PHYSICS 212 **FORMULA SHEET** **Winter 2003**

$\rho = \frac{m}{V}$ $P = \frac{F}{A}$ $P = P_0 + \rho g h$ $B = \rho V g$ $Av = \text{constant}$

$P + \frac{1}{2}\rho v^2 + \rho g y = \text{constant}$ $y(x,t) = A\sin(kx - \omega t)$ $k = \frac{2\pi}{\lambda}$

$\omega = \frac{2\pi}{T} = 2\pi f$ $v = \frac{\omega}{k} = \frac{\lambda}{T} = \lambda f$ $v = \sqrt{\frac{T}{\mu}}$ $v = \sqrt{\frac{B}{\rho}}$

$f' = f\,\frac{v \pm v_O}{v \mp v_S}$ $f_b = |f_1 - f_2|$

$\lambda_n = \frac{2L}{n}$ $f_n = \frac{v}{\lambda_n} = n\frac{v}{2L}, \quad n = 1,2,3,\ldots$ $f_n = \frac{v}{\lambda_n} = n\frac{v}{4L}, \quad n = 1,3,5,\ldots$

$T_C = T - 273.15$ $T_F = \frac{9}{5}T_C + 32°F$ $\Delta L = \alpha L_i \Delta T$ $\Delta V = \beta V_i \Delta T$

$PV = nRT$ $Q = C\Delta T$ $Q = mc\Delta T$ $Q = mL$

$W = \int_{V_i}^{V_f} P\,dV$ $\Delta E_{\text{int}} = Q - W$

$Q = nC_V\Delta T$ $Q = nC_P\Delta T$ $\Delta E_{\text{int}} = nC_V\Delta T$

$C_P - C_V = R$ $PV^\gamma = \text{constant}$ $\gamma = \frac{C_P}{C_V}$

$e = \frac{W}{Q_h} = 1 - \frac{Q_c}{Q_h}$ $e_C = 1 - \frac{T_c}{T_h}$

$COP = \frac{Q_c}{W}$ $COP_C = \frac{T_c}{T_h - T_c}$ $\Delta S = \int_i^f \frac{dQ_r}{T}$ $\Delta S \geq 0$

$F_e = k_e\frac{|q_1||q_2|}{r^2}$ $\vec{\mathbf{E}} = \frac{\vec{\mathbf{F}}_e}{q_0}$ $\vec{\mathbf{E}} = k_e\frac{q}{r^2}\hat{\mathbf{r}}$ $\vec{\mathbf{E}} = k_e\sum_{i=1}^{n}\frac{q_i}{r_i^2}\hat{\mathbf{r}}_i = k_e\int\frac{dq}{r^2}\hat{\mathbf{r}}$

$\vec{\mathbf{F}}_e = q\vec{\mathbf{E}}$ $\Delta V = \frac{\Delta U}{q_0}$ $\Delta V = V_B - V_A = -\int_A^B \vec{\mathbf{E}} \bullet d\vec{\mathbf{s}}$ $V = k_e\frac{q}{r}$

$V = k_e\sum_{i=1}^{n}\frac{q_i}{r_i} = k_e\int\frac{dq}{r}$ $E_x = -\frac{\partial V}{\partial x}$ $E_y = -\frac{\partial V}{\partial y}$ $E_z = -\frac{\partial V}{\partial z}$

$U = k_e\frac{q_1 q_2}{r}$ $C = \frac{Q}{\Delta V}$ $C = \frac{\varepsilon_0 A}{d}$

$C_{\text{eq}} = C_1 + C_2 + C_3 + \ldots$ $\frac{1}{C_{\text{eq}}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \ldots$

$U = \frac{Q^2}{2C} = \frac{1}{2}C(\Delta V)^2$ $C = \kappa C_0$

$I = \frac{dQ}{dt}$ $R = \frac{\ell}{\sigma A} = \frac{\Delta V}{I}$ $\rho = \frac{1}{\sigma}$ $\mathcal{P} = I\Delta V$

$\mathcal{P} = I^2 R = \frac{(\Delta V)^2}{R}$ $R_{\text{eq}} = R_1 + R_2 + R_3 + \ldots$ $\frac{1}{R_{\text{eq}}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots$

$q = C\mathcal{E}\left(1 - e^{-t/RC}\right)$ $I = \frac{\mathcal{E}}{R}e^{-t/RC}$ $q = Qe^{-t/RC}$ $I = -\frac{Q}{RC}e^{-t/RC}$