Formulas I Parcial

- Constantes

$$\epsilon_0 = 8.854 \times 10^{-12} C^2 N^{-1} m^{-2} \qquad k_e = 8.987 \times 10^9 N m^2 C^{-2}$$

$$m_e = 9.109 \times 10^{-31} kg \qquad m_p = 1.672 \times 10^{-27} kg$$

$$e = 1.602 \times 10^{-19} C \qquad N_A = 6.022 \times 10^{23} \text{partículas/mol}$$

- Definición de Variables en Sistemas Coordenadas.

$$\rho = \sqrt{x^2 + y^y} \qquad \phi = \arctan \frac{y}{x} \qquad z = z$$

$$r = \sqrt{x^2 + y^2 + z^2} \qquad \theta = \arctan \frac{\sqrt{x^2 + y^2}}{z} \qquad \phi = arctan \frac{y}{x}$$

- Matrices de Transformación de Coordenadas.

$$\begin{bmatrix} A_\rho \\ A_\phi \\ A_z \end{bmatrix} = \begin{bmatrix} \cos\phi & \text{sen}\,\phi & 0 \\ -\text{sen}\,\phi & \cos\phi & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} A_x \\ A_y \\ A_z \end{bmatrix}$$

$$\begin{bmatrix} A_x \\ A_y \\ A_z \end{bmatrix} = \begin{bmatrix} \cos\phi & -\text{sen}\,\phi & 0 \\ \text{sen}\,\phi & \cos\phi & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} A_\rho \\ A_\phi \\ A_z \end{bmatrix}$$

$$\begin{bmatrix} A_r \\ A_\theta \\ A_\phi \end{bmatrix} = \begin{bmatrix} \text{sen}\,\theta\cos\phi & \text{sen}\,\theta\,\text{sen}\,\phi & \cos\theta \\ \cos\theta\cos\phi & \cos\theta\,\text{sen}\,\phi & -\text{sen}\,\theta \\ -\text{sen}\,\phi & \cos\phi & 0 \end{bmatrix} \begin{bmatrix} A_x \\ A_y \\ A_z \end{bmatrix}$$

$$\begin{bmatrix} A_x \\ A_y \\ A_z \end{bmatrix} = \begin{bmatrix} \text{sen}\,\theta\cos\phi & \cos\theta\cos\phi & -\text{sen}\,\phi \\ \text{sen}\,\theta\,\text{sen}\,\phi & \cos\theta\,\text{sen}\,\phi & \cos\phi \\ \cos\theta & -\text{sen}\,\theta & 0 \end{bmatrix} \begin{bmatrix} A_r \\ A_\theta \\ A_\phi \end{bmatrix}$$

- Capítulo 23.

$$\vec{E} = \frac{\vec{F}}{q} \qquad \vec{F} = k_e \frac{q_1 q_2}{r^2} \hat{r_{12}} \qquad \vec{E} = k_e \frac{q}{r^2} \hat{r} \qquad \vec{E} = \sum_i k_e \frac{q_i}{r_i} \hat{r_i} \qquad \vec{E} = k_e \int \frac{dq}{r^2} \hat{r}$$

- Capítulo 24

$$\Phi = EA\cos\theta \qquad \Phi = \int \vec{E} \cdot d\vec{A} \qquad \Phi = \oint \vec{E} \cdot d\vec{A} = \frac{q_m}{\epsilon_0}$$

- Capítulo 25

$$\Delta V = \frac{\Delta U}{q} = -\int \vec{E} \cdot d\vec{s} \qquad \Delta V = -E\int ds = -Ed \qquad \Delta U = -q\int \vec{E} \cdot d\vec{s}$$

$$V = k\frac{q}{r} \qquad U = k\frac{q_1 q_2}{r_{12}} \qquad E_x = -\frac{dV}{dx} \qquad V = k\int \frac{dq}{r}$$

- Integrales Útiles

$$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a} \qquad \int \frac{dx}{\sqrt{a^2 + x^2}} = \log(x + \sqrt{x^2 + a^2})$$

$$\int \frac{xdx}{\sqrt{x^2 \pm a^2}} = \sqrt{x^2 \pm a^2} \qquad \int \frac{xdx}{\sqrt{a^2 - x^2}} = -\sqrt{a^2 - x^2}$$

$$\int \frac{dx}{(x^2 + a^2)^{3/2}} = \frac{x}{a^2\sqrt{x^2 + a^2}} \qquad \int \frac{xdx}{(x^2 + a^2)^{3/2}} = \frac{-1}{\sqrt{x^2 + a^2}}$$