Physics 202 Formula Sheet for Young&Geller Chapters 26, 28, 29 (Exam 4)

Chapter 26

$r_2 - r_1 = m\lambda,\ m = 0, \pm 1, \pm 2, \ldots$ $\quad r_2 - r_1 = (m + \frac{1}{2})\lambda,\ m = 0, \pm 1, \pm 2, \ldots$

$d \sin\theta = m\lambda,\ m = 0, \pm 1, \pm 2, \ldots$ $\quad d \sin\theta = (m + \frac{1}{2})\lambda,\ m = 0, \pm 1, \pm 2, \ldots$

$y_m = R\dfrac{m\lambda}{d},\ m = 0, \pm 1, \pm 2, \ldots$ $\quad y_m = R\dfrac{(m + \frac{1}{2})\lambda}{d},\ m = 0, \pm 1, \pm 2, \ldots$

$2t = m\lambda,\ m = 0, 1, 2$ $\quad 2t = (m + \frac{1}{2})\lambda,\ m = 0, 1, 2$

$\sin\theta = \dfrac{m\lambda}{a},\ m = \pm 1, \pm 2, \pm 3, \ldots$ $\quad y_m = R\dfrac{m\lambda}{a},\ m = \pm 1, \pm 2, \pm 3, ..$

$2d \sin\theta = m\lambda,\ m = \pm 1, \pm 2, \pm 3, ..$ $\quad \sin\theta_1 = 1.22\dfrac{\lambda}{D}$ $\quad \theta_{\text{res}} = 1.22\dfrac{\lambda}{D}$

Chapter 28

$\frac{1}{2}mv_{\max}^2 = hf - \phi = eV_0$

$E = hf = \dfrac{hc}{\lambda}$ $\quad p = \dfrac{E}{c} = \dfrac{h}{\lambda}$ $\quad h = 6.626\times10^{-34}\ \text{J}\cdot\text{s} = 4.136\times10^{-15}\ \text{eV}\cdot\text{s}$

$hf = E_i - E_f$ $\quad hf = E_f - E_i$ $\quad \dfrac{1}{\lambda} = R\left(\dfrac{1}{2^2} - \dfrac{1}{n^2}\right)$ $\quad R = 1.097\times10^7\ \text{m}^{-1} = \dfrac{me^4}{8\varepsilon_0^2 h^3 c}$

$E_n = -\dfrac{hcR}{n^2} = -\dfrac{13.6\ \text{eV}}{n^2},\ n = 1, 2, 3, \ldots$ $\quad L = mvr = n\dfrac{h}{2\pi},\ n = 1, 2, 3, \ldots$

$r_n = \varepsilon_0\dfrac{n^2h^2}{\pi me^2}$ $\quad r_1 = 0.5293\times10^{-10}\ \text{m}$ $\quad v_n = \dfrac{1}{\varepsilon_0}\dfrac{e^2}{2nh}$ $\quad v_1 = 2.19\times10^6\ \text{m/s}$

$\varepsilon_0 = 8.854\times10^{-12}\ \text{C}^2/(\text{N}\cdot\text{m}^2)$ $\quad m = 9.109\times10^{-31}\ \text{kg}$ $\quad e = 1.602\times10^{-19}\ \text{C}$

$\Delta\lambda = \lambda' - \lambda = \dfrac{h}{mc}(1 - \cos\phi)$ $\quad \dfrac{h}{mc} = 2.426\times10^{-12}\ \text{m}$

$\lambda = \dfrac{h}{p} = \dfrac{h}{mv}$ $\quad \Delta x\Delta p_x \geq \dfrac{h}{2\pi}$ $\quad \Delta E\Delta t \geq \dfrac{h}{2\pi}$ $\quad \hbar = \dfrac{h}{2\pi} = 1.054\times10^{-34}\ \text{J}\cdot\text{s}$

Chapter 29

$L = \sqrt{l(l+1)}\hbar,\ l = 0, 1, 2, \ldots, n-1$ $\quad L_z = m_l\hbar,\ m_l = 0, \pm 1, \pm 2, \ldots, \pm l$

$S = \dfrac{\sqrt{3}}{2}\hbar$ $\quad S_z = s\hbar,\ s = \pm\frac{1}{2}$