AP Physics Midterm Exam Equations

Fluids, Heat, and Thermodynamics

$$\rho = \frac{m}{V}$$

$$P = \frac{F}{A}$$

$$P = \rho g h$$

$$\frac{F_i}{A_i} = \frac{F_o}{A_o}\left(F_o = F_i\frac{A_o}{A_i}\right)$$

$$F_B = \rho g V$$

$$P_1 + \rho g y_1 + \tfrac{1}{2}\rho v_1^{\,2} = P_2 + \rho g y_2 + \tfrac{1}{2}\rho v_2^{\,2}$$

$$\Delta L = \alpha L_0 \Delta T \quad *****$$

$$PV = nRT\ (PV = NkT)$$

$$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$$

$$n = \frac{m}{M} = \frac{N}{N_A}$$

$$KE_{ave} = \tfrac{3}{2}kT$$

$$Q = mc\Delta T\ (Q = nC_P\Delta T\ /\ Q = nC_V\Delta T)$$

$$Q = ml_v\ /\ Q = ml_f \quad *****$$

$$\Delta U = Q + W$$

$$\Delta U = \tfrac{3}{2}nR\Delta T$$

$$W = -P\Delta V$$

$$\varepsilon = \frac{W_{NET}}{Q_H} = 1 - \frac{Q_L}{Q_H}$$

$$\varepsilon_C = 1 - \frac{T_L}{T_H}$$

$$\Delta S = \frac{Q}{T}$$

$$\Delta S_{Univ} = \Delta S_{Sys} + \Delta S_{Env} > 0$$

Electrostatics

$$F = k\frac{q_1q_2}{r^2}$$

$$E = k\frac{Q}{r^2}\left(E = \frac{F}{q}\ /\ F = qE\right)$$

$$V = k\frac{Q}{r}\left(V_{ab} = \frac{\Delta PE}{q} = \frac{W_{\min}}{q}\right)$$

$$Q = CV$$

$$C = k\varepsilon_0\frac{A}{d} \quad *****$$

$$V = Ed$$

$$E = \tfrac{1}{2}QV = \tfrac{1}{2}CV^2 = \tfrac{1}{2}\frac{Q^2}{C} \quad *****$$

DC Electric Circuits

$$I = \frac{\Delta Q}{\Delta T}$$

$$R = \rho\frac{L}{A}$$

$$V = IR$$

$$P = IV = I^2R = \frac{V^2}{R}$$

$$R_{eq} = R_1 + R_2 + \ldots$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$$

$$V_{ab} = \varepsilon - Ir \quad *****$$

Magnetism

$$F = IlB\sin\theta$$

$$F = qvB\sin\theta$$

$$\tau = NBAI\sin\theta\ (\tau = NBAI\sin\omega t)$$

$$B = \frac{\mu_0}{2\pi}\frac{I}{R}$$

$$F_{12} = \frac{\mu_0}{2\pi}\frac{I_1I_2}{R}l$$

$$\phi = NBA\cos\theta\ [\phi = NBA\cos(\omega t)]$$

$$\varepsilon = -\frac{\Delta\phi}{\Delta t}\left[\varepsilon = NBA\omega\sin(\omega t)\right]$$

$$\varepsilon = Blv$$

$$V_S = \frac{N_S}{N_P}V_P \quad *****$$

$$I_S = \frac{N_P}{N_S}I_P \quad *****$$

***** You should be familiar with this equation, but I will give you on exam if needed