S \mathbf{B} \cdot d\mathbf{a} = -\frac{d\Phi}{dt} = emf$$

$$\oint_s \mathbf{E} \cdot d\mathbf{a} = \frac{q}{\varepsilon_0} = \Phi_e = \int E \cos\theta da$$

$$\oint_s \mathbf{B} \cdot d\mathbf{a} = \Phi_m = 0$$

$$B = \mu H = \mu_0 \mu_r H$$

$$\lambda = N \cdot \Phi$$

$$\Phi = N \cdot \frac{d\Phi}{dt} = \frac{d\lambda}{dt}$$

$$\lambda = f(i) = L(\cdot) \cdot i$$

$$F = Ni = H_c l_c = \frac{B_c l_c}{\mu} = \Phi \frac{l_c}{\mu A_c} = \Phi \Re_c$$

$$L_m = \frac{N^2}{\Re_m}$$

$$W_e = W_f + W_m = \int e_f i dt = W_f + \int f_m dx$$

$$\lambda i = W_f + W_c$$

$$f_m(i,x) = \left. \frac{\partial W_c(i,x)}{\partial x} \right|_{i=const}$$

$$f_m(i,\lambda) = \left. -\frac{\partial W_f(i,\lambda)}{\partial x} \right|_{\lambda=const}$$