

PHY2048 Exam 3 Reference Sheet

Constants To Know

$$g = 9.80 \frac{m}{s^2}$$

$$J = N \cdot m$$

$$eV = 1.6 \times 10^{-19}$$

$$PE = mgh = (\text{mass})(\text{gravity})(\text{height})$$

$$KE = \frac{1}{2}mv^2 = kg \frac{m}{s^2} \cdot m \Rightarrow N \cdot m \Rightarrow J$$

$$E_{tot} = PE + KE = mgh + \frac{1}{2}mv^2 \Rightarrow \text{constant}$$

$$m_e = \text{Masa del electrón} = 9.11 \times 10^{-31} \text{ kg}$$

$$m_n = \text{Masa de neutrón-protón} = 1.67 \times 10^{-27} \text{ kg}$$

$$N_A = \text{Número de Avogadro} = 6.022 \times 10^{23} \text{ moléculas/mol}$$

$$k_B = \text{Constante de Boltzmann} = 1.38 \times 10^{-23} \text{ J/K}$$

Chapter 7 PPT Problems

$$\vec{F}_{ij} = k \frac{Q_i Q_j}{r_{ij}^2} \hat{r}_{ij} = \frac{1}{4\pi\epsilon_0} \frac{Q_i Q_j}{r_{ij}^2} \hat{r}_{ij} = Q_i \vec{E}_j$$

$$\vec{E}_i = k \frac{Q_i}{r_{io}^2} \hat{r}_{io}$$

$$V = k \frac{Q_i}{r_{oi}}$$

Chapter 7 Quiz

$$\lambda = \frac{q}{L} = \frac{dq}{dL}, dq = \lambda dL$$

$$\sigma = \frac{q}{A} = \frac{dq}{dA}, dq = \sigma dA$$

$$\rho = \frac{q}{V} = \frac{dq}{dV}, dq = \rho dV$$

Chapter 8 PPT Problems

Campo

$$d\vec{E} = k \frac{dq}{r_{do}^2} \hat{r}_{do}$$

$$\vec{E} = k \int \frac{\lambda dL}{r_{do}^2} \hat{r}_{do}, \vec{E} = k \int \frac{\sigma dA}{r_{do}^2} \hat{r}_{do}, \vec{E} = k \int \frac{\rho dV}{r_{do}^2} \hat{r}_{do}$$

$$\vec{E}_{linea} = \frac{1}{2\pi\epsilon_0} \frac{\lambda}{r} \hat{r}$$

$$\vec{E}_{placa} = \frac{\sigma}{2\epsilon_0} \hat{r}_\perp$$

$$\text{Entre placas opuestas } \vec{E}_{placas} = \frac{\sigma}{\epsilon_0} \hat{r}_\perp$$

$$E_i = -\frac{dV}{dx_i}; x_i = x, y, z$$

$$\vec{E} = -\vec{\nabla}V$$

Chapter 8 Quiz

Gauss

$$\Phi = \oint \vec{E} \cdot d\vec{A} = \frac{q_{enc}}{\epsilon_0}$$

Potencial

$$V = \frac{U}{q}$$

$$V = \vec{E} \cdot \vec{r}$$

$$V - V_o = - \int \vec{E} \cdot d\vec{l}$$

$$V = \frac{1}{4\pi\epsilon_0} \int \frac{dq}{r}$$

$$V = k \int \frac{\lambda dL}{r_{do}}, V = k \int \frac{\sigma dA}{r_{do}}, V = k \int \frac{\rho dV}{r_{do}}$$

Energía

$$\Delta U = - \int_a^b \vec{F} d\vec{l} = -q \int_a^b \vec{E} d\vec{l}$$

$$\Delta U = q \Delta V = -W_{ab} = qEl$$

Chapter 9 PPT Problems

$$C_o \frac{q}{V} = \frac{\epsilon_0 A}{d}, \text{ con dieléctrico } C = kC_o = \frac{k\epsilon_0 A}{d}$$

$$C_p = C_1 + C_2 + \dots + C_n = \sum_i^n C_i$$

$$C_s = 1/C_1 + 1/C_2 + \dots + 1/C_n = (\sum_i^n \frac{1}{C_i})^{-1}$$

$$E_{pot-elec} = U = \frac{1}{2}qV = \frac{q^2}{2C} = \frac{1}{2}CV^2$$

$$\mu = \frac{\epsilon_0 E^2}{2} = \frac{\epsilon_0 V^2}{2d^2} = \frac{U}{Volumen}$$

Chapter 9 Quiz

$$I = \frac{V}{R} = \frac{\Delta q}{\Delta t} = \frac{dq}{dt} = JA = \int \vec{J} \cdot \vec{A}$$

$$v_d = \frac{I}{nAe} = \frac{J}{ne} = a\tau = \frac{eE\lambda}{m}$$

$$R = \rho \frac{L}{A}, \rho = \frac{E}{J} = \frac{1}{\sigma} = \frac{m_e}{ne^2\tau}, \vec{J} = \sigma \vec{E} = -nev_d$$

$$R_s = R_1 + R_2 + \dots + R_n = \sum_i^n R_i$$

$$R_p = 1/R_1 + 1/R_2 + \dots + 1/R_n = (\sum_i^n \frac{1}{R_i})^{-1}$$

$$P = IV = I^2 R = \frac{V^2}{R} = \frac{dU}{dt}, dU = dqV_{ab} = IdtV_{ab}$$

Fuentes Campo Magnético

$$F = \frac{\mu_0}{2\pi} \frac{qvI}{r}$$

$$\vec{F} = q\vec{v} \times \vec{B}, F = qvB \sin\theta$$

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

$$\vec{F} = q\vec{E} + q\vec{v} \times \vec{B}$$

$$B = n\mu_0 I$$

$$\vec{F} = i\vec{l} \times \vec{B}$$

Cargas en Movimiento con Presencia de Campos

Biot-Savart

$$d\vec{B} = \frac{\mu_0}{4\pi} \frac{Id\vec{l} \times \vec{r}}{r^3}$$

$$B = \frac{\mu_0 I}{4\pi R^2} \Delta l_{arco}$$

$$B = \frac{\mu_0 I}{4\pi R} (\cos\theta_1 - \cos\theta_2)$$

Cargas en Movimiento

$$r = \frac{mv}{qB}$$

$$a = \frac{qvB}{m} = \frac{v^2}{r}$$