Exam III Constants and Formulas

$\varepsilon_o = 8.85 \times 10^{-12}\ C^2/Nm^2$ $\mu_o = 4\pi \times 10^{-7}\ Tm/A$ $c = 3.00 \times 10^8\ m/s$

$$d \sin\theta = \begin{cases} m\lambda & (bright) \\ \left(m + \frac{1}{2}\right)\lambda & (dark) \end{cases} \qquad m = 0, 1, 2, 3.... \qquad W \sin\theta = m\lambda \quad \text{(dark)} \quad m = 1, 2, 3, ...$$

$D \sin\theta = 1.22\,\lambda$ $\theta_{min} \approx 1.22\,(\lambda/D)$

$d \sin\theta = m\lambda$ (principal maxima) m = 0, 1, 2, 3, . . .

$$\Delta t = \frac{\Delta t_o}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad L = L_o\sqrt{1 - \frac{v^2}{c^2}} \qquad p = \frac{mv}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad E_o = mc^2 \qquad KE = E - E_o$$

$$\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} = 1 + \frac{1}{2}\left(\frac{v^2}{c^2}\right) + \frac{3}{8}\left(\frac{v^2}{c^2}\right)^2 + \cdots \qquad \sqrt{1 - \frac{v^2}{c^2}} \approx 1 - \frac{1}{2}\left(\frac{v^2}{c^2}\right)$$

$$v_{AB} = \frac{v_{AC} + v_{CB}}{1 + \frac{v_{AC}v_{CB}}{c^2}}$$

$E = nhf$ $hf = KE_{max} + W_o$ $hf_o = \frac{hc}{\lambda_o} = W_o$ $hf = hf' + KE$

$\lambda = h/p$ $(\Delta p_y)(\Delta y) \geq \frac{h}{2\pi}$ $E_i - E_f = hf = hc/\lambda$ $L_n = mv_n r_n = n\frac{h}{2\pi}$

$E_n = -(2.18 \times 10^{-18}\ J)\frac{Z^2}{n^2} = -(13.6\ eV)\frac{Z^2}{n^2}$ $n = 1, 2, 3, ...$ $1\ eV = 1.6 \times 10^{-19}\ J$

$\ell = 0,\ 1,\ 2,\ \ldots\ (n-1)$ $m_\ell = -\ell, \ldots, -1, 0, 1, \ldots +\ell$

$$L = \sqrt{\ell(\ell+1)}\,\frac{h}{2\pi} \qquad L_z = m_\ell \frac{h}{2\pi} \qquad m_s = \pm\frac{1}{2} \qquad \lambda_o = \frac{hc}{eV}$$