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GUATEMALA  
FACULTAD DE INGENIERÍA  
ESCUELA DE CIENCIAS  
DEPARTAMENTO DE FÍSICA

ING. OSCAR TECUN

Física 2 P	Nota:
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AUX. ANDREA GARCIA	

TAREA

HOJA DE TRABAJO

EXAMEN CORTO

☐☒☐

No.  
4

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## Problema 1.

$$\vec{A} = 3\text{m}^2\hat{i} + 7\text{m}^2\hat{j}$$

$$\vec{E} = (4\hat{i} - 2\hat{j}) \text{ N/C}$$

$$\Phi_1 = ?$$

$$\Phi_1 = \vec{E} \cdot \vec{A}$$

$$\Phi_1 = (4)(3) + (-2)(7)$$

$$\Phi_1 = 12 + 14 = -2$$

$$\vec{A} = 3\text{m}^2\hat{i} - 7\text{m}^2\hat{j}$$

$$\vec{E} = (4\hat{i} - 2\hat{j}) \text{ N/C}$$

$$\Phi_2 = ?$$

$$\Phi_2 = \vec{E} \cdot \vec{A}$$

$$\Phi_2 = (4)(3) + (-2)(-7)$$

$$\Phi_2 = 12 + 14 = 26$$

$$\Phi_1 = -2 \text{ N/C} \cdot \text{m}$$

$$\Phi_2 = 26 \text{ N/C} \cdot \text{m}$$

## Problema 2:

$$r_1 = 0.02 \text{ m}$$

$$\Phi_E = \frac{q_{\text{enc}}}{\epsilon_0}$$

$$q_{\text{enc}} = \sigma A$$

$$\sigma = 4 \text{ nC/m}^2$$

$$q_{\text{enc}} = (4 \text{ nC/m}^2)(4\pi(0.02)^2)$$

$$q_{\text{enc}} = 2.011 \times 10^{-11} \text{ C}$$

$$\Phi_E = \frac{2.011 \times 10^{-11}}{8.854 \times 10^{-12}} = 2.27 \frac{\text{N} \cdot \text{m}^2}{\text{C}}$$

$$\Phi_E = 2.27 \frac{\text{N} \cdot \text{m}^2}{\text{C}}$$

## Problema 3:

$$\vec{E} = (8\hat{i} + 2\hat{j}) \text{ N/C}$$

$$\Phi_E = \vec{E} \cdot \vec{A}$$

$$\vec{E} = 8\hat{i} + 2(3)\hat{j}$$

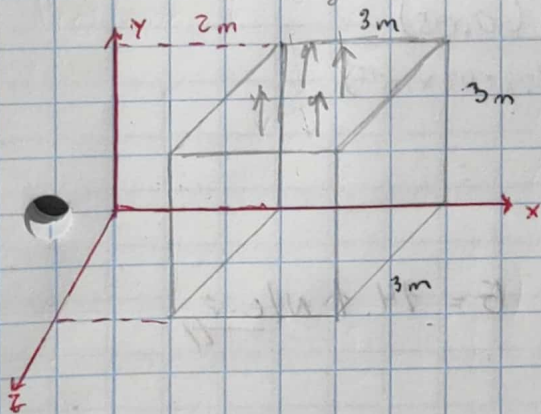
$$\vec{E} = 8\hat{i} + 6\hat{j}$$

$$\vec{A} = 3^2\hat{j} = 9\hat{j}$$

$$\Phi = (8)(0) + (6)(9)$$

$$\Phi = 54 \frac{\text{N} \cdot \text{m}^2}{\text{C}}$$

$$\Phi = 54 \frac{\text{N} \cdot \text{m}^2}{\text{C}}$$





Problema 4:

$$\rho = 5 \text{ nC/m}^3$$

$$R_1 = 6 \text{ cm}$$

$$R_2 = 10 \text{ cm}$$

$$r = 8 \text{ cm}$$

$$r = 15 \text{ cm}$$



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

$$\vec{E} = \frac{(5 \times 10^{-9}) \left( \frac{4\pi}{3} (0.08)^3 - \frac{4\pi}{3} (0.06)^3 \right)}{4\pi (0.08)^2 \cdot 8.8542 \times 10^{-12}}$$

$$\vec{E} = 8.71 \frac{\text{N}}{\text{C}} \hat{r}$$



$$\vec{E} = \frac{(5 \text{ n}) \left( \frac{4\pi}{3} (0.1)^3 - \frac{4\pi}{3} (0.06)^3 \right)}{4\pi (0.15)^2 \cdot 8.8542 \times 10^{-12}} = 6.56 \frac{\text{N}}{\text{C}} \hat{r}$$

$$\vec{E}_1 = 8.71 \text{ N/C } \hat{r}$$

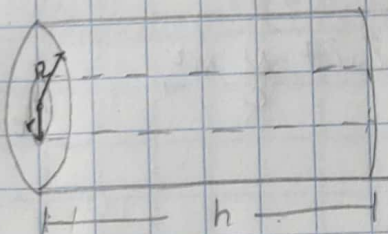
$$\vec{E}_2 = 6.56 \text{ N/C } \hat{r}$$

Problema 5:

$$R = 0.12 \text{ m}$$

$$\rho = 5 \text{ nC/m}^3$$

$$r = 0.05 \text{ m}$$



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

$$E(2\pi r h) = \frac{q_{enc}}{\epsilon_0}$$

$$\vec{E} = \frac{\rho r}{2\epsilon_0} = \frac{(5 \text{ n}) (0.05)}{2(8.8542 \times 10^{-12})}$$

$$E(2\pi r h) = \frac{\rho \pi r^2 h}{\epsilon_0}$$

$$\vec{E} = 14.1 \text{ N/C}$$

$$\vec{E} = \frac{\rho r}{2\epsilon_0} \hat{r}$$

$$E = 14.1 \text{ N/C } \hat{r}$$

Problema 6:

$$R = 0.12 \text{ m}$$

$$\rho = 5 \text{ nC/m}^3$$

$$r = 0.15 \text{ m}$$

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

$$q_{enc} = \rho \pi R^2 h$$

$$\vec{E} = \frac{\rho R^2}{2\epsilon_0 r} = \frac{(5 \text{ n}) (0.12)^2}{2(8.8542 \times 10^{-12}) (0.15)} = 27.1 \text{ N/C } \hat{r}$$

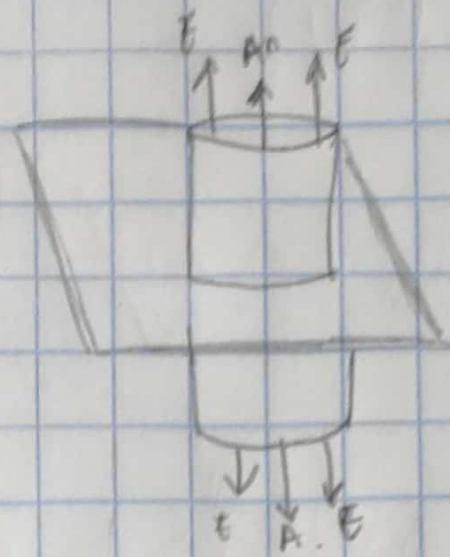
$$\vec{E} = 27.1 \text{ N/C } \hat{r}$$

Problema 7:

$$m = 10 \text{ g}$$

$$q = -0.700 \text{ nC}$$

$$V = ?$$



$$\begin{array}{c} \uparrow F_e \\ \downarrow mg \end{array}$$

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

$$\sum F_y = 0$$

$$F_e = mg$$

$$QE = mg$$

$$q \left( \frac{\sigma}{2\epsilon_0} \right) = mg$$

$$EA + EA = \frac{\sigma A}{\epsilon_0}$$

$$E = \frac{\sigma A}{2A\epsilon_0}$$

$$E = \frac{\sigma}{2\epsilon_0}$$

$$\sigma = \frac{mg(2\epsilon_0)}{q}$$

$$2EA = \frac{\sigma A}{\epsilon_0}$$

$$\sigma = \frac{2(10 \times 10^{-3})(9.8)(8.8542 \times 10^{-12})}{-0.7 \times 10^{-9}} = -2.48 \text{ nC/m}^2$$

$$\sigma = -2.48 \text{ nC/m}^2$$