PHYS 124: Particles and Waves

Formula sheet, Final Exam (May 26, 2006)

Feel free to complete the back with more formulas. No solutions allowed. This sheet will be collected together with your answers after the examination.

$\sin\theta = \frac{\text{opp}}{\text{hyp}}$ $\cos\theta = \frac{\text{adj}}{\text{hyp}}$ $\tan\theta = \frac{\text{opp}}{\text{adj}}$ $v = \frac{2\pi r}{T}$ $a_c = \frac{v^2}{r} = \omega^2 r$

$f_K = \mu_K F_N$ $W = Fs\cos\theta$ $\Delta PE \equiv -W_{\text{C}}$ $I = \frac{1}{2}MR^2$

$\Delta KE = W$ $PE_{\text{grav}} = mgh$ $g = 9.81\ \text{m/s}^2$ $PE_{\text{elastic}} = \frac{1}{2}kx^2$
$E = KE + PE$ $\Delta E = \Delta KE + \Delta PE = W_{\text{NC}}$ $KE = \frac{1}{2}mv^2$
$KE_{\text{rot}} = \frac{1}{2}I\omega^2$

$\theta = s/r$ $v_T = \omega r$ $a_T = \alpha r$ $180^\circ = \pi\ \text{rad}$
$\mathbf{J} = \bar{\mathbf{F}}\Delta t$ $\mathbf{p} = m\mathbf{v}$ $\mathbf{J} = \Delta\mathbf{p}$ $x_{\text{cm}} = \frac{m_1x_1+\cdots+m_Nx_N}{m_1+\cdots+m_N}$
$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$ $\omega = \omega_0 + \alpha t$ $\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0)$
$\tau = F_\perp r = Fr_\perp$ $\sum\tau = I\alpha$ $\sum\tau = 0$ $L = I\omega$

$F = -kx$ $E = \frac{1}{2}mv^2 + \frac{1}{2}kx^2 = \frac{1}{2}kA^2 = \frac{1}{2}mv_{\text{max}}^2$
$x = A\cos(\omega t)$ $v = -\omega A\sin(\omega t)$ $a = -\omega^2 A\cos(\omega t)$

$\omega = \sqrt{\frac{k}{m}}$ $\omega = \sqrt{\frac{g}{L}}$ $\log(ab) = \log a + \log b$ $\log(\frac{a}{b}) = \log a - \log b$

$v = \lambda f$ $T = \frac{1}{f}$ $\omega = 2\pi f$

$I = \frac{P}{A} = \frac{P}{4\pi r^2}$ $\beta = 10\log\frac{I}{I_0}$ $I = I_0\ 10^{\beta/10}$ $I_0 = 10^{-12}\ \text{W/m}^2$

$f_o = f_s\left(\frac{1\pm\frac{v_o}{v}}{1\mp\frac{v_s}{v}}\right)$ $v = \sqrt{\frac{F}{\rho}}$ $\rho = \frac{M}{L}$ $v \simeq 20\sqrt{T[^\circ K]}\ \text{m/s}$

$f_1 = \frac{v}{2L}$ $f_1 = \frac{v}{4L}$ $f_n = nf_1$ $f_{\text{beat}} = |f_1 - f_2|$

$\delta = m\lambda$ $\delta = (m + \frac{1}{2})\lambda$ $\delta = d\sin\theta$ $\theta_r = \theta_i$

$n = \frac{c}{v}$ $n_1\sin\theta_1 = n_2\sin\theta_2$ $\sin\theta_c = \frac{n_2}{n_1}$

$P = \frac{1}{f}$ $\lambda_n = \frac{\lambda}{n}$ $W\sin\theta = m\lambda$ $d\sin\theta = m\lambda$

$\tan\theta = \frac{y}{L}$