Physics 2102 Final Exam Formula Sheet

$$eV_0 = hf - \phi$$

$$E_n = -\frac{hcR}{n^2} = -\frac{13.60 \text{ eV}}{n^2}$$

$$L_n = mv_n r_n = n\frac{h}{2\pi}$$

$$r_n = \varepsilon_0 \frac{n^2 h^2}{\pi m e^2} = n^2 a_0$$

$$v_n = \frac{1}{\varepsilon_0}\frac{e^2}{2nh}$$

$$eV_{AC} = hf_{\max}$$

$$\lambda' - \lambda = \frac{h}{mc}(1 - \cos\phi)$$

$$I = \sigma T^4$$

$$\lambda_m T = 2.90 \times 10^{-3} \text{ m} \cdot \text{K}$$

$$I(\lambda) = \frac{2\pi hc^2}{\lambda^5\left(e^{hc/\lambda kT} - 1\right)}$$

$$E_n = -\frac{Z_{\text{eff}}^2}{n^2}(13.6 \text{ eV})$$

$$E_b = \left(ZM_H + Nm_n - {}_Z^A M\right)c^2$$

$$N(t) = N_0 e^{-\lambda t}$$

$$T_{\text{mean}} = \frac{1}{\lambda} = \frac{T_{1/2}}{\ln 2}$$

$$d \sin\theta = m\lambda$$

$$\theta_1 = \frac{\lambda}{a}$$

$$\Psi(x,y,z,t) = \psi(x,y,z)e^{-iEt/\hbar}$$

$$-\frac{\hbar^2}{2m}\frac{d^2\psi}{dx^2} + U(x)\psi(x) = E\psi(x)$$

$$\psi(x) = Ae^{ikx} + Be^{-ikx}$$

$$\psi(x) = Ce^{\kappa x} + De^{-\kappa x}$$

$$E = \frac{\hbar^2 k^2}{2m}$$

$$E_n = \frac{n^2\pi^2\hbar^2}{2mL^2}$$

$$\psi_n(x) = \sqrt{\frac{2}{L}} \sin\frac{n\pi x}{L}$$

$$T = Ge^{-2\kappa L}$$

$$G = 16\frac{E}{U_0}\left(1 - \frac{E}{U_0}\right)$$

$$\kappa = \frac{\sqrt{2m(U_0 - E)}}{\hbar}$$

$$E_n = \left(n + \frac{1}{2}\right)\hbar\sqrt{\frac{k'}{m}}$$

$$E_l = l(l+1)\frac{\hbar^2}{2I}$$

$$I = \frac{m_1 m_2}{m_1 + m_2} r_0^2$$

$$\frac{1}{2}\dot{R}^2 - \frac{GM(R)}{R} = E$$