

Formula sheet - Phys 272 Exam #2 - April 8, 2010

$$\vec{E} = -\vec{\nabla}V = -\left(\frac{\partial V}{\partial x}, \frac{\partial V}{\partial y}, \frac{\partial V}{\partial z}\right), E = -\frac{dV}{dx}, E = -\frac{dV}{dr}$$

$$U = \frac{1}{2} \sum_{i=1}^N q_i V_i, U = \frac{1}{2} \sum_{i=1}^N Q_i V_i$$

$$C = \frac{Q}{V}, U = \frac{1}{2} \frac{Q^2}{C} = \frac{1}{2} QV = \frac{1}{2} CV^2$$

$$u_E = \frac{1}{2} \epsilon_0 E^2$$

$$C_{\text{parallel}} = C_1 + C_2, C_{\text{series}} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}}$$

$$E = E_0 / \kappa, \epsilon = \kappa \epsilon_0$$

$$I = qn v_d A$$

$$R \equiv \frac{V}{I}, R = \frac{\rho L}{A}$$

$$P = IV = I^2 R = \frac{V^2}{R}$$

$$R_{\text{series}} = R_1 + R_2, R_{\text{parallel}} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$$

$$\tau = RC$$

$$\vec{F}_B = q\vec{v} \times \vec{B}, d\vec{F}_B = Id\vec{\ell} \times \vec{B}$$

$$R = \frac{mv}{qB}$$

$$\vec{\mu} = NIA\hat{n}, \vec{\tau} = \vec{\mu} \times \vec{B}, U = -\vec{\mu} \cdot \vec{B}$$

(continued on reverse side)

$$\vec{B}=\frac{\mu_0}{4\pi}\frac{q\vec{v}\times\hat{r}}{r^2},\;d\vec{B}=\frac{\mu_0}{4\pi}\frac{Id\vec{\ell}\times\hat{r}}{r^2}$$

$$\oint_{surface} \vec{B} \cdot \hat{n} dA = 0$$

$$\oint_{curveC} \vec{B} \cdot d\vec{\ell} = \mu_0 I_C$$

$$B\;=\;\frac{\mu_{\;0}\,I}{2\,\pi r}\;,\;B=\mu_0nI$$

$$\vec{M}=\frac{d\vec{\mu}}{dV},\;\vec{B}=\vec{B}_{external}+\mu_o\vec{M}\;, \;\vec{B}=\vec{B}_{external}\left(1+\chi_M\right)=K_M\;\vec{B}_{external}$$